Radomska Szkoła Wyższa w Radomiu

Radom University in Radom

Annual Reports of Education, Health and Sport 9781329876002

Edited by

Iwona Czerwińska Pawluk
Radosław Muszkieta
Marek Napierała
Walery Zukow

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Publishing House: Radomska Szkoła Wyższa w Radomiu, Radom University in Radom Str. Zubrzyckiego 2 26-600 Radom Tel.: +48 48 383 66 05 med.@rsw.edu.pl

Printing House: Radomska Szkoła Wyższa w Radomiu, Radom University in Radom Str. Zubrzyckiego 2 26-600 Radom Tel.: +48 48 383 66 05 med.@rsw.edu.pl

ISBN 9781329876002

Liczba znaków: 520 000 (ze streszczeniami i okładką). Liczba grafik: 70 x 1 000 znaków (ryczałt) = 70 000 znaków.
Razem: Liczba znaków: 590 000 (ze streszczeniami, okładką i grafikami) = 14,75 arkuszy wydawniczych.
Number of characters: 520 000 (with abstracts). Number of images: 90 x 1000 characters (lump sum) = 90 000 characters.
Total: Number of characters: 590 000 (with abstracts, summaries and graphics) = 14,75 sheet publications.

DOI http://dx.doi.org/10.5281/zenodo.45472

Content:

Introduction

We hope that a varied program of the **Annual Reports of Education, Health and Sport** will answer your expectations. We believe that the **Annual Reports of Education, Health and Sport** will contribute to raising the knowledge, skills and abilities of doctors, therapists, physiotherapists, nurses, psychologists, biologists, researchers, practitioners and health workers interested in rehabilitation, physiotherapy, tourism and recreation.

Annual Reports of Education, Health and Sport, corresponding to the modern challenges of global health specialists collect articles from those areas of the leading centers of renowned foreign and domestic. Many of them present state of art in their field. This will be particularly valuable for young doctors in the specialization, and students.

Welcome to familiarize yourself with this issue all relevant hazards and health, life and safety at work in tourism, recreation, rehabilitation, physiotherapy, nursing organization to work safely and missions in these conditions, the influence of environmental conditions on public health.

Authors from abroad and the country will present an overview of contemporary challenges and solutions in these areas. The issue concerns the text of the wider work for human health, tourism, recreation, physiotherapy, nursing, wellness and rehabilitation, including the economics of health care.

Radziminska Agnieszka, Srokowski Grzegorz, Bulatowicz Irena, Kazmierczak Urszula, Strojek Katarzyna, Baumgart Mariusz, Strzalkowski Daniel, Zukow Walery. Assessment of the pnf method influence on gait parameters improvement in persons with cerebral palsy = Ocena wpływu metody PNF na poprawę wybranych parametrów chodu u osób z mózgowym porażeniem dziecięcym. [in] Czerwińska Pawluk Iwona Ed., Muszkieta Radosław Ed., Napierała Marek Ed., Zukow Walery Ed. Annual Reports of Education, Health and Sport 9781329876002. RSW. Radom. 2013. 7-24. ISBN 9781329876002. 220 p.

Original Text published © The Author (s) 2012. Radziminska Agnieszka, Srokowski Grzegorz, Bulatowicz Irena, Kazmierczak Urszula, Strojek Katarzyna, Baumgart Mariusz, Strzalkowski Daniel, Zukow Walery. Assessment of the pnf method influence on gait parameters improvement in persons with cerebral palsy = Ocena wpływu metody PNF na poprawę wybranych parametrów chodu u osób z mózgowym porażeniem dziecięcym. Journal of Health Sciences. 2012;2(1):7-24. ISSN 1429-9623 / 2300-665X. Open Access Open Journal Systems of Radom University in Radom, Poland ISSN 1429-9623 / 2300-665X. 2012.

ASSESSMENT OF THE PNF METHOD INFLUENCE ON GAIT PARAMETERS IMPROVEMENT IN PERSONS WITH CEREBRAL PALSY

Ocena wpływu metody PNF na poprawę wybranych parametrów chodu u osób z mózgowym porażeniem dziecięcym

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Number of characters: 28 000 (with abstracts). Number of images: 14 x 1000 characters (lump sum)= 14 000 characters.
Total: Number of characters: 42 000 (with abstracts, summaries and graphics)=1,05 spreadsheets publishing.

Keywords: PNF method; gait parameters; cerebral palsy.

Abstract

Introduction: Cerebral palsy is a chronic syndrome, not progressive, but the evolving central nervous system disorders caused by brain damage before, during and after childbirth. The most common symptoms of cerebral palsy include motor dysfunction. Depending on the type of infestation they have different degrees of severity and location. Most are paresis of the trunk and limbs, usually a spasmodic, impaired balance and motor hyperactivity. Particular disorder is the lack or limitation of independent gait.

Aim and purpose: The aim of this study was to evaluate the effectiveness of the concept of PNF, proprioceptive neuromuscular paving work to improve the gait pattern in people (children and adults) with cerebral palsy. An additional objective was to assess the impact of therapy on: ranges of motion in the joints of the lower limbs, improving the activity of preparing for gait, pathological gait pattern change.

Methods of work: Study was conducted at the Centre for rehabilitation and hippotherapy Neuron Sp. z.o.o. in Małe Gacno rehabilitation during the stay. The study covered 20 people (9 girls, 11 boys), children and adolescents with different types of cerebral palsy traveling alone or with additional orthopedic. Participants in the experiment, based on your research before you start and end of treatment were carried out research: assessment of lower limb muscle tone by modified Ashworth scale (qualification test was used for therapy), assessment of mobility in the joints of the lower limbs, to assess the specific methods of PNF activity in preparation for walking, moving a distance of 20 meters with the measurement of its speed, Timed Up and Go Test, gait evaluation of selected parameters on the basis of the documentation DVD. Completed 10 therapy sessions (5 times per week) lasting 45 minutes each. Subjects were trained in accordance with the principles of PNF method. The common element of the exercise therapy were specific to the method of PNF activity conditional normal gait.

Results of our study: Detailed results of the study are presented in tables and graphs are illustrated.

Conclusions: 1st PNF therapy method by science-specific methods of preparing for the activity of walking, improves the control of posture, which results in improving the efficiency of gait in persons with cerebral palsy.

2nd The implementation plan of 10 therapy sessions of 45 minutes could not have improved ranges of active motion in the joints of the lower limbs, there was a change in the ranges of passive movements. No improvement could be the result of difficulties with the performance of isolated movements by people with cerebral palsy. 3rd The method used, a subjective assessment using the income from the stereotype of DVD material, proved to be very sensitive. Based on the collected materials, there was no change in walking pattern.

Słowa kluczowe: metoda PNF; parametry chodu; mózgowe porażenie dziecięce.

Streszczenie

Wstęp: Mózgowe porażenie dziecięce jest zespołem przewlekłych, nie postępujących, ale ewoluujących zaburzeń ośrodkowego układu nerwowego powstałych w wyniku uszkodzenia mózgu przed, po i w czasie porodu. Do najczęstszych objawów MPD należą zaburzenia czynności ruchowych. Zależnie od typu porażenia mają one różny stopień nasilenia i umiejscowienie. Najczęściej są to niedowłady tułowia oraz kończyn, zwykle typu kurczowego, zaburzenia równowagi, a także nadczynność ruchowa. Szczególnym zaburzeniem jest brak lub ograniczenie samodzielnego chodu.

Założenia i cel pracy: Celem pracy była ocena skuteczności koncepcji PNF, proprioceptywnego torowania nerwowo-mięśniowego w pracy nad poprawą wzorca chodu u osób (dzieci i dorosłych) z MPD. Dodatkowym celem była ocena wpływu terapii na: zakresy ruchomości w stawach kończyn dolnych, poprawę aktywności przygotowujących do chodu, zmianę patologicznego wzorca chodu.

Metodyka pracy: Badanie przeprowadzone zostało w Ośrodku rehabilitacji i hipoterapii „Neuron" Sp. z o.o. w Małym Gacnie podczas trwania turnusu rehabilitacyjnego. Badaniami objętych zostało 20 osób (9 dziewcząt, 11 chłopców), dzieci i młodzież z różnymi typami mózgowego porażenia dziecięcego poruszających się samodzielnie lub przy pomocy dodatkowego zaopatrzenia ortopedycznego. U uczestników eksperymentu, na podstawie karty badań, przed rozpoczęciem i na końcu terapii zostały przeprowadzone badania: ocenę stanu napięcia mięśni kończyn dolnych wg zmodyfikowanej skali Ashworth (Badanie służyło kwalifikacji do terapii), ocenę ruchomości w stawach kończyn dolnych, ocenę specyficznych dla metody PNF aktywności przygotowujących do chodu, przejście dystansu 20 metrów z pomiarem jego szybkości, Timed Up and Go Test, ocenę wybranych parametrów chodu na podstawie dokumentacji DVD. Zrealizowano 10 sesji terapeutycznych (5 razy w tygodniu) trwających 45 minut każde. Osoby badane ćwiczone były zgodnie z zasadami metody PNF. Wspólnym elementem terapii było ćwiczenie specyficznych dla metody PNF aktywności warunkujących prawidłowy chód.

Wyniki badań własnych: Szczegółowe wyniki przeprowadzonych badań przedstawiono w tabelach i zilustrowano wykresami.

Wnioski:

1. Terapia metodą PNF przez naukę specyficznych dla metody aktywności przygotowujących do chodu, wpływa na poprawę kontroli postawy ciała, której efektem jest poprawa efektywności chodu u osób z MPD.

2. Zrealizowanie planu 10 sesji terapeutycznych po 45 minut nie wpłynęło na poprawę czynnych zakresów ruchomości w stawach kończyn dolnych, doszło do zmian w zakresach ruchów biernych. Brak poprawy może być efektem trudności z wykonywaniem ruchów izolowanych przez osoby z MPD.

3. Zastosowana metoda, subiektywnej oceny stereotypu chody z wykorzystaniem materiałów DVD, okazała się mało czuła. Na podstawie zgromadzonych materiałów nie stwierdzono zmiany stereotypu chodu.

Introduction

Cerebral palsy is a chronic syndrome, not progressive, but the evolving central nervous system disorders caused by brain damage before, after and during childbirth.In Poland, children diagnosed with MPD, there are about 50,000, including 0.1-0.2% are school children. In nearly half of all intellectual development of children with CP did not differ significantly from the norm, "distinguished" physical handicap them.

The most common symptoms of MPD include motor dysfunction. Depending on the type of infection they have varying degrees of severity and location. The most common include the trunk and limb paresis, usually a spasmodic, impaired balance and motor hyperactivity. A particular type of disorder is the lack or limitation of independent gait.

Among the methods currently used in rehabilitation of children with CP seem to be leading Neurofacilitacji techniques, including PNF - proprioceptive neuromuscular priming - muscle. PNF concept takes into account the correct movement patterns paving the pelvis, shoulders, legs, torso and head, which influence the improvement of functions. Valid patterns are played in accordance with the principles and concepts using a wide range of techniques for working with patients.
PNF method is distinguished by specific exercises / activities in preparation for walking, which they are performed in a sitting position and standing, and are an integral part of gait re-education.

Many children with CP because of frequent spasms occur to reduce the mobility of the lower spine, joints, pelvis and hip joints. Abnormal muscle tone also causes a selective loss of muscle control and lack of balance between agonists and antagonists. This results, inter alia, inadequate asymmetric tilting of the pelvis and its poor rotation during gait. The steps are shortened, and the gait is not ergonomic pathological gait pattern and its intensity are dependent on the degree of damage to the CNS and its location. The great variety of clinical symptoms makes a division and classification of gait pathology in cerebral palsy is a very difficult and sometimes impossible.

The purpose and aim of work PNF concept is one of the most popular methods of neurorehabilitation, whose effectiveness has been repeatedly confirmed. One of the main elements of the concept is to work to improve the gait pattern.

Among the many therapists are convinced that the PNF method is a method intended only for adult patients. They forget that this is a method that could also very well check in the treatment of MPD, both adults and children. Appropriate application of basic principles and concepts PNF method of therapy to fit the patient's age can make the results of rehabilitation will be similar, and sometimes better than other feasible methods.

The aim of this study was to examine and evaluate the effectiveness of the concept of PNF in the group of school children with known MPD. Therapy was based on the above re-education. activity and assessing the impact of such a procedure to change the selected parameters of gait. The common element was the exercise of specific therapies for the PNF method
normal gait conditioning activity.

Questions and research hypotheses

Implementing the chosen target were raised following research questions:

- Question 1Do PNF therapy method improves the speed of gait in people with CP?
- Question 2Are improves postural control during gait?

It was assumed that:

- The hypothesis firstTherapy PNF method improves the speed of gait in patients with MPD.
- Second hypothesisTherapy PNF method improves the control of posture during walking.

Material and methods

Conditions of accession to the survey were:

- diagnosis of cerebral palsy,
- age 8-18 years,
- muscle tension of the lower limbs up to 2 points according to the modified Ashworth scale
- ability to independently move ≥ 20 feet (allowed use of orthopedic support).

The study was conducted from December 2009 to June 2010 the Centre for Rehabilitation and hippotherapy "Neuron" Sp. Ltd. in Little Gacnie rehabilitation during the stay.

The study included 20 people were (9 girls, 11 boys), children and adolescents with different types of cerebral palsy traveling alone or with additional orthopedic equipment. .

Research group were stratified by age (Figure 1), gender (Figure 2), form the MPD (Figure 3) and a way of moving (Figure 4)

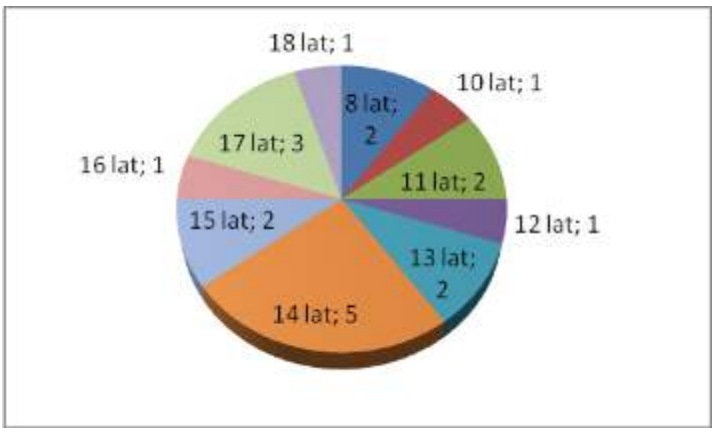

Fig. 1. The division of the research group because of their age.

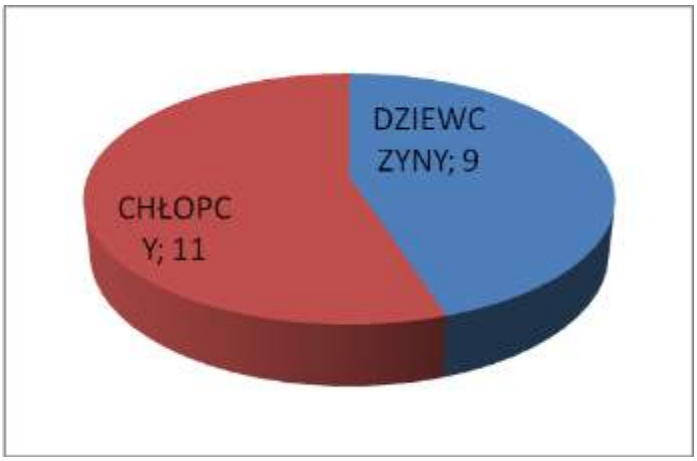

Fig. 2. Division research group based on sex.

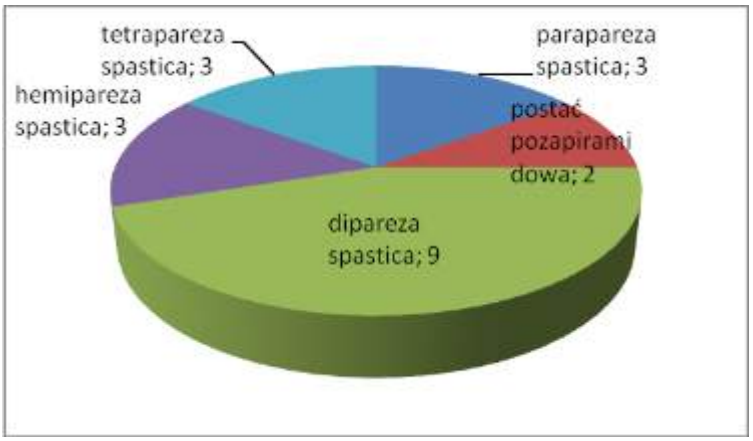

Fig. 3. The division of the research group because of the characters MPD

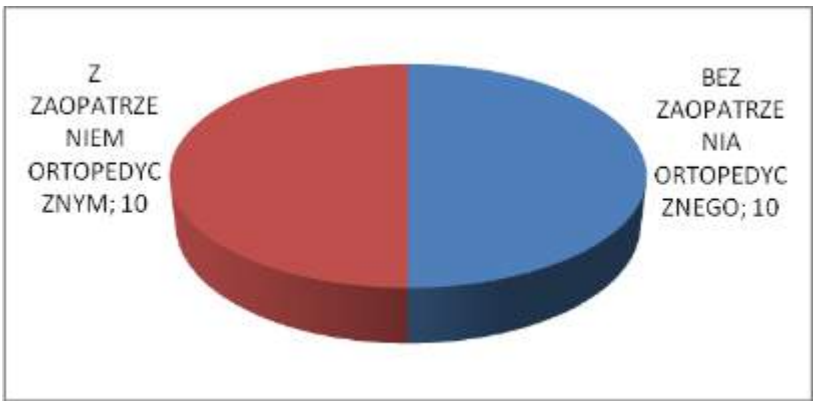

Fig. 4. The division of the research group because of the way of movement.

To assess the impact of improved methods of PNF on selected parameters of gait in people with cerebral palsy, both before and after treatment, were used:

Assessment of mobility in the joints of the lower limbs.Based on the examination goniometrycznego ranges are defined active and passive motion of the hip, knee.

Quantitative evaluation of gait - go the distance of 20 meters with the measurement of its speed

Assessment of postural control during gait - Timed Up and Go Test

Assessment of activity in preparation for walking - the specific methods of PNF activity for proper conditioning gait.

Evaluation of selected parameters of gait - observation and kinematic gait analysis based on the documentation DVD.

The procedure included 10 meetings physiotherapy treatment (5 times a week) lasting 45 minutes each. Subjects were trained in accordance with the principles of PNF method. Improving methods included specific activity PNF conditioning correct gait. These were:

in the sitting position: stabilizing position (sitting, active), symmetrical movements of the pelvis (Rocking), the movements of the head, neck, torso in the direction of flexion and extension, asymmetrical movements of the pelvis back and forth, a combination of shoulder and pelvic movements, movements of the torso in front of the detachment buttocks from the floor (standing up), back to siadu

in the standing position: to stabilize the position by approximation, diagonal movement of body weight (balance), able to stride, standing with one leg in the activity, walk forward, backward, sideways gait

exercise safely the fall

refresher training to move in with orthopedic,

science homework

Results

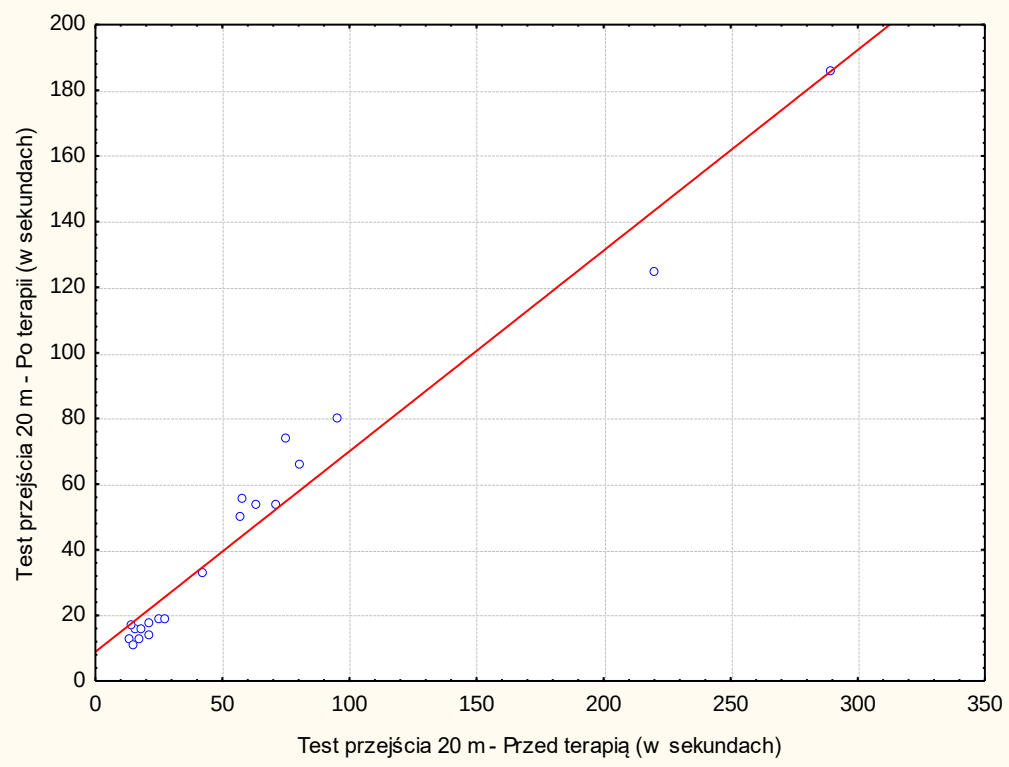

Fig. 5. Analysis of Test Results crossing 20 meters before and after the therapy. Scatterplot.

Figure 5 illustrates the comparison of the results of Test pass 20 meters before and after therapy. The form of scatter plot allows the assessment of individual patients as the results were far from each other. The average time the test before therapy was 61.9 seconds, with a standard deviation equal to 71.7. After therapy, the average time has been improved and amounted to 46.6 seconds, with deviation of 44.7. The extreme results were obtained by patients who, after treatment with sometimes overcame distance, respectively, the best - 11.26 seconds and the weakest - 186.3 seconds. Analysis of the results in Table 1 allows you to specify percentages largest and the smallest improvement in gait speed Test pass 20 meters. Summing up the transition time of 20 meters has improved in all patients.

Table 1. Analysis of Test pass rate times 20 meters before and after therapy.

Test switch 20 meters			
No test	Time before treatment (in seconds)	Time after treatment (in seconds)	The percentage improvement in time
1.	42.20	33.00	21.42%
2.	21.00	14.22	32.28%

3.	80.40	66.12	17.76%
4.	24.55	19.22	21.71%
5.	57.68	56.07	2.79%
6	57.00	50.27	11.80%
7.	13.34	12.78	4.19%
8.	288.81	186.30	35.49%
9.	16.35	15.92	2.62%
10.	21.12	17.85	15.48%
11.	94.60	79.58	17.87%
12.	17.14	14.44	15.75%
13.	26.62	18.87	29.11%
14.	70.66	54.05	23.50%
15.	14.67	11.26	23.24%
16.	75.12	74.02	1.46% least improvement
17.	63.00	54.00	14.28%
18.	17.39	12.87	25.99%
19.	220.00	125.00	43.18% the largest improvement
20.	17.87	16.00	10.46%

Figure 6 shows the comparison of test results Up and Go's before and after therapy. The form of scatter plot allows the assessment of individual patients as the results were far from each other. The average time the test before therapy was 84.9 seconds, with a standard deviation 89.9. After treatment has improved and amounted to 71.6 seconds, with a standard deviation of at 72.2. The extreme results were obtained by patients who, after treatment with the test done at times, respectively, the best - 17 seconds, and the weakest - 263.6 seconds. Analysis of the results in Table 2 allows you to specify percentages largest and the smallest improvement of execution speed Up and Go test.Execution Time Up and Go test improved in all patients.

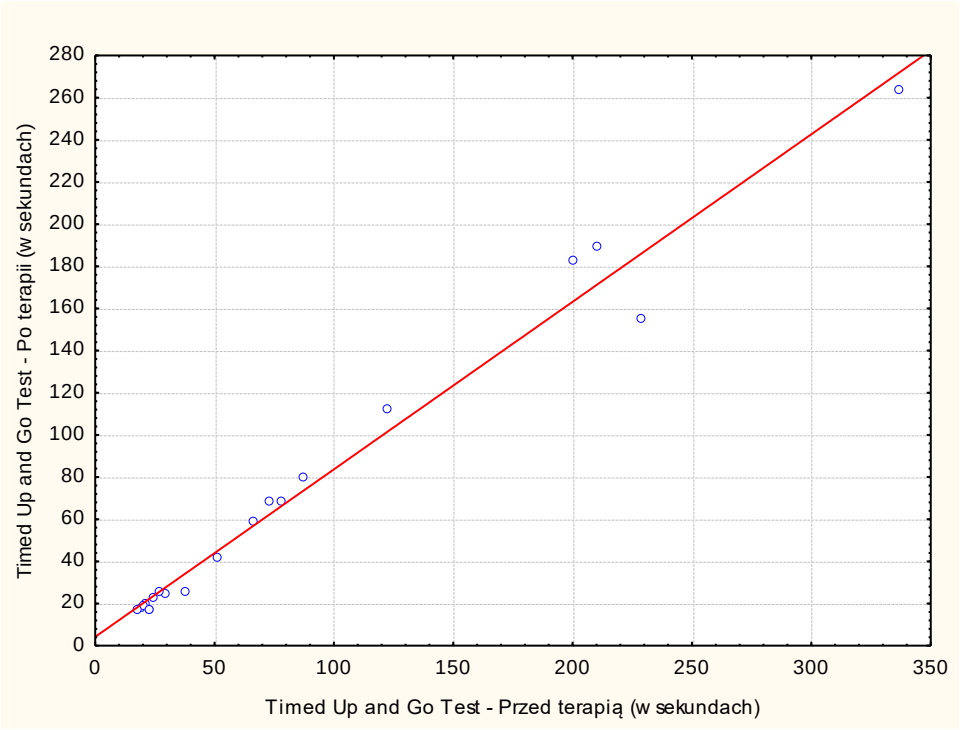

Fig. 6. Analysis of Results Up and Go Test before and after therapy. Scatterplot.

Table 2. Analysis of the percentage of times Up and Go test before and after therapy.

Timed Up and Go Test			
No test	Time before treatment (in seconds)	Time after treatment (in seconds)	The percentage improvement in time
1.	51.33	42.30	17.59%
2.	27.03	17.00	37.10% the largest improvement
3.	200.00	183.40	8.3%
4.	29.16	25.41	12.86%
5.	86.59	80.12	7.47%
6	66.00	58.89	10.77%
7.	19.27	18.06	6.27%
8.	337.12	263.62	21.80%
9.	20.70	20.04	3.18% least improvement
10.	26.70	25.85	3.18% least improvement

11.	209.67	190.30	9.23%
12.	8: 00 pm	7: 00 pm	5
13.	38.15	25.62	32.84%
14.	73.13	68.58	6.22%
15.	18.32	17.32	5.45%
16.	122.00	111.85	8.31%
17.	78.00	69.00	11.51%
18.	22.56	17.07	24.33%
19.	228.56	155.14	32.12%
20.	24.34	22.91	5.87

Figure 7 shows the improvement in the performance of specific methods of PNF activity in preparation for gait (patients do not benefit from orthopedic equipment: balls, sticks). Some patients improved or learned to perform new specific methods of PNF activity in preparation for walking.

The biggest difference is visible in the improvement of asymmetrical movements of the pelvis in the sitting position - 11 people, as well as symmetric motion pelvis - 6 patients. It is noteworthy that all patients after stabilization of therapy mastered the sit down position. Unable to influence gait in front and walk sideways - before and after therapy, 10 patients were able to

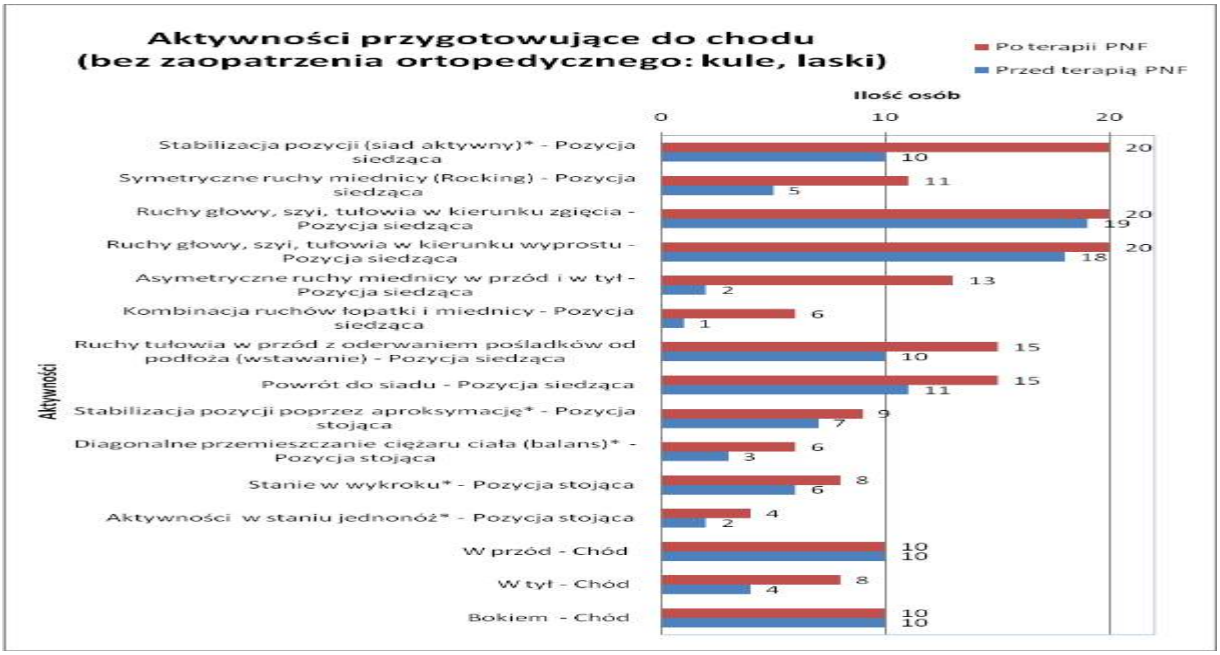

Fig. 7. Analysis of activity in preparation for walking before and after therapy.

Table 3. Averaged values of passive movements in different joints: the hip and knee-bends

POND	BEFORE THERAPY		AFTER THERAPY	
	STR. LAW	STR. LEFT	STR. LAW	STR. LEFT
Hip	60,5 ^{0}	62,9 ^{0}	63,5 ^{0}	64,1 ^{0}
Knee	104,9 ^{0}	107,6 ^{0}	106,1 ^{0}	109,2 ^{0}

Table 4. Averaged values of active movements in the hip joints – Flexion.

POND	BEFORE THERAPY		AFTER THERAPY	
	STR. LAW	STR. LEFT	STR. LAW	STR. LEFT
Hip	42.2	45.4	45	47.9

Visible improvements to mobility in the joints of the lower limbs occurred in few patients; clearest improvement concerned the movement: passive and active flexion in the hip joints (Table 3, 4)

Minimum bending outward stawnie right hip before treatment was 30 ^{0,} maximum 80 $^{0.}$On average, this range was 60.5 $^{0.}$After therapy, the minimum range is unchanged, while the maximum range increased by 8 ^{0} 88 ^{0} amounted to. Average range increased to 63.3 $^{0.}$Before therapy, the minimum bend outward left hip joint was 30 ^{0,} maximum 85 $^{0.}$On average, this range was 62.9 $^{0.}$After therapy, the minimum range is unchanged, while the maximum range increased by 8 ^{0} 88 ^{0} amounted to. Average range increased to 64.1 $^{0.}$The minimum range of active flexion of the hip, right before therapy was 10 ^{0,} maximum 79 $^{0.}$On average, this range was 42.2 $^{0.}$After therapy, the minimum active range of motion had improved and was 15 ^{0,} the range also increased the maximum and amounted to 85 $^{0.}$ Average range increased to 45 $^{0.}$The minimum range of active flexion of the hip left before treatment was 10 ^{0,} maximum 80 $^{0.}$On average, this range was 45.4 $^{0.}$After therapy, the minimum active range of motion had improved and was 17 ^{0,} the range also increased the maximum and amounted to 86 $^{0.}$ Average range increased to 47.9 $^{0.}$

The minimum range of passive flexion of the knee right before therapy was 60 ^{0,} maximum 150 $^{0.}$This range was an average of 104.9 $^{0.}$After therapy, the minimum has not changed, the maximum range is not increased. Increase was average and range of motion was 106.1 $^{0.}$The minimum range of passive flexion in the left knee prior to treatment was 62 ^{0,} maximum 145 $^{0.}$This range was an average of 107.6 $^{0.}$After therapy, the minimum and maximum range has not changed. Increase was average and range of motion was 109.2 $^{0.}$

The graph in Figure 8 shows the evaluation of gait pattern prior to treatment. Material DVD documented the patient move along the path with a length of 5 meters. Were evaluated in different phases of gait and marked with their correct [1] and abnormal [O] projects. Detailed results illustrated in Figure 9, 10.

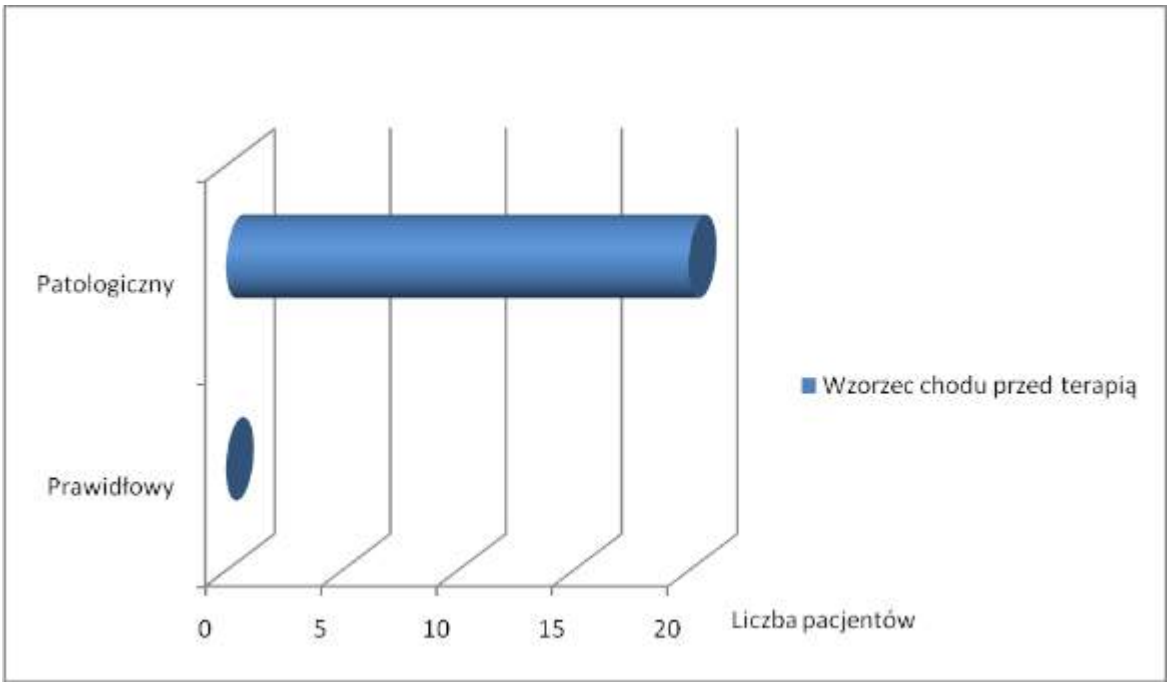

Fig. 8. Assessment of gait pattern prior to treatment.

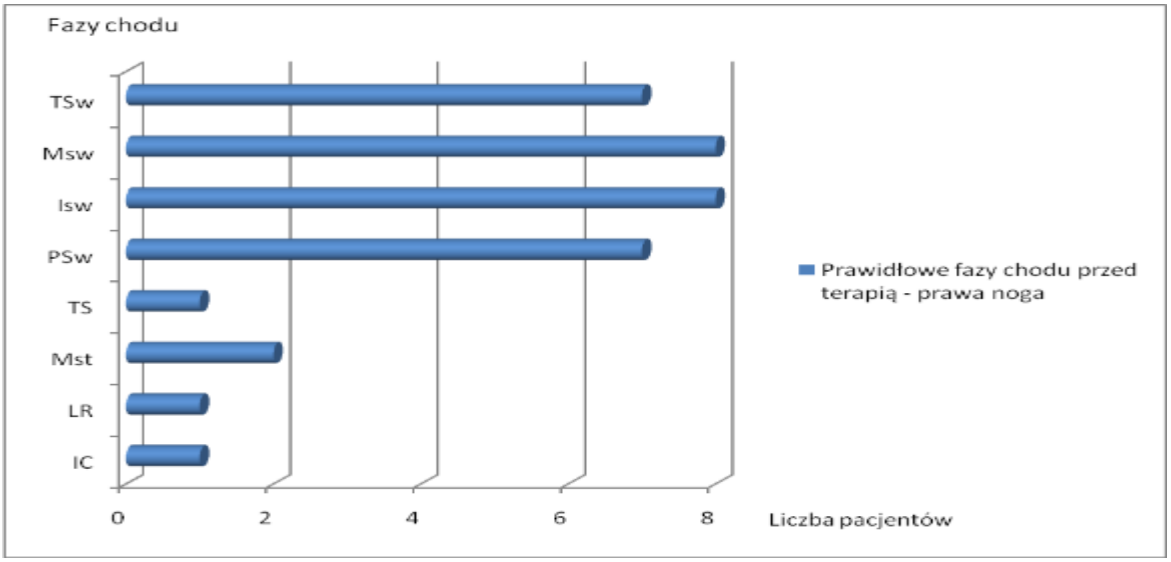

Fig. 9. Proper pre-treatment phase of gait for the right lower extremity.

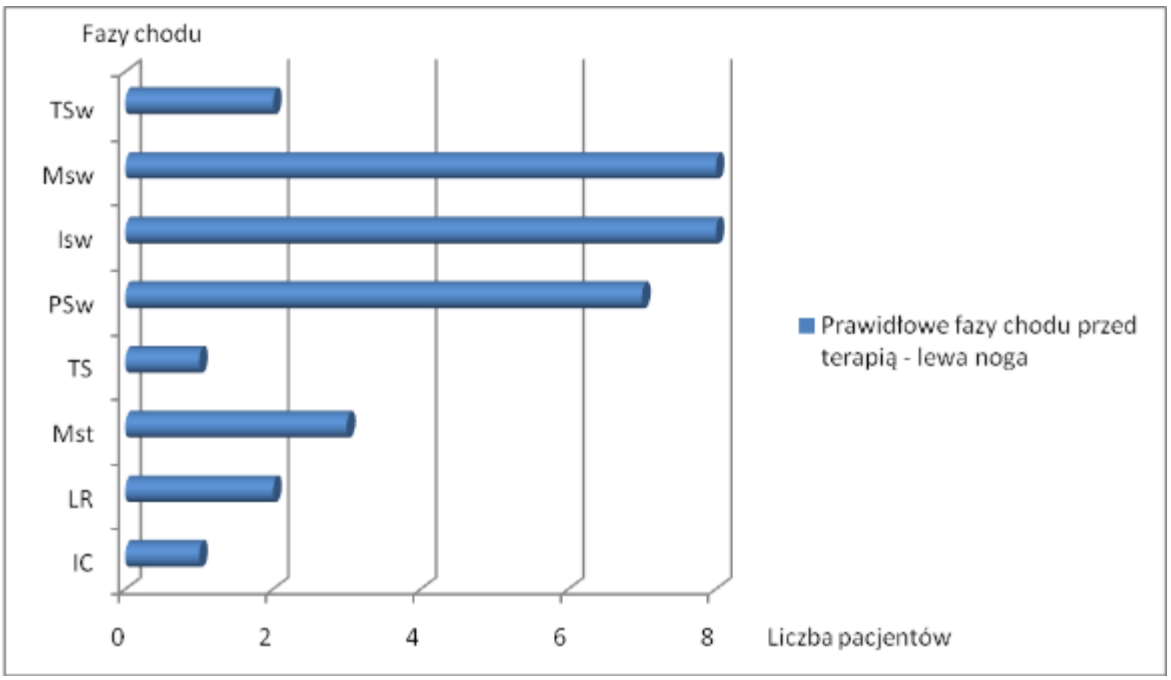

Fig. 10. Proper pre-treatment phase of gait for the left lower limb.

The graph in Figure 11 shows the evaluation of gait pattern after therapy. Evaluation was made by analyzing a DVD, which documented the patient's re-crossing the path of a length of 5 meters. As previously were evaluated phases of gait and marked their correct [1] and abnormal [O] projects. Then the results were compared with results of prior therapy. Detailed results of the engravings illustrate the re-examination 12.13.

The graphs of Figures 12 - 14 shows the results obtained from the analysis of re-recording DVD. They are identical with those obtained prior to treatment. It can be concluded that there was no visible improvement of gait pattern or stereotypical gait evaluation method proved to be too sensitive.

It may be noted that in most patients the most disturbed gait phases were:

- Phase IC - Initial Contact, heel contact with the ground,
- phase LR - Loading Response phase of depreciation,
- phase of the TS - Terminal Stance, transfusion,
- phase TSW - Terminal Swing, the final phase of the transfer.

This may be a consequence of inadequate range of motion in the drift rate of swing phase which is in most cases due to functional insufficiency of the tibialis anterior or triceps shortening of the calf.The reason may be in addition to the traffic restrictions lifted feet, insufficient range of knee extension in late swing phase, as well as inadequate control the selective movement of hip flexion, which should be linked to the movement of straightening the knee.

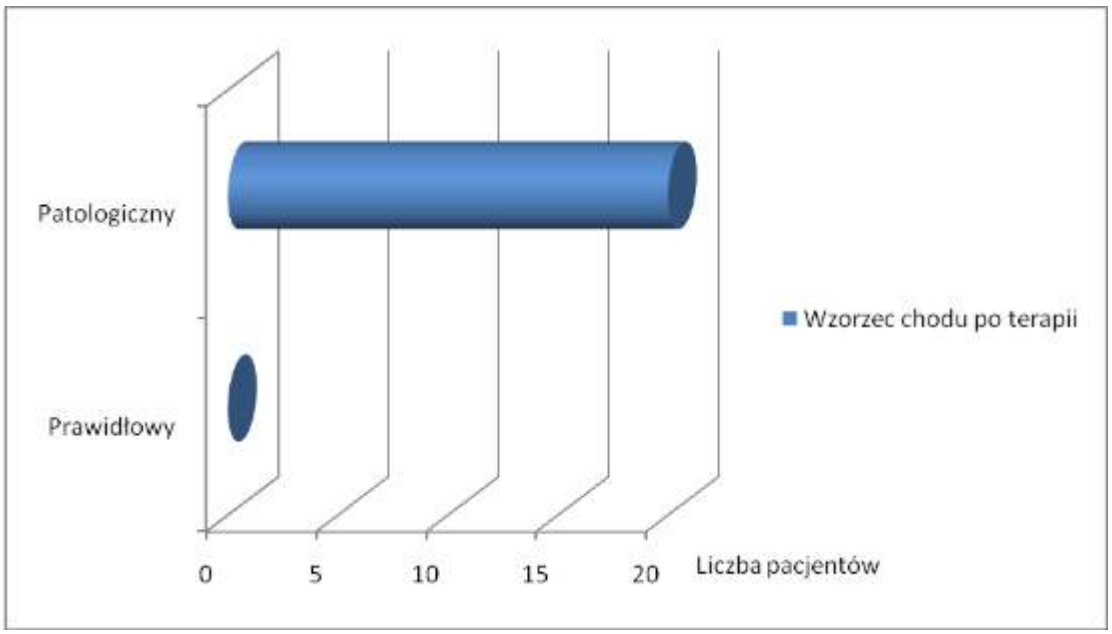

Fig. 11. Evaluation gait pattern after therapy.

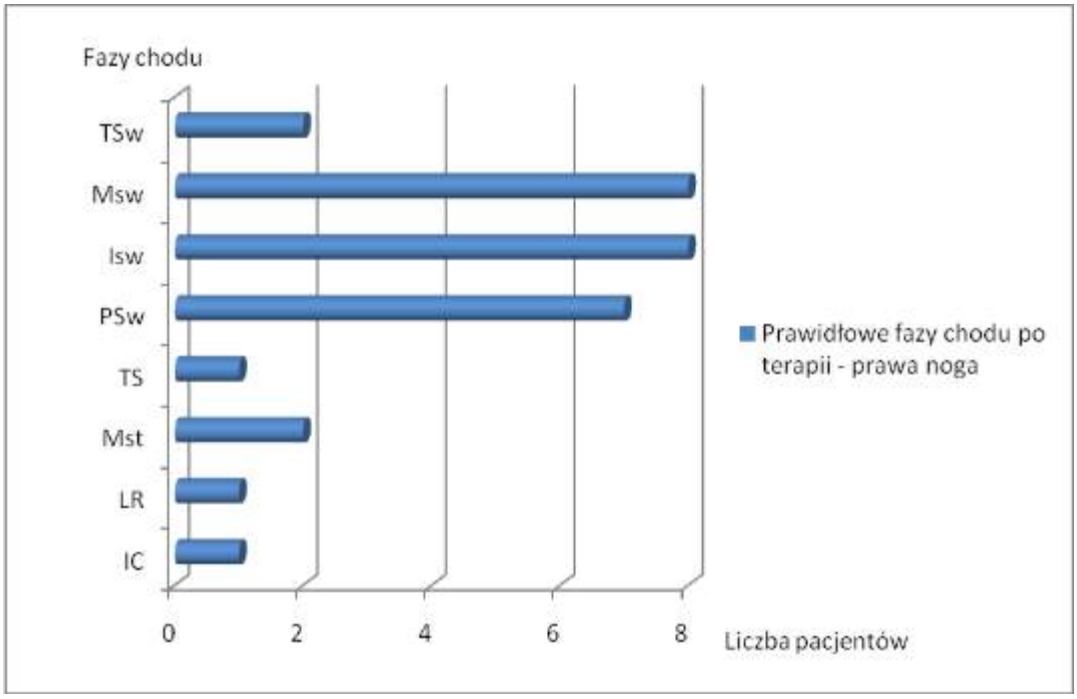

Fig. 12. The correct gait phase after treatment for right lower extremity.

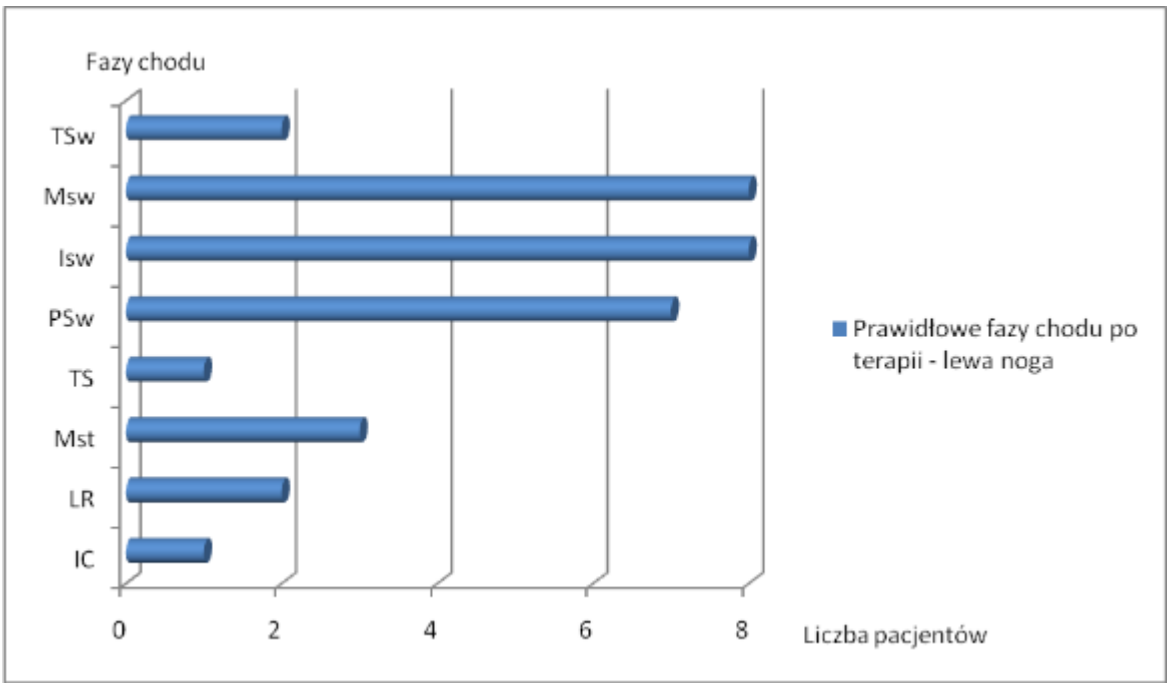

Fig. 13. The correct gait phase after treatment for the left lower limb.

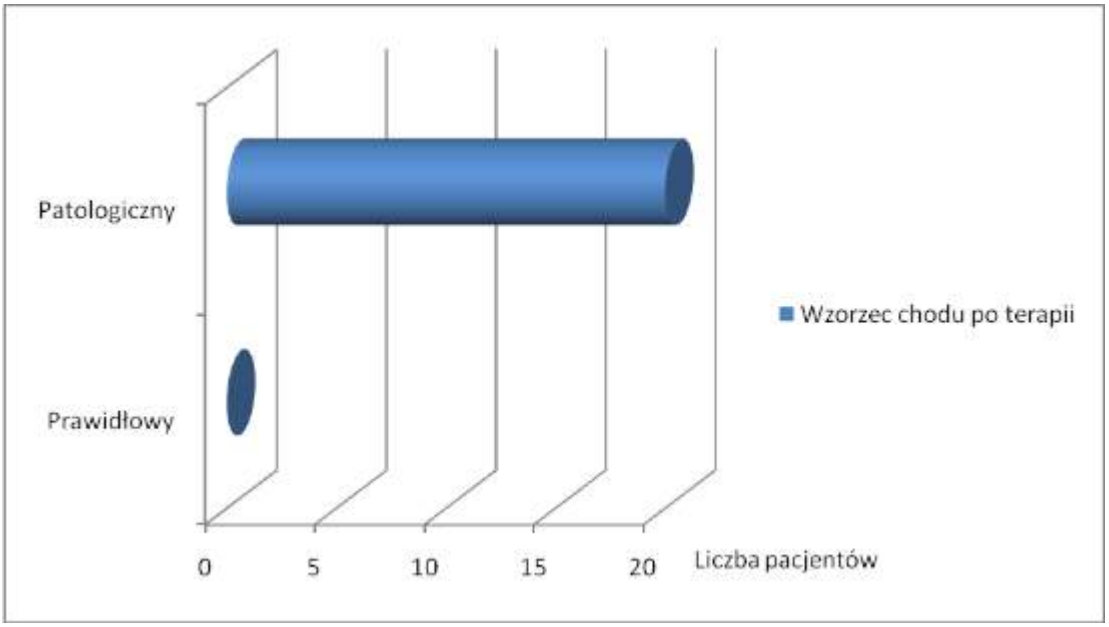

Fig. 14. Evaluation of gait pattern after therapy

Discussion

Walking is one of the most complex motor actions which man performs in everyday life. Perry and colleagues found that gait speed is associated with the possibility of obtaining better functionality and quality of life [7, 8].

General prevailing belief that the PNF method is a method intended only for older children or adults [8] is wrong. It is known that PNF techniques and philosophy are also suitable for the

treatment of neurological problems: reduction of spasticity, normalization of muscle tone, developmental delays overcome, rehabilitation after injury, cancer, podtopieniach [1, 9].

They forget that this is a method which had been originally used in the treatment of children with CP. It is true that in the past, goes to "great emphasis" on the application of maximum resistance during the movement, using it in many components of motion (patterns), which were based on primitive reflexes and posture reflexes [1]. This could lead to an increase in abnormal muscle tone. Nowadays, the prevailing thinking that the movement is the behavior that develops with motivation, emotion, perceived sensory experiences and cognitive processes. Today, more and more development goes in the direction of training at the level of activity and function for everyday activities and professional activities. In return, the plan was postponed further inhibition of "abnormal" reflex and facilitation of normal movement. Patient autonomy is always in the foreground, ie the quality of life is superior in quality traffic. If the therapist understand these principles, techniques, PNF can be equally effective or more effective than other known methods of treatment for both children and adults [1, 9]

Using the method of PNF in the treatment of children with CP in both the younger and older it is important not to forget that it should be adapted to their age. If necessary exercises should be done in a playful and have for a young patient understand the purpose [6]. Should be based on positive experience of exercise, which leads to increased motivation of the patient (hormone of happiness).This idea forms the core philosophy of PNF - the so-called positive strategy for the treatment [1, 9]. Only in this way you can discover the "hidden" in the child's functional capabilities.

Research shows that motor development in children with cerebral palsy is determined by anatomical location and area of damage to the CNS [10]. Many years of experience working with children with cerebral palsy suggest that the age of 6-7 years old child with a disability reaches its peak motor. Regardless of the method that was used, its functional state, the way of movement, movement patterns used, there are already changing for the better [4, 5]. In older children and young people lack access to rehabilitation, lack of exercise everyday, poorly conducted therapy leads to a reduction in overall efficiency, reached its peak motor.

We personally believe however, that the medical diagnosis ambiguously defines the functional capabilities of the patient. The use of appropriate therapy in conjunction with patient perseverance can sometimes amazing results regardless of age. We believe that this work is a proof of this.

The aim of this study was to examine and evaluate the effectiveness of the concept of PNF in the group of school children with known MPD. The common element was the exercise of

specific therapy for conditioning activity PNF method correct gait. 10 meetings have been made treatment (5 times a week) lasting 45 minutes each. After 2 weeks in a rehabilitation time of crossing 20 meters and the time of the test Up and Go improved significantly in all patients. These results suggest a positive effect on the rate of PNF therapy gait in patients with MPD and improving posture control. Some patients improved or learned to perform new methods of PNF-specific activity in preparation for walking. Failed to significantly improve the ranges of motion in the joints of the lower limbs.

Conclusions

Based on the analysis results of the study the following conclusions:

1. Therapy PNF method improves posture control, which results in the improvement of the efficiency of gait in patients with MPD.
2. The implementation plan for 10 therapy sessions of 45 minutes did not affect the improvement of the active ranges of motion in the joints of the lower limbs, there was a change in the ranges of passive movements. No improvement may be due to difficulty in performing isolated movements by people with MPD.
3. The method used, the subjective assessment of the stereotype of gait using DVD material, proved to be very sensitive. Based on the collected materials not found to change the stereotype of gait

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Original Text published © The Author (s) 2012. Radzimińska Agnieszka, Szyper Sebastian, Bułatowicz Irena, Srokowski Grzegorz, Kaźmierczak Urszula, Strojek Katarzyna, Kaliszewska Magdalena, Dzierżanowski Maciej, Zukow Walery. Prevention of flat feet in preschool children = Prewencja płaskostopia u dzieci w wieku przedszkolnym. Journal of Health Sciences. 2012;2(1):25-40. ISSN 1429-9623 / 2300-665X. Open Access Open Journal Systems of Radom University in Radom, Poland ISSN 1429-9623 / 2300-665X. 2012.

PREVENTION OF FLAT FEET IN PRESCHOOL CHILDREN
Prewencja płaskostopia u dzieci w wieku przedszkolnym

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Number of characters: 45 000 (with abstracts). Number of images: 10 x 1000 characters (lump sum)= 10 000 characters.
Total: Number of characters: 55 000 (with abstracts, summaries and graphics)=1,375 spreadsheets publishing.

Keywords: prevention; flat feet; preschool; faulty posture.

Abstract

Introduction: One of the most common defects in the foot is flat feet in children. The preschool should seek to increase the angle of Clarke's up to 6 years old, but very often we do not observe this phenomenon. This affects negatively the orthostatic accuracy of apparatus motion what the consequences are serious posture defects.
Objective: The aim of this study is to assess the attitudes of preschool children with particular emphasis on the development of lower limbs and feet. The essence of the need for prevention will allow accurate diagnosis with regard to attitudes evolution feet.
Material and Methods: The study was conducted on a group of 40 children, selected after an initial medical examination for the corrective and compensatory gymnastics. The Group has 19 girls and 21 boys aged from 3 to 7 years. Feet were checked by examination of podoskop. The assessment team needs a class in terms of deviations in the attitude of antibody method was used by Kasperczyk. In determining the type of attitude typology used by Brown and Staffel.
Results: The study group average angular Clarke's left foot was 35,15 degrees. For the right foot average was 31,95 degrees. Half of the units was characterized by a value of less than 35 degrees. Analysis of own studies showed a significant correlation between the index of the angle of Clarke's attitude survey by Kasperczyk and Wolanski.
Conclusions: flat feet often coexists with a small degree of posture (Kasperczyk). In simpler classifications, such as study companions Wolanski attitude described as evil. Younger children (3-4 years) have a smaller slope towards the feet, which is not always to be understood as a pathology of development. In older children (5-7 years), we observe a greater slope towards the foot.

Słowa kluczowe: prewencja płaskostopia, stopa plaska, płaskostopie przedszkolne, wady postawy.

Streszczenie

Jedną z najczęstszych wad stóp u dzieci jest płaskostopie. W wieku przedszkolnym powinno dochodzić do powiększania kąta Clarke`a aż do 6 roku życia, jednakże bardzo często nie obserwujemy tego zjawiska. Wpływa to negatywnie na ortostatyczną ścisłość aparatu ruchu, czego konsekwencjami są poważne wady postawy.

Cel: Celem pracy jest ocena postawy dzieci przedszkolnych ze szczególnym uwzględnieniem kończyn dolnych i rozwoju stóp. Istotę konieczności stosowania prewencji umożliwi dokładna diagnoza postawy z uwzględnieniem ewaluacji stóp.

Materiał i Metody: Badania przeprowadzono na grupie 40 dzieci, zakwalifikowanych po wstępnej analizie lekarskiej do programu gimnastyki korekcyjno-kompensacyjnej. Grupa liczy 19 dziewcząt i 21 chłopców w wieku od 3 do 7 lat. Stopy skontrolowano dzięki badaniu podoskopowemu. W ocenie potrzeb zespołu klasowego pod kątem przeciwdziałania odchyleniom w postawie ciała posłużono się metodą wg Kasperczyka. W określeniu typu postawy zastosowano typologię wg Browna oraz Staffela.

Wyniki: W badanej grupie średni wskaźnik kątowy Clarke'a stopy lewej wyniósł 35,15 stopnia. Dla stopy prawej wartość średnia wyniosła 31,95 stopnia. Połowa jednostek cechowała się wartością mniejszą niż 35 stopni. Analiza badań własnych, wykazała istotną zależność pomiędzy wskaźnikiem kąta Clarka`e a badaniem postawy wg Kasperczyka i Wolańskiego.

Wnioski: Płaskostopie bardzo często współistnieje z wadami postawy niewielkiego stopnia (Kasperczyk). W prostszych klasyfikacjach takich jak badanie Wolańskiego towarzyszy postawie określanej jako zła. Młodsze dzieci (3-4 lat) posiadają mniejsze wysklepienie stóp, co nie zawsze powinno być pojmowane jako patologia rozwoju. U dzieci starszych (5-7 lat) obserwujemy większe wysklepienie stopy.

Introduction

The foot is extremely important for humans because of its functions in general locomotion, the support and cushioning throughout the body. Historically, the natural environment in the form of varied terrain forced her to continuous operation and proper development of its structure. In these times of tough urban conditions, ie bituminous substrates combined with poor footwear lead to numerous deformities and pathological formation of arch over feet in children. [1].

Considering the whole foot biomechanics consider the movements and ranges of many joints comprising it. Performance of the whole structure is dependent on the rate of stabilizers steps active - passive and from the above-mentioned permanent bone architecture. [2, 3].

Great importance to the smooth functioning of joint leaps is the ankle, or talocrural joint. Belongs to a group of hinge joints, which work through the thigh muscle is able to bend the dorsal and plantar foot. These movements are made about the transverse axis, which crosses both the ankle and the medial side. Thanks to the above axis forms an angle of 82º with the axis of the tibia shaft. From the position of functional interest, or such in which it is set parallel to the substrate to form an angle of 90° from the shin, is it possible to snap (for foot unweighted) to 20° - 30° and flexion to 40° - 50°. Under full load the leg bending backward with the foot forms an angle of 50° and the forward angle of 30°. [3, 4].

According Dziak [5] the band plantar flexor muscles of interest include the following: gastrocnemius, mantleable, tibialis posterior, and the dorsal flexor muscles of the team: tibialis anterior, rectifier long fingers, third sagittal.

The potency of rectifiers is four feet lower than the flexor. While maintaining good posture must be maintained balance between extensor and flexor muscles, because they teeter on the shin pad of the talus. Positioning of the foot during gait in which forces continued its correction by means of muscles. [3, 4, 5].

The potency of rectifiers of the foot is fourfold lower than of flexors. At keeping the good posture of the body kept a balance must be between muscles of rectifiers but flexors, because the

shin balances on the block of the talus. During the walk placing the base oneself what extorts constant her correction with the help of muscles. [3, 4, 5].

Another joint, which affects the function of the foot is joint the ankle-calcaneal-navicular. In it movements of turning away both converting, dissuading and driving ace well ace bending and straightening the foot out occur. These moves interface with themselves and visiting and straightening the foot out harmonizes with converting, and driving and bending accompanies turning away. While walking hey different base thanks it these moves the foot is able perfectly it accommodate itself. The axis in this joint spends feet running from the calcanean tuber it the paracentral side. In rank feet among muscles which participate in the supination: flat tibial front, flat long flexor of digits, flat tibial back, flat the long flexor of the hallux and the Achilles tendon, and and flat participates in the pronation fibular debts, flat fibular short, flat long extensor of the hallux and the flat long extensor of digits. In the correctly educated foot moves of converting and turning away exalt about 30º. Movements in all tarsal-metatarsal joints firmly are limited and adapt the arch of the foot it base. [3, 4, 5].

Movements in ponds between phalangeal and metatarsal-digital have picking uneven base up for the task. In metatarsal-phalangeal joints they are taking movements of the dorsiflexion out about 60 °, and moves of the plantar flexion 30º. The hallux at the foot cannot make moves to side. His function is based on strong driving to base. In the position rest in such a way that digits of feet are standing in metatarsal-phalangeal ponds are bent dorsal, and in joints between phalangeal closer and more distant in the plantar flexion (shape of talons). While burdening front for foot during the walk interosseous muscles plantar are setting metatarsal bones altogether digits, as well as heads. However they are deployed during very contact of the heel with base (a charge is missing). [3, 4, 5].

A flat foot is one of the most frequent defects in bases (Fig. 1). The large percentage out of all deformations has character of the acquired vice. The flat foot consists in lowering insteps (oblong and crosswise). Abundance of factors predisposing flat feet to the formation so as wearing the bad footwear, overloading feet caused by the excess weight or inappropriate habitual standing or walking causes that it is hard to save children from the major defect a flat foot is which. [6, 7].

At children to about 4 the year of age is being observed so-called seeming flat foot or differently called the early-child's flat foot. The seeming triggered flat foot is a presence at the child of a lot of an underlayer of fat, with the faint work of the muscles holding insteps and with walk on widely deployed bases. At children in century 4 - 5 years the early-child's flat foot should disappear. [5, 8]. The nursery school age is a very important period in the development and shaping correct topping with a vaulted roof feet at children. Age is a stage of the dynamic psychomotor evolution, experiencing new sensations and the ability. At that time it should reach for enlarging the angle Clarke's all the way to 6 of year of age, unfortunately very often we don't observe this phenomenon. [9, 10].

The foot is already exposed to deformations from 7 of month of the life. Very often fast forcing by parents a standing position at the child causes the market, that to the poor distortion is still seeking the skeleton of the foot. It isn't possible to hasten correct stages of the development of the ontogenic child. At the child in the baby century seating it on the edge of the bed, or chairs are other mistake which largely is contributing to the malformation of the foot this way, that the edge of base is pressing down on the popliteal fossa. Such a position is bringing consequences in the form of the fainter blood supply to muscles shaping the foot, of what weakening them is a result. The pre-school malformation of feet is caused also through wearing the unsuitable footwear, of long staying

on bad ground (courts poured out with concrete) or of bad nourishing. [5, 11]. An elimination is lacking factors predisposing to the creation of the talipes planus, as well as not-controling the development for her is triggering the progress bone-articular deformations. It influences negatively, peculiarly the orthostatic accuracy of the system of the move in the pre-school period, of what grave abnormal spinal curvatures and silhouettes are consequences. [1, 6]. Pre-school substantial changes are also very much occurring in the psychomotor development of the child. The aspiration to the perfection at the motor efficiency is getting the child thanks to the great coordination. [12, 13].

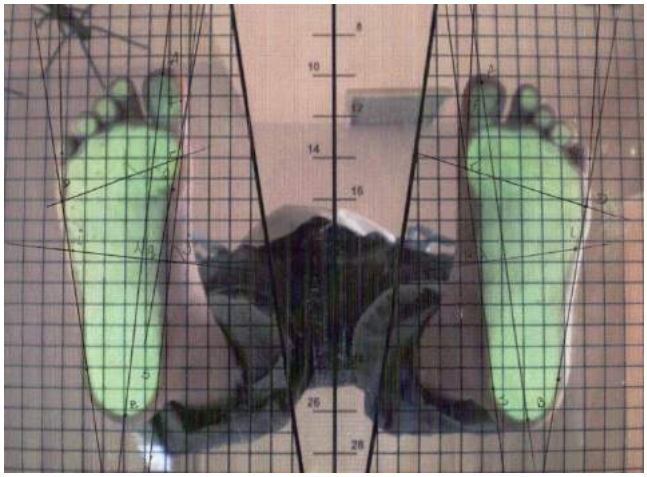

Figure 1. Plantoconturogramme flat feet [slide own]

Prevention of defects of interest is most effective during childhood. If it is not used to perpetuate the disease and carries a heightened impact and irreversible in the form of advanced deformity and pain. [14].

In terms of prevention should be involved in addition to the teacher and gymnastics instructor, also a parent. It is important that the prevention program was also used in the home. This ensures continuity and comprehensiveness of treatment. Parents have a responsibility observation and possible intervention when a child does not attend the classes to any educational institution. [15, 16].

For the prevention of flat foot include the use of proper footwear, proper maintenance of physical activity and proper way of life, education of parents and children, working on the consolidation of the normal habits of proper loading of the foot. [1, 15, 16, 17].

Suitable footwear in its preventive effect by using a special type of heel prevented the foot twisting out of shape Thomas heel, and forefoot brings. Prophylactic footwear in no way could hurt the foot. To rate could develop in a proper manner shoes child must have a rigid heel counter, soft and flexible sole, high lacing, which does not oppress the back foot and a high front, which will not restrict the free movements of the fingers. [3, 5, 17, 18].

Learn proper foot loading during walking and standing is also important in preventing a form of flat feet. Fig. 2.

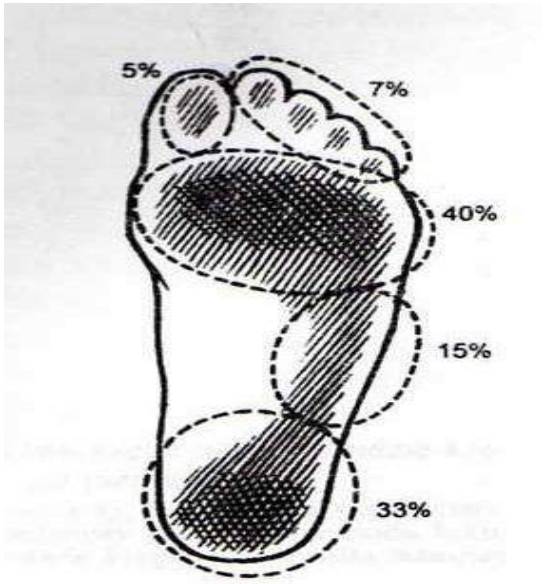

Figure 2. Schematic of the load of individual human foot plantar surface in the standing position [19].

Correct rates are located in relation to each other in parallel. It allows for symmetrical distribution of weight on both lower limbs. During the gait should be paid special attention to the way the load of the foot. It should be gradual. The first contact with the ground initiates the heel, metatarsal and then the latter is the forefoot. The last phase is a reflection of feet from the ground using your fingers. This sequence allows for alternating and muscles to work effectively. [3, 18].

Maintaining adequate physical activity, along with caring for a healthy lifestyle to prevent distortion of the feet (Fig. 3). Already in childhood and have fun walking barefoot on natural ground that is grass or sand allow the child to unfettered movement in the joints of the foot. Swimming also allows free movement in the joints located in relieving. Additionally, you can enter the gymnastic exercises performed prophylactically at home to maintain the full range of motion in the joints of the foot. Should be used regularly several times a day. Each of the types of physical activity acts preventatively in distortion of the human foot. To improve muscle performance rates in obese people contributes to a large extent, the reduction of body weight. Less weight helps the muscles responsible for maintaining proper wysklepienia feet. [3, 18].

Figure 3. Classes of bags. One form of exercise for a flat rate [20].

Untreated foot becomes flat ground a number of musculoskeletal complications. Underestimation of the appropriate corrective exercises and prevention can lead to diseases which can prevent the condition or walking (an advanced form of defects). The absence of any therapeutic intervention makes the child flat feet cause pain in the feet, calves, and spine and through the bone deformation contributes to the reduction in functional capacity of the foot. It can also be a consequence of earlier degenerative changes. Painful feet is also a direct cause of decline in physical activity in children. The resulting hipokinesis is one of the main causes of muscle failure in children. [18, 20, 21, 22].

The consequence of an elongated flat feet are often chronic inflammation of bags and ligaments around the foot and lateral toe valgus described above. In children with normal body shape can be seen setting the axial line of the lower limbs and shoulders and hips set is called. symmetrical posture. Reducing muscle tension responsible for the axial setting of the lower limbs may cause abnormal posture, the consequence may be: valgus and hyperextension in the knee joints and a round or flat back, which is the substrate for subsequent formation of scoliosis. [5, 6, 18].

Valgus knees very often coexists with the foot flat-crooked. This defect arises from the increased pressure on the external condyle of the femur with the consequence of inhibiting the growth side of the knee. This situation, along with stretching the tibial collateral ligament and peroneal shortening of the collateral causes shin to the home position to visit (ankle measured from the inner side are at a distance greater than 5cm). [18, 21, 22].

Flat feet may also indirectly contribute to a flat back. They are characterized by flattening of the curvature of the spine and pelvis anteversion, which may cause loss of function of depreciation of the spine. The back round is primarily increased thoracic kyphosis and cervical lordosis. This leads to muscle stretch rectifier back and neck. Head and shoulders are in protraction. [6, 18, 20, 22].

Confirmation of the relationship between growth rate and the evolution of the spine is the statement Steinmetz [1], who believes that: There is a correlation between the type of forming a foot, and the evolution of the spine. If the rate can be improved by the spine, the spine can be improved by the foot. Work must always begin with a spine.

Proceedings of correction - compensating depends on etiology occurring defects and selected on an individual basis. The stage of defects, child's gender, age and lifestyle can have a significant effect on the character of flat feet. In the case of flat feet - crooked corrective action should be based on physiotherapy. Gymnastics in the chronic period should focus on properly setting up the heel and forefoot, stretch muscles contracture (m. three-headed calves), strengthening appropriate muscle groups responsible for maintaining arch of the foot. It is also important to introduce your child has the habit of regarding the proper standing and walking. During acute when it is bent flat rate applies only to immobilization. [17, 21, 22].

The correction and compensation through appropriate exercises flat feet affect the areas of: bone and joints, neurofisiological, musculo-ligament, environmental, and emotional-volitional. One of the major tasks of corrective is to educate the child and the guardian of the presence of defects and its consequences and increased sense of awareness of one's own body. The child therapist should also seek to obtain a suitably smooth muscle stabilization - ligamentous. [17, 22].

This task posed a corrective action - compensation is to achieve specific objectives. The most important first of all corrections include flat feet and getting the correct structure of the foot, avoiding the occurrence of defects if the foot is exposed to adverse environmental conditions that may contribute to the creation and achievement of full functional capacity of the foot. If you can not

fully eliminate the disadvantages of the therapist should get the best visual status of what is possible to consolidate and reduce the rate of progression of flat feet. The pace and intensity of exercise should be individually tailored to the child. Too high load can lead to a decline in the commitment and motivation to participate in gymnastics classes. [16, 18, 17, 22].

A very important principle, which applies to all types of exercises in a proceeding to enforce the correction is appropriate and correct adjustment of the foot. With this principle it is possible to effectively work the muscles. Do not use it can greatly accelerate the pace of development of flat feet and deepen his character. [16, 17, 22].

Keeping compensating gymnastics - correction associated with knowledge of the methodology of physical education. Physical exercises they perform the children participating in activities to contribute to the correction of defects (Fig. 4) Any form of exercise has the characteristic methods and principles that should be familiar with and follow the lead instructor. [8, 17].

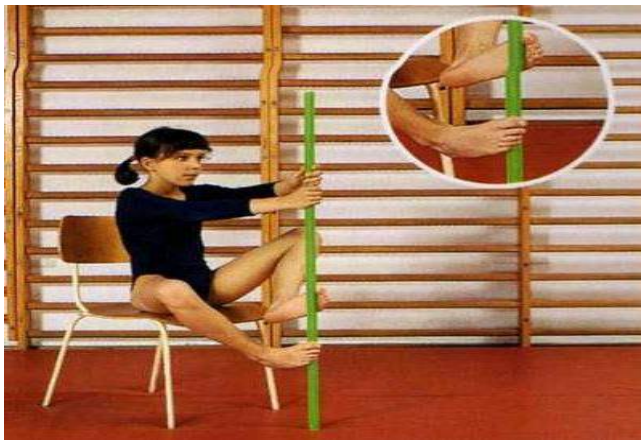

Figure 4. Exercises strengthen the muscles springing interest in relieving [17].

The methodology of teaching gymnastics pays special attention to using appropriate starting points, the selection and manner of execution of exercises, the attitude of the operator, baby clothes and a place and time of exercise. [8, 17].

Selection of the appropriate starting position is extremely important (Fig. 5). Valid body system is largely exercises can help, and more importantly setting incorrect posture can accelerate progression of the defect. Each entry should work on an existing anomaly correction attitude. Setting body should be selected individually to the existing defects and practicing motor skills. By choosing the appropriate starting position instructor can enforce traffic only in their intended distance. It may also get relief back or feet.

Figure 5. Handcuffable sitting position [17].

The basic starting points used in gymnastics compensating correction include: lying back and front, the position of low and medium Klapp, kneels supported, simple, sitting, kneeling, handcuffable, bent, crossed, straight, overhang, and active and passive state. [17].

Selection of gymnastics should be on a division into age groups. Younger children should perform exercises in the form of a play. The aim is to increase motivation and engagement in activities. Child expressing acceptance of exercises proposed by the instructor should feel free to controlled. In older children apply strict form of exercise. Each exercise must be proportional to the motor skills of preschoolers. The degree of difficulty of exercises should be decided individually. The condition for effective corrective gymnastics child is fully involved in the implementation of such exercises, which will be enforced in his adoption of the adjusted position. Gymnastics can not act tiring out and demotivating to the child. The instructor should be used in a variety of gymnastics alternate implementation easier and more difficult exercises, static and dynamic, separate muscle groups (eg, exercise the legs and shoulder girdle). The load can be controlled exercise their duration or quantity of specific repeats. Very often, due to used additional apparatus instructor can get the child to clarify the correctness of the exercises, as well as increase their motivation. [8, 17, 21].

The most important thing we should pay attention to each activity leader of corrective and compensatory gymnastics is to keep the child continuously adjusted position. The loss of this attitude removes the sense of correction and compensation defects in children. Continuous monitoring of the child determines the position adjusted to obtain the correct figure of a habit. [8, 17, 21].

Important role in the course of compensating gymnastics classes - plays correction mentioned above leads. His responsibilities include monitoring the course of each exercise, selecting the appropriate choice of starting positions and additional instruments. All of these tasks should be completed while motivating children to exercise and maintain complete discipline. [1, 17].

Exercise should be done in a properly equipped gym or a specially adapted room. Place of practice should be checked by the teacher in order to exclude and remove items that may be the cause of the accident. (Eg, sharp things, kant table or vase). The child should be practicing in the room feel comfortable and at ease. A very important element is the child's dress, which should be clean, neat and most importantly can not restrict his movements. [8].

Time compensating corrective gymnastics should be dependent on the concentration and commitment to children. Generally it does not exceed 20-30 min. However, the operator should always specify the length of individual classes until the first signs of discouragement in children. Exercises performed each time the child also is an individual matter. [8, 21].

A very clear pattern of gymnastics classes correction compensating for flat feet represents Kasperczyk [18]:

Part I

Collection, greeting, job application lesson

Animating fun - drawing attention to the correct setting of interest

Part II

Exercise arms and legs - low positions

Legs and abdominal exercises - relaxation

Exercise the legs and torso in relieving - removing any contractures

Exercise arms, abdomen and buttocks - in relieving

Exercises possums - in relieving

Abdominal exercises and foot supination
Exercises the back and buttocks
Exercise equivalent and possums
Half an overhang and overhangs
Fun lively flat running or gripping exercises with elements
Part III
Gambol with a focus on the correct setting of interest
The march, paying attention to the correct setting of interest
Completion - a discussion of lessons and homework.

Aim of study

The aim of the study is to assess the attitudes of preschool children with particular emphasis on the development of lower limbs and feet. Kindergarten is a dynamic stage of psychomotor development of children, experiencing new experiences and skills. In addition to positive change, this period may foster the emergence and consolidation of multiple defects in the flat feet. The direct benefit of participating in the research program is accurate diagnosis, taking into account the attitude of the foot and the inclusion of evolution child gymnastics program targeted compensating - correction. To achieve a particular purpose should answer the following questions:

What is the status of the foot preschool children assessed on the basis of Clarke`s angle indicator Sztriter - Godunov?

Is there a relationship between poor functional status and attitude of the child's feet?

Shaped like flat feet in children of different ages?

Material and methods

Tests were conducted on a group of 40 children, who after an initial medical examination were eligible for participation in the corrective and compensatory gymnastics. All children are aged 3 to 7 years, including 19 girls and 21 boys. Every day they attend kindergarten No 19 and 80 in Bydgoszcz. Of all the children participating in the correctional and compensatory gymnastics in the study involved only those who have obtained written consent from a parent or legal guardian after having regard to the information concerning the conduct of the study.

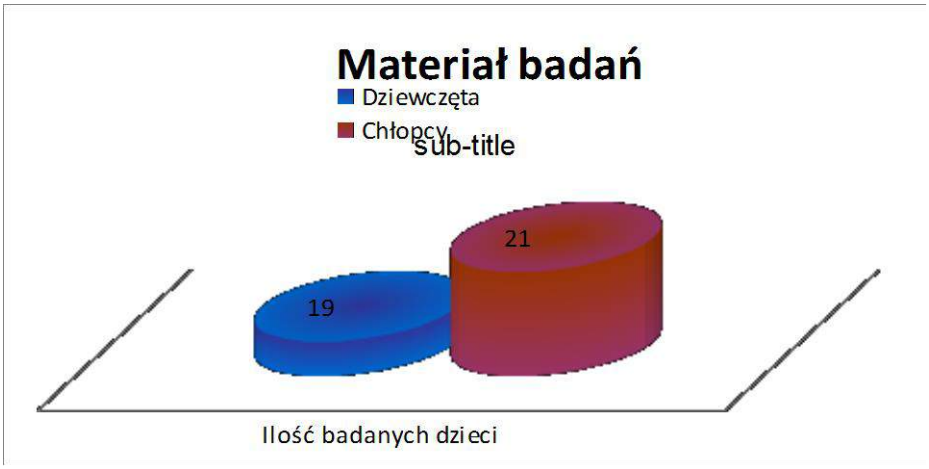

Figure 6. Material.

Selection of the group took place on the basis of interviews and conversations with parents / guardians and the physician.

The study was conducted in kindergartens No. 80 (Street Kujawska) and No. 19 (Street Grunwaldzka) in Bydgoszcz. Eligibility for the study was to test the direct consent of the child and family or guardian. Tests were conducted over a period of 6 weeks.

Alloys have been examined by studying podoskop involve the creation of accurate prints (plantoconturogramme) to obtain information about the spatial shape topping with a vaulted roof feet. This allows for a reliable assessment of longitudinal topping with a vaulted roof, hallux valgus angle evaluation, varus angle of the finger and the observation of load-bearing areas. So you can determine the correctness of the distribution of pressure forces. To be able to read prints rates were used the following indicators: Clarke`s angle, which consists in determining the tangent line along the medial edge of the foot (CS) and the inner tangent (qq). Intersection of two straight lines makes an angle of Clarke`s. Values of this index topping with a vaulted roof determine the level of interest where: x - 30º - flat rate, 31° -41° - reduced the rate of topping with a vaulted roof, 42º -54º - normal rate, 55°-x - rate of elevated topping with a vaulted roof. Sztriter-Godunov indicator is defined in the middle of the longitudinal arch of the foot. Consists in determining the length of the shaded part of the quotient plantoconturogramme to the length of the shaded and not shaded together. The result of this activity is classified according to the universal distribution rate: hollow rate of 0.00 – 0.25, normal rate of 0.26 – 0.45, reduced the rate of I° 0.46 – 0.49, reduced rate of II° 0.50 - 0.75, flat rate of 0.76 - 1.00.

Another indicator is the juxtaposition of two tangents of internal and external, forming an angle of heel Gamma. The standard recognizes the interval 15° -18°. A very important factor, which assesses the size of flat feet is the ratio of transverse Wejsflog. It is the ratio of debt to the width of the foot bones. With photographs of plantoconturogramme can also designate a hallux valgus angle of Alpha or value of the angle contained between the tangent to the medial edge of a tangent drawn interest from the point at its widest point to the outer edge of the forefoot toe. Varus angle of the finger is determined by analogy on the outer side of the foot.

Research methodology was based on three stages. The first stage (ie selective), a selection of children who were tested was held on the basis of interviews and conversations with parents / guardians. The second stage (right) consisting of a preliminary examination was performed which will include: research podoskop involve the creation of accurate prints (plantoconturogramme) to obtain information about the spatial shape topping with a vaulted roof feet. This allows for a reliable assessment of longitudinal topping with a vaulted roof, hallux valgus angle evaluation, varus angle of the finger and the observation of load-bearing areas. So you can determine the correctness of the distribution of pressure forces. The last step is to analyze the results of which method was used for data analysis of interdependence of two variables using Pearson's linear correlation coefficient and chi-squared test to examine the strength and direction of the correlation between the examined variables.

The assessment team needs a class in terms of prevention and countering deviations in posture and body structure scoring method was used by Kasperczyk and Wolanski. In determining the type of attitude typology used by Brown and by Season. An essential element of the study is to evaluate the visual stance of the body from front, back, side and top position in front bend.

The method of scoring has allowed the analytical description of the components of attitudes; lists defects that occur, their location, nature and size. This method also allowed satisfactorily overcome difficulties arising from the individual variation of posture, and they are particularly troublesome when the need to test the eligibility of some type attitude, as is the case, for example, in the methods of silhouette. The study objective rates are used by plantoconturographic.

Compared the level of individual motor skills in a child with physical fitness test Wroclaw by B. Sekita.The proposed set of test samples was twice tested for accuracy, reliability, selectivity, and objectivity. This test consists of three tests: medicine ball throw (1 kg), short course (20 kg), long jump and the space shuttle run (4x5m). The results can determine the appropriate level of physical abilities of the child.

Results

Results were processed by analysis of the interdependence of two variables using Pearson's linear correlation coefficient and chi-squared test to examine the strength and direction of the correlation between the examined variables. Also calculated the following parameters: median, coefficient of variation, standard deviation, arithmetic mean.

Table I. Distribution interstitial series Clarke`s rate for the left and right feet.

Indicator in °	Left	Rights
0-14	6	8
15-29	10	6
30-44	10	16
45-59	10	10
60-74	4	0

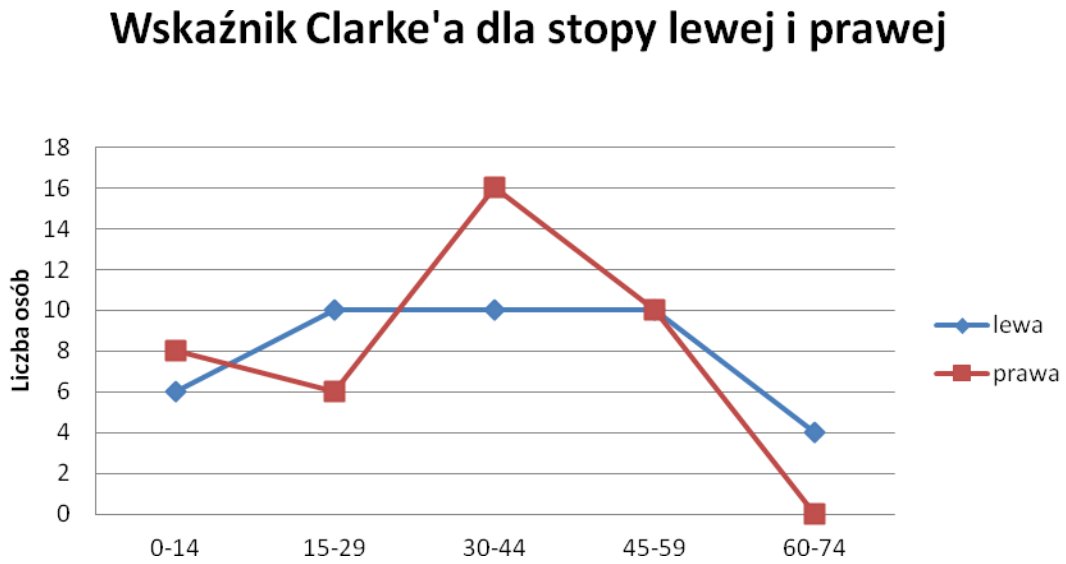

Figure 7. Clarke`s rate for the left and right feet.

In the study group average angular Clarke for the left foot was 35.15 degree, and for half of the respondents was less than 39 degrees. For the right foot average was 31,95 degrees, and half of individuals characterized by a value of less than 35 degrees. Both the left and right foot we have a very large variation of results for each individual. It is respectively 53% and 50% of the average. The chart above shows the distribution of abundance ratio for each foot.

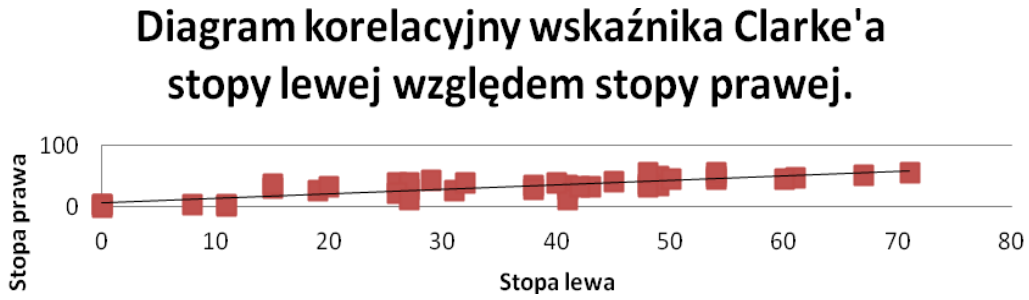

Figure 8. Diagram of correlation ratio Clarke `s left foot against right foot.

The above diagram illustrates the interdependence of interest rate interest rates left and right. As you can see we have a positive linear relationship.

Table II. Basic statistics on the Clarke`s Angle.

medium	35.15	31.95
standard deviation	18.57	16.09
coefficient of variation	53.	50%
median	39	35

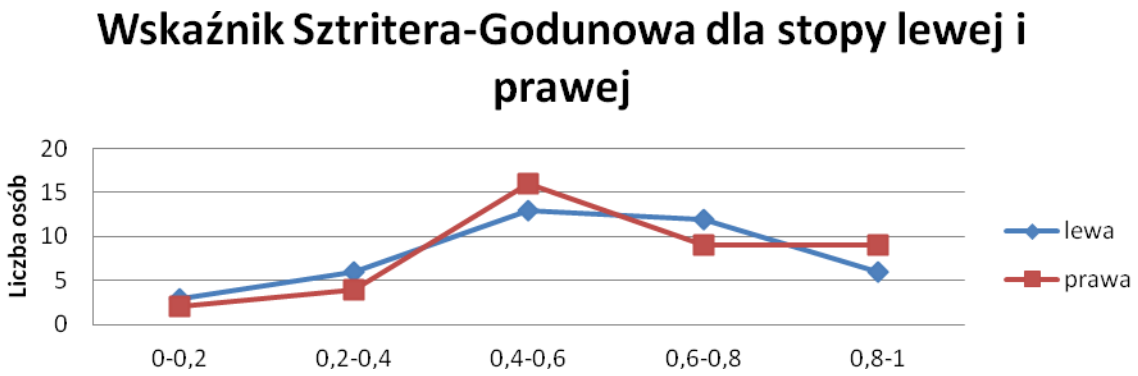

Figure 9. Sztriter Godunov indicator for left and right feet.

The chart above shows the distribution of abundance ratio for each foot. In the study group average Sztriter - Godunov for the left foot was 0.55, while for half of the respondents was less than 0.58. For the right foot average was 0.59, and half the units were characterized by a value less than 0.56. Both the left and right foot have quite large differences in results for each individual. It is respectively 43% and 40% of the average.

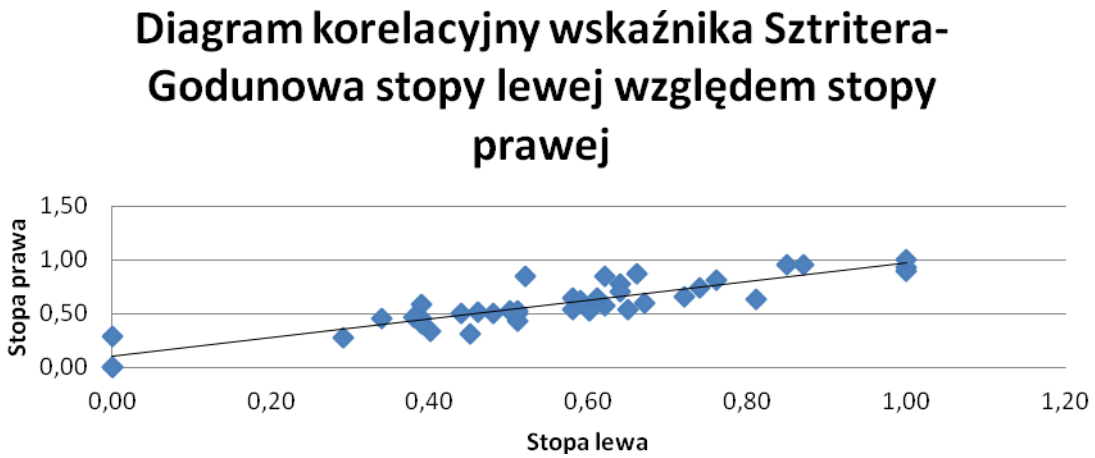

Figure 10. Ratio correlation diagram Sztriter-Godunov left foot against right foot.

The chart above shows the interdependence of interest rate interest rates left and right. As you can see we have a positive linear relationship.

Based on an analysis of these data dependencies. All tests were performed at the significance level 0.05.

The relationship between angular rate and attitude by Clarke Kasperczyk: The left foot was examined using correlation significance test of Pearson's correlation coefficient.The resulting value of the test statistics at the critical value - 0.642 0.312 test indicates a statistically significant relationship between the studied traits.For a right-foot resulting test statistic value - 0.6929 at the critical value test of 0.312 indicates a statistically significant relationship between the studied traits. Pearson coefficient indicates a moderate negative linear relationship.

In examining the relationship between angular rate and age for Clarke left foot resulting value of the test statistics at the critical value 0.408 0.312 test indicates a statistically significant relationship between the studied traits. Pearson coefficient indicates a moderate positive linear relationship. For the right foot while the value obtained test statistics with the critical value 0.513 0.312 test also indicates a statistically significant relationship between the studied traits.

Table III. Distribution interstitial series for the index Sztriter–Godunov foot left and right.

Indicator	Left	right
0-0,2	3	2
0,2-0,4	6	4
0,4-0,6	13	16
0,6-0,8	1	9
0,8-1	6	9

Table IV. Basic statistical data on the rate-Sztriter-Godunov.

medium	0.55	0.59
standard deviation	0.24	0.24
coefficient of variation	43.	40%
median	0.58	0.56

Table V. Distribution interstitial series for calcaneal angle gamma.

angle	Left	right
8-12	3	2
13-17	25	26
18-22	1	11
23-27	0	1

Discussion

Presented results show the problem had flat feet in children at preschool age, and its correlation with other developmental traits.

According to Shepherd [8], flat feet in children is mainly caused by impaired muscle responsible for maintaining the physiological curves of the foot. He believes that a flat rate of correction can be achieved, inter alia, by strengthening them. The best way to improve muscle performance in children is corrective and compensatory gymnastics, which through carefully selected exercises is effective both in treatment and prevention. A similar view is considered Kutzner-Kozińska [21], which says that as far as improving exercise all the elements of interest are amplified in terms of heightened physiological stimuli. Increases efficiency and can easily overpower the foot of these large loads. Karski and colleagues [23] reported that the main cause of flat feet in children preschool age is a shortening of muscle flaccidity three-headed and arthritis, which contributes to the destabilization of the ligaments in the ankle joints. Also believes that the correction of the foot flat-crooked can be obtained through the use of special exercises to increase muscle performance, together with removal of existing contractures. According to Hare-Gawlak and colleagues [24] compensating corrective exercises for a flat rate must be selected individually for each child and are based on the elimination of jumps, the correction of tumor settings calcaneal long axis drumsticks and play physiological points of support.

The results have emphasized the need for prevention and prevention of flat feet at pre-school. In a group of kindergarten children average angular Clarke for the left foot was 35.15 degrees. For the right foot average was 31.95 degrees, and half of individuals characterized by a value of less than 35 degrees. These data are eligible children at reduced rates topping with a vaulted roof. Similar results were obtained Lizis [3], studying 2799 children who received the Clarke value of angle `in the range 32° -47°. Also Galinski et al [9] obtained similar results by examining a group of children 7-10 years old. Alloys with low topping with a vaulted roof had over half of boys and about 41% of girls. Analysis of results shows the average Sztriter-Godunov for the left foot equals 0.55, while for half of the respondents was less than 0.58. For the right foot average was 0.59, and half the units were characterized by a value less than 0.56. Tell you that a large group of children has reduced the interest rate of second-degree by Sztriter-Godunov.

Flat feet is a problem whose consequences may be further complications in the ankle, knee or spine. In people with advanced flat rate, we can see rapid damage and above all, deformities in the organ motion. [6, 18, 20, 22].

It is believed that up to about 3 years after birth can not talk about flat foot child. Weak concavity foot is caused by the presence of soft, fatty tissue in the plantar part. In the last 3 years should observe the process of creating topping with a vaulted roof sole of the foot. Properly extending its development in the period 3-6 years has the highest annual increase in the angle of Clarke`s, so you can clearly be observed properly arched like a bow, both longitudinal and transverse. Also Makarczuk [25] argues that a small flat feet occur in preschool should not be too upset if educators are not connected with crooked heel setting. Summarizing the results of children in the study group, whose age 5 years is the dominant value takes a positive linear relationship between the moderate angle of Clarke`s (left and right feet) and the age of the children. For the left foot test statistic value is 0.408 at the critical value test of 0.312, and 0.513 for the right foot at the

critical value test of 0.312. You can recognize that children at a younger age of 3-4 years have a low arched feet. Similarly, consider Trzcińska et al [26], which concluded in their research that the value of the angle of Clarke`s 8 year old girls is over 35°, while in the oldest group (16 years), children's feet are arched at the level of 44.1°. In another research work Trzcińska et al [27] presented a similar conclusion, which says that the angle of Clarke`s and reached higher values in the older groups of pupils and students. [3, 18].

Conclusions

Based on the survey should provide the following conclusions:

1. State interest of the children at preschool age can be described as bad, as the average angular rate of Clarke`s the right foot was 31.95°, with the left foot 35.15° (both scores to qualify for reduced rates topping with a vaulted roof). Average rate Sztriter-Godunov for the right foot was 0.59, 0.55 for the left foot (feet reduced second-degree).
2. Flat feet as a serious flaw on the structure of the foot very often coexists with a small degree of posture (Kasperczyk). In simpler classifications such as attitude survey attitude accompanied Wolanski described as evil.
3. Younger children (3-4 years) have lower rates of topping with a vaulted roof, which is not always to be understood as a pathology of development. In older children (5-7 years), we observe a greater slope towards the foot. Severe flat feet during this period should be a warning signal of abnormal development of the child's feet.

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EFFECT OF PHYSICAL THERAPY FOR THE RETURN FUNCTION OF UPPER LIMBS AFTER SEVERE INJURIES IN WOMEN AGED 40-60 YEARS

Wpływ zabiegów fizjoterapeutycznych na powrót funkcji kończyn górnych po przebytych urazach u kobiet w przedziale wiekowym 40-60 lat

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Number of characters: 46 000 (with abstracts). Number of images: 18 x 1000 characters (lump sum)= 18 000 characters.
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Keywords: physical therapy; function; upper limbs; injuries; women.

Abstract

Upper limb is a precise and complex system of bones, muscles, ligaments and tendons. The skeleton enters its 37 bones. These bones are connected by movable joints or connections. Among the upper limb joints can be distinguished: the shoulder joints (ie, a team of three joints: the glenohumeral joint, acromioclavicular joint, sterno-cleido joint), elbow (built from the brachiocephalic elbow joint, the joint brachiocephalic radial and radial-ulnar joint proximal), carpal joint.

These ponds are vulnerable to injury. The causes of injury is very much, but the most common include traffic accidents, accidents at home and work accidents. There are many divisions of injuries, one of them is the breakdown by type of damage. Given this criterion, we can distinguish the following injuries: contusions, sprains, dislocations and fractures. Each of the trauma induces local and systemic change, the magnitude of these changes depends on the size, type and location of damage.

Proceedings physiotherapy aims to eliminate the changes caused by trauma. The scope of physical therapy and laser therapy is used magneto. These treatments are designed to accelerate the regeneration process, causing an analgesic and anti-inflammatory. In the case of injuries in addition to physical therapy is advisable to use kinesis. Exercise steps-passive and active exercises are free to increase muscle strength and improve range of motion in the joints.

Słowa kluczowe: fizjoterapia; funkcja; kończyny górne; urazy; kobieta.

Streszczenie

Kończyna górna stanowi precyzyjny i skomplikowany system kości, mięśni, więzadeł i ścięgien. W skład jej szkieletu wchodzi 37 kości. Kości te połączone są za pomocą ruchomych połączeń czyli stawów. Wśród stawów kończyny górnej możemy wyróżnić: staw barkowy (czyli zespół trzech stawów: stawu ramiennego, stawu barkowo-obojczykowego, stawu mostkowo-obojczykowego), staw łokciowy (zbudowany z stawu ramienno-lokciowego, stawu ramienno-promieniowego oraz stawu promieniowo-łokciowego bliższego), staw nadgarstkowy.

Stawy te narażone są na urazy. Przyczyn urazów jest bardzo wiele, jednak do najczęstszych należą wypadki komunikacyjne, wypadki w domu oraz wypadki przy pracy. Istnieje wiele podziałów urazów, jednym z nich jest podział ze względu na rodzaj uszkodzenia. Biorąc pod uwagę to kryterium wyróżnić można następujące urazy: stłuczenia, skręcenia, zwichnięcia i złamania. Każdy z urazów wywołuje zmiany miejscowe i ogólnoustrojowe, wielkość tych zmian zależy od wielkości, rodzaju i miejsca uszkodzenia.

Postępowanie fizjoterapeutyczne ma na celu zlikwidowanie zmian wywołanych poprzez uraz. Z zakresu fizykoterapii stosuje się laseroterapie oraz magnetoterapie. Zabiegi te mają na celu przyspieszyć procesy regeneracji, powodują działanie przeciwbólowe oraz przeciwzapalne. W przypadku urazów oprócz fizykoterapii wskazane jest stosowanie kinezyterapii. Ćwiczenia czynno-bierne oraz ćwiczenia czynne wolne mają na celu zwiększenie siły mięśniowej oraz poprawić zakres ruchomości w stawach.

Introduction

Human evolution has led to the adoption by its upright position and improved motor function. Changes in the structure of human locomotor allowed to explore the world around him. Organ movement has been shaped by the needs and obstacles which man had to overcome to win the fight for survival. Under the influence of the evolution of man is a being of higher order, his legs have adapted to the functions of motion and upper limbs and prehensile functions adopted manual.

Upper limb is a precise system of bones, muscles, ligaments and tendons, which is readily injuries. Musculoskeletal damage occurs mainly as a result of mechanical injury, less thermal or chemical. Causes of injury may be very different, they can be traffic accidents, accidents at work, falls, sports activities but also to every action of daily life. Each trauma induces local and systemic changes. And reveal the effects of trauma depends on the strength, type and location of damage. Depending on what type of injury has to do different is the process of healing and rehabilitation process. According to W. Dega, rehabilitative medicine is a vast area of comprehensive actions designed to restore the disturbed organ performance by congenital defect, disease or trauma.[1].

In the case of injuries to the rehabilitation process is to ensure proper muscle strength, normal range of motion in the joints and proper functioning in everyday life. Often, process improvement is a long and complex.

Upper limb.

As a result, she found upper limb phylogeny freed from the supporting and locomotor function, but she found adapted for grasping and manipulative actions. The design of the upper limb has become a dynamic nature, there has been increasing the diversity and range of motion in the joints. [2].

Anatomical parts of the upper limb.

The skeleton of the upper limb bones fall 37.Can distinguish the rim of the upper limb bone or collarbone and shoulder and upper limb bones free. This group includes: humerus, two forearm bones, eight wrist bones, five metacarpal bones and fourteen bones of the fingers. The individual elements of the upper limb skeleton are connected by links. There are close connections or fixed, for example: syndesmosis, synchondrosis and synostosis, and mobile connections or joints. The design of the upper limb skeleton provides its high mobility. [3]

Construction of the shoulder

It is a clinical term denoting a set of three joint functional connections. These ponds are: shoulder joint, shoulder - sternoclavicular articulation. The shoulder joint movements take place as follows: in the sagittal plane: flexion movement forward, extension movement in the frontal plane, movement of abduction, adduction movement, in the transverse plane, movement of external rotation, internal rotation motion. [4]. Standards range of movement in the shoulder joint: movement - normal range in the age group 40-60 years [5]: 170º Flexion, 40º Extension, 175º Abduction, 65°Adduction, 75° Internal Rotation, 85º External Rotation.

The above mentioned movements that were not possible were it not exist in the upper limb muscles. The movement, which is made by muscle occurs as a result of its contraction. Each muscle is responsible for a specific movement. [5].

Injuries to the upper limbs

Man every day exposed to traumatic. Not only athletes or persons conducting an active lifestyle, in every life situation can be injuries. Injuries may involve many changes in processed whole musculoskeletal system. These changes are dependent on the strength and extent of damage.

Limb top is an important part of the whole human body. In principle, any work done and the work associated with her. For this reason, even the smallest of the upper limb trauma, to a lesser or greater extent causing difficulty in performing activities of daily living, or vocational training. [10].

Definition of injuries

The definition of injury by A. Dziak seq reads: "activation of an external factor on the organism causing the anatomical and functional changes in local or local and general." [11]. Among the factors causing the injury can be divided into mechanical factors, physical and chemical characteristics. [11]. Breakdown of injuries. There are many divisions of injuries, depending on the

criterion that will be adopted: Because of the way of injury can be distinguished: acute-trauma caused by violent injury-chronic injuries caused by the presence of micro-injuries. Due to the resulting changes: many-injuries-that is, failure of one of the motor system in several places; trauma multi-organ-damaging musculoskeletal and other organ of the body. Due to the mechanism of creation: direct trauma, indirect trauma. Due to the nature of injury: fractures, dislocations, sprains, bruises. In the following subsections will be discussed in detail rag breakdown by type of damage. [12].

Contusion

Contusion (Latin contusio) is the damage caused by direct trauma. The scope and extent of bruising depends on the strength os injury. In the case of a small force only occurs contusion injury of the skin, the more power can lead to deeper tissue contusion (muscles, nerves, vessels and even internal organs). [13]. Bruising under the skin characterized by tissue damage from rupture of small blood vessels and stroke symptoms is broken: swelling, pain and idiopathic compression, subcutaneous hemorrhages blood, skin abrasions, warming in the area of damage. [14].

Sprains

Sprains (Latin distorsio) is a slight degree of rupture of the ligaments and joint capsules without interruption of their continuity. The cause is usually sudden twisting motion exceeding the physiological range of motion in the pond. There are four degrees of sprains: stretching the capsule and ligaments, joint capsule rupture, rupture the joint capsule and ligaments, ligament separation from bone fragment. [15]. Symptoms of sprains include: Swelling; Pain worsens during movement and oppression; Intraarticular hematoma; Subcutaneous hemorrhages blood; Lifting motion in the joint or mobility of the pathological; Blurring the outlines of the pond; Impaired blood supply, sensation. [16].

Dislocations

Dislocation of hip soundtrack (Latin luxatio) is a total, permanent or momentary loss of contact of joint surfaces under the influence of their movement relative to each other. Changes in the case of traumatic dislocation may affect all anatomical structures of the joint: the synovium, cartilage, ligaments, joint capsule, blood vessels, nerves, tendons and muscles. Symptoms of dislocations can be divided into certain and probable. [17]. The symptoms of some: Deformation of the joint; Immobilization in a pathological setting; Aacetabulum or the head of the pond in an unusual setting. Symptoms likely: swelling; pain; intraarticular hematoma or periarticular; insulation around damaged; impaired blood supply, sensation. [18]. In the case of dislocation diagnostic tests should be performed, among which are: subjective test, physical examination, X-ray examination, in case of doubt, you can perform a CT scan. [19, 20].

Fractures

Fracture (Latin fracture) is a break in the bone tissue, as a result of direct or indirect trauma. In case there is usually a direct mechanism for large and serious damage to the bone and soft tissue, while the indirect mechanism of these lesions are usually smaller. [21].

Symptoms of fractures are divided into certain and probable.

Some symptoms are: Incorrect positioning; Tactile factions of bone fracture or fissure; The oppression of crepitus factions; Pathological mobility of bone. Symptoms likely to include: Swelling; Soreness; Bloody hemorrhages under the skin; Forced to set the limb; Damage to soft tissue; Red or pale around damaged; Impaired blood supply, sensation and mobility. [22].

There are many divisions of fractures: Depending on the mechanism of injury: A direct violation; Indirect fracture Depending on the location of the fracture gap: Shaft fractures; Root fracture; Fractures metaphysis; Projections of bone fractures; Fractures of articular surfaces. Depending on the movement of factions; Of displaced fractures (types of movements: to the side, with shortening, with prolongation, rotary, angular, wedged); Fracture without displacement. Depending on the number of resulting fragments; Breaking two factions; Multiple fractures; Fractures of dismemberment. Depending on the direction of the slots fractures: Transverse; Oblique; Spiral. Depending on the type of fractures: Closed fractures; Fractures open (they can be

divided into three stages. I factions bone: pierce with a small soft tissue damage them, II visible factions of bone and soft tissue damage significantly, III fracture comminuted with large loss of skin and muscle damage nerves and blood). [14].

Causes of injuries

According to the World Health Organization is the cause of injury in 20% of accidents at work, 40% were traffic accidents and the others are accidents in the home and other types of injuries. The number of injuries is increasing as a result of changes in the life model, technical progress, continuous pursuit of work, lack of rest and fatigue by what people are careless and distracted, reckless driving vehicles, and non-safety rules. [23].

Treatment and first aid in injuries of upper extremities. First aid in case of less serious injuries is based on the principle of RICE method helps to reduce swelling and pain, protects damaged tissue and speeds up the return to health. The name means the first letter of the English words: r-rest prevents further deepening of the injury, i-ice, helps reduce pain and swelling, c-compression-pressure, reduces swelling, thanks to which accelerates regeneration processes, causes of injury by 20%. E-elevation-raising, limits swelling by reducing blood flow. The above-mentioned principle shall apply in lighter injuries, while in the case of heavy injuries, or when symptoms persist, seek medical attention. Depending on the type of injury with which we have taken are different therapeutic actions. [24] In the case of breakage of the upper limb extremities should be grounded until pain subsides, treatment should be used antioedematous (temporary cooling, elevation of extremities), analgesia (general or localized), against tetanus prevention and early rehabilitation. For treatment of sprains can be divided into conservative and operative. To conservative treatment include: punctures in the case of intraarticular hematoma, stiffness by elastic bandage, plaster or full rails gypsum, and analgesic treatment antioedematous. While for surgery include: arthroscopy diagnostic or corrective treatments or reproducing the continuity of damaged structures. Treatment for sprains include possibly as soon as possible repositioning and immobilization of the joint extremities, as in previous cases, and analgesic treatment antiedematous. After each reduction and immobilization is important to investigate the circulation, sensation and motion of the distal parts of limbs. Treatment of fractures can be divided into operational and non-operative treatment. Among the non-operative treatment can be distinguished: repositioning, lifts, locks blocking puncture and dressings. [25] In the case of fractures can be distinguished outright indication for surgery. To these indications belong - open fractures impossible to set conservative or maintain stability after setting - fractures with arterial injury, nerves and internal organs. There are also an indication of the relative which include: breaking throughintracular, displaced fragments of the articular surfaces and distorted, giving himself to set the fracture risk of secondary displacement, many-fractures, fracture involvement. [26].

Among the surgical treatment can be distinguished: Bone-seam is every anastomosis (wire, screw, intramedullary nail), which requires postoperative immobilization; Fixation is stable, that bond, which requires no additional immobilization; External stabilizers-are a design allows to determine the fractions of fractures without placement in the immediate vicinity of the metal. [25].

Surgical treatment is performed on all components of the musculoskeletal system. May involve tendons, muscles, joints, bones and nerves. [19].

The element on which the surgery is performed first type tendon surgery second tendon shortening of tendons third Achilles lengthening fourth suture tendons fifth 6th release of tendons nerve first plastic tendons neurolisis second nerve twigs intersection first pond opening of the second pond notch synovial joint replacement fourth 5th arthrodesis. Locking joint sixth enucleation of the first bone in the joint bones of the second intersection third bone fusion bone grafting bone lengthening

Rehabilitation of upper limb injuries.

In the event of any injury to the upper limb, very important is the process of rehabilitation. This process should be undertaken as early as possible. Often it is a long process and requires

commitment both therapist and patient. The aim of rehabilitation is to improve the extremities and restore all functions. [27].

Physiotherapy

Physiotherapy is a healthcare department, which uses natural physical factors and physical factors produced by the device. The first group of factors include: water, air humidity, atmospheric pressure, electricity, and solar radiation, while the second: Thermal power generating device, small or large currents, frequency, radiation, light, ultraviolet, infrared, or ultrasound. [28].

Laser therapy.

This is one of the new, rapidly developing physical therapy divisions. This department deals with the use of laser radiation for medical purposes. Laser he found application in many areas of medicine, also in the musculoskeletal system injuries. [29].

Basic physical and biological operation.

Physical basis of operation is the phenomenon of laser absorption and emission of radiation by atoms in systems of quantum. Atom, which is located in the energy, higher than normal is called the excited atom energy. If the atom is a transition from a higher to a lower energy level, then the energy is reflected on the outside, this phenomenon is called the emission of radiation. Natomiast reverse phenomenon, namely those in which there is a transition of an atom from a lower to a higher level of absorption is called, this phenomenon is possible after delivery of energy. [30].

Laser radiation exhibits characteristic features, which them stand out from ordinary radiation. For these features include August: 1. Consistency: the same phase of the waves, both spatial and Time 2. Monochrome: one color radiation. Laser radiation is almost the same wave length. 3. Parallelism: means a small angular divergence beam of light. 4. Intensity: an inch radiated power is contained in a narrow bundle of rays. [31].

Approximately 40-50% of laser radiation is reflected away from the surface of the skin. The rest penetrates into the tissue and is dispersed, the absorption and further penetration. Scientifically it is proven to increase the laser interaction collagen synthesis, protein and RNA (ribonucleic acid). Changes also occur in the cell membrane potential and the secretion of neurotransmitters. Also been found beneficial effects on tissue oxygen supply, in case of damage and inflammation of soft tissue and also in healing wounds and ulcers and to treat bone fractures, an increase in vascularization and rapid growth of callus. [32].

Indications and contraindications. Laser therapy has been used in various clinical disciplines and in different diseases. The most important indications belong - hard to heal wounds and ulcers - chronic inflammatory conditions - difficult adhesion marrow - osteoarthritis - inflammation of the periarticular - bands overload muscles and soft tissue - inflammation of the tendons, fascia, tendon sheath - injuries: contusions, sprains, dislocations . Belong to contraindications - pregnancy - menstruation - pacemaker - generalized bacterial disease - fever - epilepsy, cancer. [33].

Methods of treatment. Currently, various kinds are produced lasers. Differing technical parameters. In the case of trauma is the most effective operation of local, uses laser power in 1500-2500 Hz, time of about 6-8 minutes. Please remember to observe the safety regulations, on the premises and goggles. [34].

Magnetotherapy.

In recent years greatly increased interest in the therapeutic action of the magnetic field. Began to apply an alternating magnetic field of 0-50 Hz frequency and magnetic induction higher than the earth's field induction. This is what is known magneto therapy. 35%

Basic physical and biological operation.

The magnetic field is generated by electric charges that move in an orderly manner, and by moving-charged body. Among the actions that causes the magnetic field on the body can be distinguished: - analgesic, anti-inflammatory and anti - stimulating tissue respiration, - mobilization of microcirculation, - stimulation of peripheral circulatory, - accelerates the regeneration of damaged soft tissue, accelerates bone adhesion. [32, 36].

Methods of treatment.

Magnetotherapy treatment applies to all injuries. Before surgery, instruct the patient that should not have with him, watch, mobile phone or credit card. In the case of injuries rectangular pulses are recommended. [28, 37] However, the frequency and induction field depends on the state of trauma.

Kinesitherapy

Kinesitherapy of the Greek language kinesis means movement, so a kinetic therapy is the treatment movement. Kinesitherapy can be divided into: Local kinesitherapy: activities relate directly to the affected organ, can identify the following types of exercises: Passive exercises - exercises-passive steps - selfhelp exercises - exercises for relieving - active exercises - exercises with resistance - exercises conducted – lifts; synergistic exercises - breathing exercises - relaxation exercises - orthostatic and learning to walk. Kinesitherapy General: can distinguish the following exercises: Exercises general conditioning; Morning gymnastic exercises; Exercises in the water.

Methods kinezitherapy: specialized methods, based on knowledge of anatomy, physiology and biomechanics. [38]. Exercises should be chosen individually to the patient, taking into account his state of health, opportunities, pain, psychological factors. Among the exercises, which are indicated after injuries of the upper limb exercises can be distinguished steps, passive and active exercises free. [39]. Steps-passive exercises are designed to improve muscle strength, the formation and movement patterns play. The exercises of the movement are carried out passively (by therapist) and the task is active practicing relaxing muscles, in this part of the locomotor system, which is practiced against. The movement leads are part of, the determinant are pain, slow the pace and exact exercises. Number of repetitions in a series starting at 10 and gradually increasing to 15, the number of series increases from 3 to 5 The second group of active exercises are free, their aim is to increase muscle strength and endurance, maintain or increase range of motion in joints, improve coordination of movement. These are exercises performed by the patient under constant control of the therapist. The movement should be smooth and rhythmic, the time depends on the endurance exercises the patient, the number of repetitions and the series is gradually increased. [40] Among the contraindications to exercises both steps-passive and active free exercises can be distinguished: - fevers of unexplained etiology - acute inflammation - inflammatory diseases of cardiovascular disorders of blood coagulation. [38].

Purpose of research

Aim of this study is to demonstrate what types of injuries in the upper limbs are women aged 40-60 years and what impact has the rehabilitation proceedings for the return of the damaged upper limb function.

Material - the subject of research

The study was conducted in 30 women who underwent Ore kt upper extremity injuries. Among these injuries distinguished fractures, dislocations, sprains and contusions. The women were between the ages of 40 to 60 years. The study includes the following joints: shoulder, elbow and wrist. Women who worked for the study: a) physically cleaner, cashier, working on the assembly line; b) mentally: accountant, secretary, teacher, civil servant.

Research problems:

What kind of upper limb injuries are most often women aged 40-60 years?

What are the joints in the upper limb injuries are most common in women aged 40-60 years?

What are the effects of physiotherapy used bring in forfeiture of the upper limb injuries in women aged 40-60 years?

Research hypotheses:

Physiotherapy treatments are conducted in women with a history of upper extremity trauma have positive effects. Led rehabilitation contributes to the improvement of muscle strength and improve range of motion.

Research Methods

The study included 30 female patients were non-public Health Care "REFIMED" in Wągrowiec that have upper extremity injuries.

Each of the women was examined before and after rehabilitation undertaken. All data and results were recorded in the patient.

The studies in women:

The test circuit length and upper limbs

The study of muscle strength

Examination range of motion

Examination of the (execution of functional tests)

Function tests presented below, which were made in women.

Function tests.

1. Test 9 holes.

The test involves placing 9 wooden pegs in 9 holes and their removal from them.

Evaluated is the time in which the job is done.

2. Test blocks.

Pads are located on one side of a poodle, the test is designed in 1 minute blocks translate to the opposite chamber poodle. Estimated number of superiors blocks.

3. Test with the measure.

On the wall is glued inch measure; the test goes as high as possible. Writing is the height to which the test reached.

4. The test reveals decreased mobility in the shoulder joint (test wall Dega). The patient's sit down with the legs hanging freely along the trunk. The back is leaning against the wall. Performs raising the arms by bending forward. When part of the limb movement is not touching the dorsal surface of the wall. Writing what is missing is the distance to the wall.

Analysis of the results

Study, 30 women were subjected in the age group 40-60 years who had upper extremity trauma. In the study group 47% of the women has any injury radial-carpal joint, shoulder joint 43% and 10% of the elbow. Of all injuries 50% given a break, it zlatania 47% and 3% dislocation.

The types of trauma that people have traveled investigated. The types of injuries so far have been different joints are shown in Table 1.

Table 1. Types of injuries in individual joints.

Joint	**Contusion**		**Fractures**		**Dislocation**	
	n	**%**	**n**	**%**	**n**	**%**
Shoulder joint	9	69	4	31	0	0
Elbow joint	3	100	0	0	0	0
Carpus joint	3	21,5	10	71,5	1	7,1

Among the 73% of the women there was a change of polling limbs after injury relative to a healthy, 27%, these changes did not occur. In the case of injury of the elbow occurred in all test circuits to increase the upper limb.

The injuries of the wrist joint enlarged circuits throughout the limb occurred in 14% of respondents, with 22% of the circuits have not changed in 57% change occurred in the periphery of the forearm and wrist joint, 7% change occurred only in the circuit wrist joint.

The injuries of the shoulder joint to enlarge circuits entire limb occurred in 8% of respondents, with 38% of the circuits have not changed, 31% change in arm circumference was only, in 23% increased arm circumference, and forearm.

In all patients with trauma of the elbow was reduced mobility in the elbow, and bend, and visiting the shoulder joint. In 33% of the respondents in addition to the above restrictions was also to limit the extension, adduction, and internal and external rotation of the shoulder joint. 67% also had limited mobility in the joint during wrist flexion and extension movement. After surgery all patients physiotherapy mobility in the wrist and shoulder joint returned to normal standards. While increasing mobility in the elbow flexion is shown in the graph.

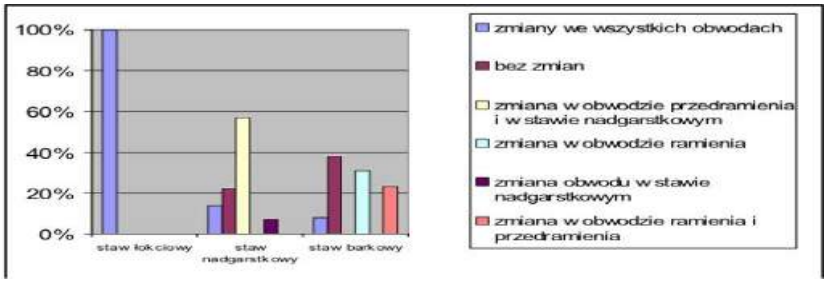

Figure 1. Flexion range of motion in the elbow after elbow trauma.

Data on the wrist joint range of motion.In the case of an injury in the wrist joint in 93% of mobility limitations occurred only in the movements in the wrist joint, while in 7% reduction also occurred in the elbow and shoulder. Changes have occurred in the wrist joint mobility after physiotherapy treatments are shown in the following charts.

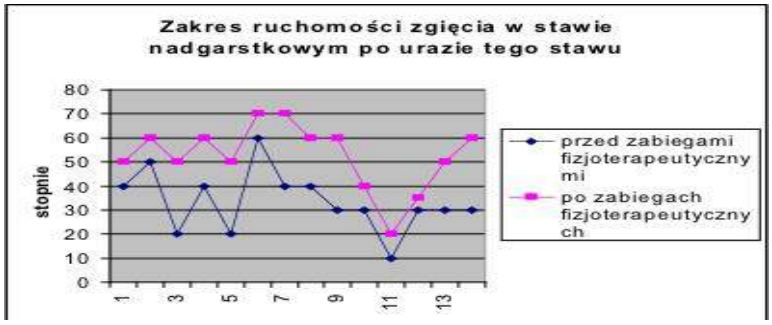

Figure 2. Range of motion wrist flexion after injury to the joint.

In all patients with trauma in the joint motion of wrist joint flexion in the post-operative physiotherapy has increased. These changes were as follows: - 36% range increased by 10 degrees - even in 36% range increased by 30 degrees - 21% range increased by 20 degrees - 7% range have increased by 5 degrees.

Figure 3. Extension range of motion in the joint after injury of the wrist joint.

Extension motion in the wrist joint was improved in all subjects, 21% of those obtained by increasing the mobility of 15 degrees, 14% by 5 degrees, 14% of respondents motion improved by 20 and 30 degrees in 7% of patients improved by 40 degrees. Motion range wrist flexion after injury to the joint 11% by 13 degrees in front of my physiotherapy treatments after surgery physiotherapy.

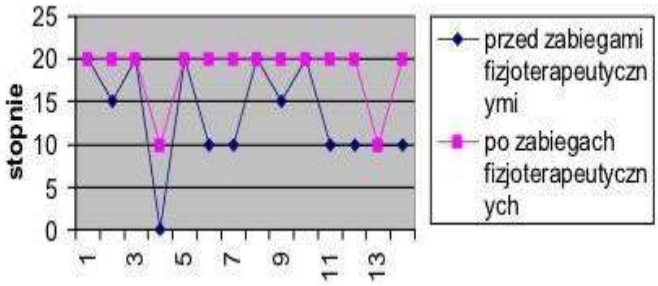

Figure 4. Abduction range of motion in the joint after injury of the wrist joint.

Examination range of motion in the joint wrist abduction presented as follows: - in 43% of range of motion did not change after surgery physiotherapy - also in 43% motility increased by 10 degrees in 14% increased by 15 degrees.

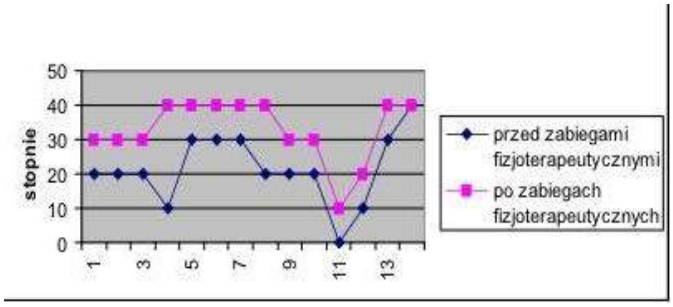

Figure 5. Adduction range of motion in the joint after injury of the wrist joint.

After physiotherapy treatments carried out in the joint motion of wrist adduction in 79% of the subjects increased by 10 degrees, 7% increased by 20 degrees, 7% increased by 30 degrees and also at 7% remained unchanged. Abduction range of motion in the joint of the wrist joint after injury.

In the case of injury of the shoulder 85% of the women had only decreased mobility in the shoulder joint movements, and 15% had also restricted the movements of the elbow. In all patients an improvement in mobility as shown in the following charts.

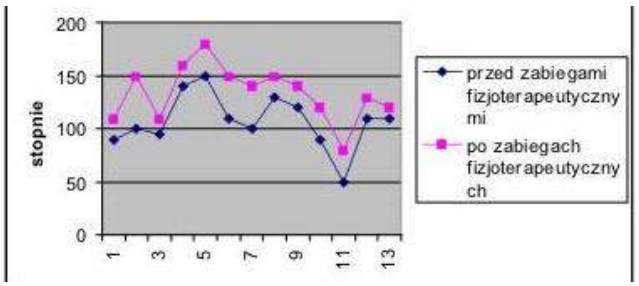

Figure 6. Range of motion flexion of the shoulder after trauma.

Motion of shoulder flexion after surgery physiotherapy all patients increased:
In 38% to 20 degrees; In 23% of 30 degrees; In 15% of 40 degrees; In 8% of 15, 10 and 50 degrees.

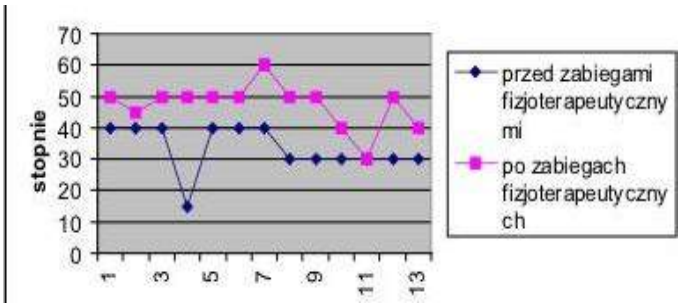

Figure 7. Extension range of motion in the shoulder joint shoulder joint after injury.

Extension motion in the shoulder joint after surgery physiotherapy carried out in 8% of patients remained unchanged, while 56% increased by 10 degrees, 30% increased by 20 degrees au 8% increased by 5 and 35 degrees.

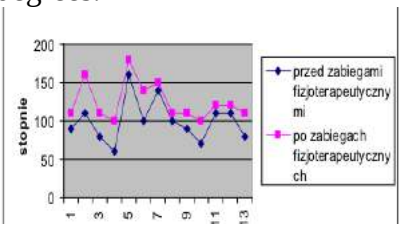

Figure 8. Abduction range of motion in the shoulder joint shoulder joint after injury.

Abduction motion in the shoulder joint after surgery physiotherapy in 31% increased by 10 degrees, with 23% increased by 30 and 20 degrees, 15% increased by 40 degrees, and in 8% increased by 50 degrees.

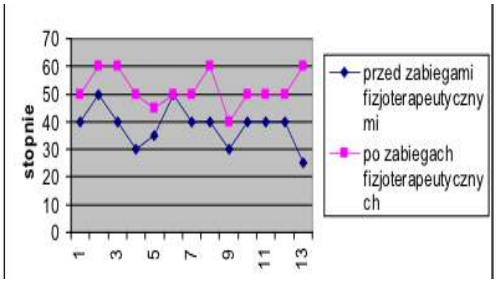

Figure 9. Scope motion adduction in the shoulder joint shoulder joint after injury.

Adduction motion in the shoulder joint after surgery physiotherapy in 8% remained unchanged while in the remaining part was increased by 10 and 20 degrees. Adduction range of motion in the shoulder joint shoulder joint after injury.

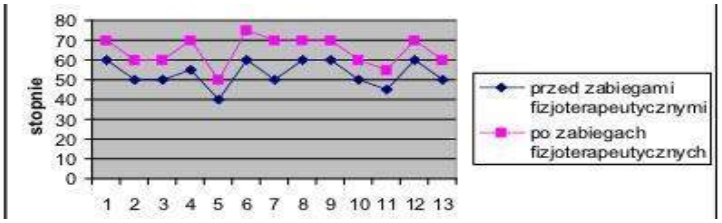

Figure 10. Internal rotation range of motion in the shoulder joint shoulder joint after injury.

Internal rotation of the shoulder joint after surgery physiotherapy in 77% of respondents grown by 10 degrees, 15% by 15 degrees, 8% by 20 degrees.

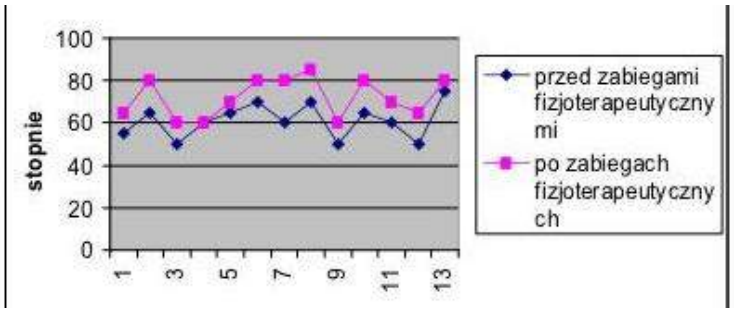

Figure 11. External rotation range of motion in the shoulder joint shoulder joint after injury.

External rotation of the shoulder joint in post-operative physiotherapy in 8% of respondents remained unchanged au remaining part of the movement has increased - from 38% to 10 degrees - from 31% to 15 degrees - 15% by 5 degrees - from 8% to 20 degrees. Internal rotation range of motion in the shoulder joint after injury of the shoulder 0.

Running on muscle strength of upper limb joints.

The data on muscle strength muscles acting on the elbow (by Lovett).

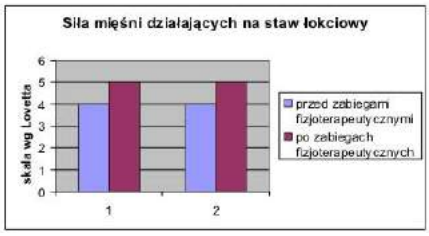

Figure 12. Muscle strength acting on the elbow joint.

67% of the damage in the elbow muscle strength weakened meant to bending and straightening the elbow, these muscles were evaluated at 4 according to Lovett, while 33% had normal muscle strength. After a series of physical therapy strength of weakened muscles came back to normal.

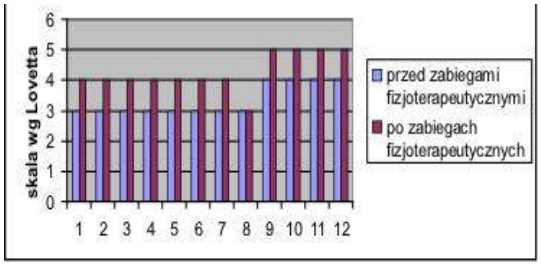

Figure 13. Running on muscle strength carpal joint.

86% of people with damage to the wrist joint meant to weakened muscle strength, the remaining 14% of people had no changes in muscle strength. Among those who had weakened muscle strength 67% had weakened muscles acting on the carpal joint to 3 according to Lovett, and 33% at 4 according to Lovett. After physiotherapy treatments in people with muscle strength according to Lovett 3 obtained 75% improvement in muscle strength, whereas in 25% strength remained unchanged. People with muscle strength 4 according to Lovett on 100% recovered normal muscle strength.

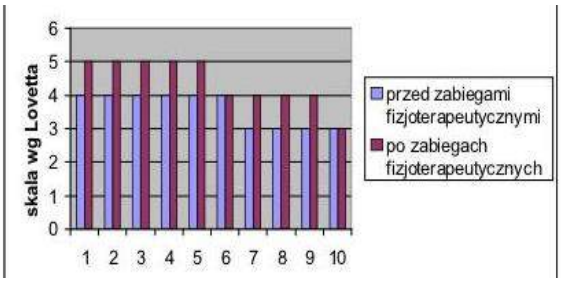

Figure 14. Muscle strength running on the shoulder joints.

Among people who had damaged the shoulder joints 77% of subjects had weakened the strength of muscles running on the shoulder joints, of which 40% of this strength was 3 according to Lovett, 60% 4 au according to Lovett. In 23% of respondents experienced no muscular weakness. After physiotherapy treatments in people with muscle strength 3 Lovett 75% according to the improved strength, while 25% remained unchanged. In subjects with strength 4 according to Lovett 83% returned to normal muscle strength au 17% no changes.

Functional Tests

Among the women performed four functional tests: test 9 holes, translating test pads, the test with the help of measurement, and test Dega wall-mount bracket. After surgery all patients physiotherapy has improved the results of these test page.

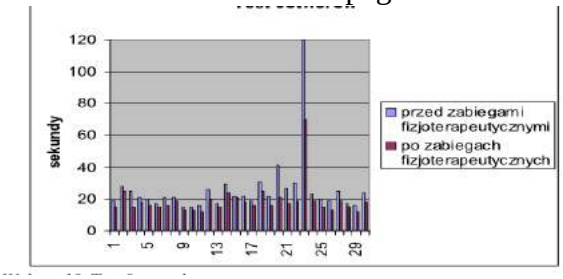

Figure 15. Test 9 holes.

The results of the nine test holes were as follows: - in subjects with elbow injury test result improves an average of 4 seconds - in subjects with traumatic wrist joint test result improves an

average of 10 seconds - in subjects with traumatic shoulder joint test improves an average of 3 seconds.

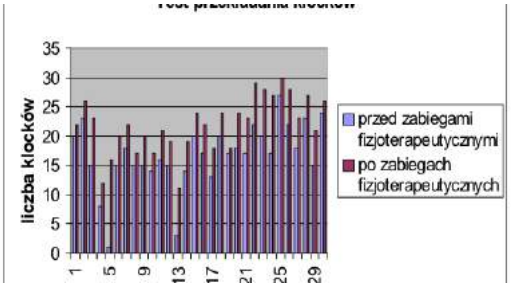

Figure 16. Translating test pads.

In people with traumatic elbow pads translating test increased on average by 4 blocks in people with carpal trauma average of about 4 blocks from the senior injury shoulder joint an average of 5 pads.

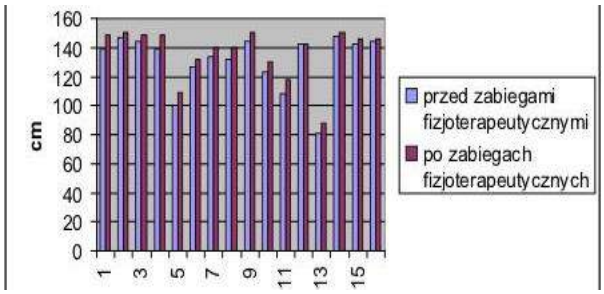

Figure 17. Test with the measure.

In people with elbow injury test with measurement improves an average of 6 centimeters, in people with traumatic shoulder joint outcome has improved an average of about 6 centimeters. For people with carpal trauma in this test, there was no difference compared to healthy limbs.

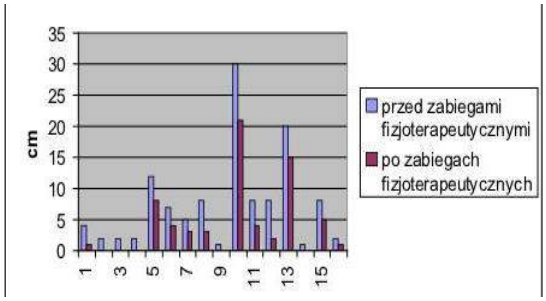

Figure 18. Dega Test wall-mount bracket.

The test results of wall Dega, otherwise movable test reveals limitations in the shoulder joint were as follows: - in people with traumatic wrist joint limitations was not movable at the shoulder joint - in people with traumatic elbow scores improved an average of about 2 centimeters - in people with traumatic the shoulder joint scores improved an average of 3.5 centimeters.

Results and analysis

Study, 30 women were subjected in the age group 40-60 years who had upper extremity trauma. In the study group 47% of the women has any injury radial-carpal joint, shoulder joint 43% and 10% of the elbow. The site of injury to the person examined have traveled. Of all injuries 50% indicated a contusion, a fracture 47% and 3% dislocation.

Discussion

The problem of trauma that occurred in people's lives forever. Many authors undertook their work in this problem. J. Babecki and A. Dziak in 1973 published a book "Fractures and dislocations of joints - Advice for the convalescent." Although the work has more than 30 years the information contained herein are reliable today. The message of the book says that the overall return to health and work can only be achieved by our own efforts and diligence. In the process of rehabilitation carried out these features are also the success and recovery.

In this paper, was presented the most common causes of injuries briefings upper limb according to the World Health Organization. According to the organization's most injuries occur in traffic accidents, accidents at home and are less accidents. M. Matyja, A. Eggs and S. Dragan performed a study evaluating the causes of injury in patients Clinic of Orthopedics and Traumatology of Locomotor Movement in Wroclaw. From their analysis of the injuries were the most common cause of accidents in the home, in second place were traffic accidents [41].

Group E of this research work are women who have undergone upper limb trauma. Have undergone physiotherapy treatment. The main objectives were to improve the rehabilitation process, range of motion, reduce swelling and restore muscle strength. Similar rehabilitation goals put authors of the article "Rehabilitation of patients after fractures of the upper limb" and W. P. Lisinski Stryła of the Medical Academy in Poznań. According to their goal of rehabilitation is taken to maintain good muscle strength, improve range of motion in the joints and acceleration of bone union. Proposals have been submitted by the authors say that the process of improving its limbs after injury is a permanent and necessary part of therapy, which leads to an improvement in its function [27]. This study also confirms this conclusion, since physiotherapy helped to increase mobility in the joints, reduce swelling and increase muscle strength. K. Marciniak in his article "Rehabilitation after injuries limbs" also puts the same objectives as a priority in the rehabilitation process. The same author as a supportive treatment of upper limb function return to normal in the field of physical therapy is now: magnetotherapy, sollux, whirl massage, and laser [39].In this paper, the research group was treated to: laser therapy and magnetotherapy.

Effect magnetic field on the human body has been studied repeatedly. Among other things, attempt to assess the effectiveness of magnetic field therapy took M. Lisiecka-Biełanowicz , A. Krawczyk and A. Lusawa. The authors put forward proposals that magnet therapy is an effective therapeutic method [42]. More detailed studies undertaken Woldańska-Okonska M. and J. Czernicki, who assessed the effectiveness of magnetic fields in physiotherapy. The conclusions presented have confirmed the beneficial effect of magnetic field in the case of post-traumatic states [43].

B. Kurkus and W. Kulinski conducted research on laser therapy, according to the achieved results it is advisable to use laser radiation in the case of upper limb injuries [44].

M. Rosiński conducted research on the elbow injury. The patient has been done to improve range of motion exercises and treatments magnetotherapy. After a 2-week rehabilitation process have had a reduction in limb circumference, increased mobility in the elbow [21]. In the present study also shows that post-operative physiotherapy to reduce the circuit reaches the limb and improve mobility.

K. Kiwerska-Yagodańska proceedings conducted research on medical and streamlining the dislocation of the elbow. In the study group were: measurement of motion in the elbow, measure the mobility of the shoulder joint and wrist, and measurement of muscle strength. After 2 weeks of a rehabilitation in 64.4% of respondents improved limb function: return full range of motion or loss of up to 20 degrees, came back normal muscle strength or weakness does not exceed 10% [45]. The author of the study confirmed that physiotherapy contributes positively to the return of elbow function after injury. Referrers sleep affect physical therapy for injuries of the shoulder and wrist are not yet carried out detailed research. The author of the work comes to the conclusion that these joint physiotherapy treatments also have a beneficial effect.

Conclusions

1. In the group of women between the ages of 40-60 years ESCI The most common injury was a contusion.
2. In the group of women in the age range 40-60 years usually underwent carpal joint injury.
3. Physiotherapy treatments are performed in women with a history of upper extremity trauma contribute to improving the function of the limb.
4. Proceedings physiotherapy carried out in women with a history of upper extremity trauma helps to reduce swelling, increase muscle strength and improve range of motion in the joints.

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Bugaj Anna, Trela Ewa, Nalazek Anna, Zukow Walery. Evaluation to improve the physiotherapy treatment efficiency of patients with osteoarthritis of the hip joints = Próba oceny poprawy sprawności chorych ze zmianami zwyrodnieniowymi stawów biodrowych po zastosowaniu zabiegów fizykoterapeutycznych. [in] Czerwińska Pawluk Iwona Ed., Muszkieta Radosław Ed., Napierała Marek Ed., Zukow Walery Ed. Annual Reports of Education, Health and Sport 9781329876002. RSW. Radom. 2013. 57-82. ISBN 9781329876002. 220 p. © The Author(s) 2013. This articles is published with Open Access at Annual Reports of Education, Health and Sport. RSW. Radom. Poland.

Original Text published © The Author (s) 2012. Bugaj Anna, Trela Ewa, Nalazek Anna, Zukow Walery. Evaluation to improve the physiotherapy treatment efficiency of patients with osteoarthritis of the hip joints = Próba oceny poprawy sprawności chorych ze zmianami zwyrodnieniowymi stawów biodrowych po zastosowaniu zabiegów fizykoterapeutycznych. Journal of Health Sciences. 2012;2(1):57-82. ISSN 1429-9623 / 2300-665X. Open Access Open Journal Systems of Radom University in Radom, Poland ISSN 1429-9623 / 2300-665X. 2012.

EVALUATION TO IMPROVE THE PHYSIOTHERAPY TREATMENT EFFICIENCY OF PATIENTS WITH OSTEOARTHRITIS OF THE HIP JOINTS
Próba oceny poprawy sprawności chorych ze zmianami zwyrodnieniowymi stawów biodrowych po zastosowaniu zabiegów fizykoterapeutycznych

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Number of characters: 100 000 (with abstracts). Number of images: 0 x 1000 characters (lump sum)= 110 000 characters.
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Keywords: prevention; osteoarthritis; hip joint; physiotherapy.

Abstract

Osteoarthritis of lower limb is the most widespread in the world. In principle, there is probably a man who in a certain period of life, to a lesser or greater extent encountered by not with her. This disease can cause pain, or distortion of the joints.

Aim of this study is to determine what measures used by physiotherapists, can be used in the fight against the consequences of osteoarthritis lower limb. The analysis is also subject to the extent to which different types of therapies are used in the struggle with the effects of this disease and the extent to which the various methods adopted by physiotherapists are proving effective. The work is an attempt to answer the question to what extent the commonly used physical treatments are effective and what conditions must be met to obtain the maximum high efficiency, both in terms of analgesic, as well as improve efficiency of movement.

The aim of this study was to confirm the effectiveness of physiotherapy treatment Tens currents and magnetic fields in the case of osteoarthritis of the hip joints. Equally important was to investigate the improvement of patient's health status in osteoarthritis of hip after physiotherapy treatment Trabert currents and laser.

Work is devoted to the influence of physiotherapy treatment for relief of symptoms of osteoarthritis of the hip joints. Theme emphasizes the importance of the fact that this disease is the most prevalent diseases in the world. Almost everyone in more or less in contact with her or she touches him directly.

Work presents physiotherapy activities Tens currents, magnetic fields and currents Trabert and laser, designed to reduce feelings of pain and shows which treatments work best in these situations effectively. It contains information both on how to conduct tests and analyze and discuss a whole.

Conclusions. The results confirmed the hypothesis that better results could be achieved through therapy Tens currents and magnetotherapy, rather than after the application of Trabert currents and laser therapy.

Słowa kluczowe: zwyrodnienie; staw biodrowy; fizjoterapia.

Streszczenie

Choroba zwyrodnieniowa stawów kończyny dolnej należy do najbardziej rozpowszechnionych w świecie. W zasadzie nie ma chyba człowieka, który w pewnym okresie życia, w mniejszym lub większym stopniu nie zetknąłby się z nią. Choroba ta może wywoływać ból, czy powodować zniekształcenia stawów.

Celem pracy jest sprawdzenie, jakie środki stosowane przez fizjoterapeutów, sprawdzają się w walce z konsekwencjami choroby zwyrodnieniowej stawów kończyny dolnej. Analizie podlega również zakres w jakim poszczególne rodzaje terapii są stosowane w walce z efektami tego schorzenia oraz w jakim stopniu poszczególne przyjęte przez fizjoterapeutów metody okazują się skuteczne. Praca jest próbą odpowiedzi na pytanie, do jakiego stopnia powszechnie stosowane zabiegi fizykalne są skuteczne i jakie warunki muszą zostać spełnione, by uzyskać maksymalnie wysoką skuteczność, zarówno w zakresie przeciwbólowym, jak również podniesienia efektywności ruchu.

Celem pracy było potwierdzenie skuteczności stosowanych zabiegów fizykoterapeutycznych prądami Tensa i pola magnetycznego w przypadku zmian zwyrodnieniowych stawów biodrowych. Równie ważne było zbadanie poprawy stanu zdrowia pacjenta w chorobie zwyrodnieniowej stawów biodrowych po zastosowaniu zabiegów fizykoterapeutycznych prądami Träberta i laserem.

Praca poświęcona jest wpływowi zabiegów fizykoterapeutycznych na złagodzenia objawów zmian zwyrodnieniowych stawów biodrowych. Wagę tematu podkreśla fakt, że choroba ta należy do najbardziej rozpowszechnionych schorzeń na świecie. Niemal każdy w mniejszym lub większym stopniu styka się z nią lub dotyka go ona bezpośrednio.

Praca prezentuje działania fizjoterapeutyczne prądów Tensa, pola magnetycznego oraz prądów Träberta i laseroterapii, mające za zadanie zmniejszenie odczucia bólu oraz przedstawia, które z zabiegów działają w takich stanach najbardziej efektywnie. Zawiera informację zarówno na temat sposobu przeprowadzenia testów oraz analizę i omówienie całości.

Wnioski. Wyniki badań potwierdziły tezę, że lepsze efekty udało się osiągnąć dzięki terapii prądami Tensa i magnetoterapii, aniżeli po zastosowaniu prądów Träberta i laseroterapii.

Introduction

Osteoarthritis of lower limb is the most widespread in the world. In principle, there is probably a man who in a certain period of life, to a lesser or greater extent encountered by not with her. This disease can cause pain, or distortion of the joints.

Aim of this study is to determine what measures used by physiotherapists, can be used in the fight against the consequences of osteoarthritis lower limb. The analysis is also subject to the extent to which different types of therapies are used in the struggle with the effects of this disease and the extent to which the various methods adopted by physiotherapists are proving effective. The work is an attempt to answer the question to what extent the commonly used physical treatments are effective and what conditions must be met to obtain the maximum high efficiency, both in terms of analgesic, as well as improve efficiency of movement. To achieve the objective of the research needed is a short overview of the practice - in factories physiotherapy - forms and methods of physical therapy.

Osteoarthritis is formed as a result of "wear and tear" arthritis. Injuries and constant mechanical loading of joints throughout life lead to mechanical abrasion of the cartilage. Arthritis occurs in most people it is estimated that at least to some extent, affects half of those over 40 years of age and almost all over 60 years of age. Interestingly, much faster and more widely it occurs in women than men. There is also a cause of degenerative disease - it is mostly due to the interaction of many different factors. Such factors may be such as previous injuries and joint diseases, too little physical activity, posture, sex, age, certain occupations, obesity and genetic factors. Rehabilitation is one of the elements of preparing for the possible elective surgical treatment of degenerative changes. [1-3, 19].

The most important for our body motoring have three joints of lower limbs - hip, knee and ankle. Damage to any of them mean serious problems in movement, in the case of serious injury or even prevent the disease independent of movement.

Anatomy and physiology of the hip. The hip joint (articulatio Cox) connects the rim of the lower extremity lower extremity free. The pond comes a deep acetabulum and the pelvic bone of the femoral head. Acetabular articular surface is a broad, unclosed covering the bottom ring cavity, called the pit acetabulum. At the edge of the acetabulum is fastened articular cartilaginous seam. Femoral head is covered by a bush outside the equator. [1, 18, 19].

Strengthens the hip handbag many ligaments. The strongest of these is the ilio-femoral ligament (ligamentum iliofemorale). It runs from the front hip area of the lower spike to intertrochanter borderlands. This ligament inhibits excessive straightening of the thigh and is important in maintaining erect posture. Pubo-femoral ligament (ligamentum pubofemorale) is dissuading the thigh, and ishiofemorale ligament (ligamentum ischiofemorale) adduction excessive. Ligament lies the femoral head and connects interarticular bottom of the pit will acetabular femoral head. This ligament (ligamentum capitis femoris), stretched between the pit head and bottom shells, inhibits the movements of adduction and rotational movements to the outside. But there is no mechanical significance. Relative importance in the structure and tasks of the hip also plays a circular layer (zona orbicularis). It is a circular band of fibrous, extending around the neck of the anatomy of the femoral head. Circular layer reinforces the articular capsule, relaxes and stabilizes the hip joint. [1, 2, 19].

Hip axial skeleton serves as the supporting limb cushioning and shock absorbing as well as helps stabilize the torso and spine support while walking, running or jump. Articular surfaces of the head and the acetabulum are covered with hyaline cartilage, which is moistened synovial fluid, rich in chondroitinsufatis produced by the synovial membrane. Lubricating properties of cartilage and fluid friction forces allow to obtain 100-fold less than the friction of ice on ice. Periarticular muscles and ligaments that allow you to dynamically stabilize the limb against the trunk, or vice versa (at the limb based the ground) during any physical activity. This process takes place very smoothly and harmoniously with the antagonist (eg flexors and rectifiers) and agonist (eg co-rectifier) supported the so-called muscle activity. proprioception (deep feeling). [2, 19].

Biomechanics of the hip joints. Pond is one of the hip joints of the human body, where there are so called. three degrees of freedom. In other words, performs movements in each plane and around each axis. In the ponds there are two basic moves: Transfusion and Slip forces. Acting on the hip joint can be divided into external and internal. External forces are the attraction of the earth, and the forces supporting interaction with other bodies which act on the human body. Internal forces are the forces resulting from the action of muscles. The hip joint moves the static and dynamic loads resulting from weight loss, muscle forces acting on the pond and the acceleration and the Earth's gravity. Angles and directions of muscle force vectors acting on the pond are variable, depending on the function and gait phases. While support for both limbs, it is assumed that the S4 in the center of gravity load from the head, torso and upper limbs constitute 62% of body weight. While support for one leg hip joint load transfer from the head, KKG torso, and the other KD. The center of gravity is located in the S5, accident downforce K represented 81% of body weight. In single-phase load total value of the limb joint loading forces due to the impact of body mass and strength with which they act on the pond mm periarticular. [3, 4, 26].

Model Pauwels - vector model of the resultant force R is applied at an angle of 16 'while standing at the point of stand one foot 0, covering the anatomical center of the femoral head. Shoulder abductor force runs from the pivot point 0 to point k, which is the projection of the center of gravity on a horizontal pivot runs through the 0th The strength of R is the resultant size of the reduced body weight, and Pz = 0.81P M mm abducent strength of the hip, pelvis stabilizing and balancing the body weight. In the horizontal plane taken into account the impact of rotating thighs mm Movement in the hip. [5]. F m - extensor muscle strength, F m1 - flexor muscle strength.

Model Maqueta - band call of the wide thigh fascia is written by the abducent muscles. It is stimulated as a rod running along the shaft of the femur from the knee to the pelvic bones. The impact of ilio-tibial band give an additional horizontal force, which stabilizes the hip joint. [5]

Active model takes into account both the impact of load effects on the body mass near the femoral head R, Impact mm abducent M, ilio-tibial band T, the impact of rotator cuff causing femoral torsion k. [6, 7, 8].

Degenerative changes. Definition of osteoarthritis. Osteoarthritis (degenerative-deforming) is not a single disease entity, but a team of pathological changes resulting from the combination of the destruction of joint cartilage and secondary changes in the subchondral bone layer [6, 9, 26]. The concept of degeneracy we mean adverse changes throughout life in the processes of biological tissue. Degeneration is a result of cell aging and adverse changes in its interior, following a number of summarizing the physical and biochemical factors disrupting their functions. These changes lead to damage to the anatomical structure of the pond, an impaired function and pain. These changes may be accompanied by a secondary inflammation of synovial membrane, which explains the more commonly used last name instead of the previous osteoarthritis osteoarthrosis [6, 10, 28]. Degenerative-deforming changes have long been regarded as a disease associated with aging of tissues, and the name morhua senilis, which was originally given to this disease, its etiology prejudge [6, 11, 29]. Ground joint degenerative changes are usually a variety of congenital and acquired, past injuries, metabolic diseases, obesity, excessive overload the joints, lack of physical activity, adopting the wrong posture and many others [6, 12, 31]. Unfortunately, they often consciously or not consciously accelerate these processes.

Division of degenerative changes. Osteoarthritis is divided into primary (idiopathic) and secondary. We distinguish the following subtypes of osteoarthritis: - erosion - inflammatory - destructive character, rapidly progressive (on the shoulder joints, and less hip and knee in the elderly). [13, 23].

The figure includes primary osteoarthritis: peripheral joints, especially the proximal and distal interdigitalis (formed there, and Bouchard's nodules Heberdena) joints of the cervical intervertebral discs and lumbar spine, the first metatarsophalangeal joint-digitalis, hip joints, knee joints [14, 26]. Secondary osteoarthritis is probably the result of changing micro-environment cartilage disorders. It includes: congenital abnormalities of joints, genetic defects (infectious, metabolic, endocrine, nervous system-related) disease, changing the structure and function of normal hyaline cartilage (rheumatoid arthritis, gout, chondrocalcinosis), trauma (fracture), arthritis associated with overload occupational [15, 28]. From a clinical point of view, divided into the following subtypes of osteoarthritis of the hip:

I. Depending on the shape of the acetabulum: 1 koksartroza of the acetabulum is too shallow - dysplastic; 2 the pan is too deep - protrusion; 3 with normal acetabulum.

II. Depending on the relationship between the destructive process and manufacturing process: 1 Destructive (also considered a form of sterile necrosis of the femoral head in adults); 2 hiperostotyczna (with a predominance of osteophytes on the characteristics of destruction, in the form of the limb dysfunction is associated primarily with reduced mobility in the joint); 3 Mixed form (linking changes occurring in the previous types [16, 23, 28].

Clinical symptoms. Osteoarthritis is the most common rheumatic diseases. Sick of it about 50 percent. adults, of which 90% are in the elderly [17, 28]. For people affected are mainly occupied ponds loaded with body weight. Typical for this disease is a bold stroke of joints, especially knees, and the deformation axis of the lower limbs. Most patients report to the doctor because of pain described as a growing pain, deep, dull, escalating the weather changes and increased activity. The pain associated with the activity occurs immediately or shortly after the initiation of movement and can last briefly or for several hours after the operation [18, 28]. Some people notice the first signs of a pond after a minor trauma or after intense physical activity. In advanced stages, pain may be continuous and interrupted sleep. In the course of the changes patients become less mobile and may feel crepitus, blocking or friction in the joint during movement. These changes are not symmetrical. The patient's general condition is good. Sometimes the disease is limited to one or more joints. In some cases, changed the joints are slightly thickened. To significant mobility limitations or disability occurs rarely [19, 26, 28]. A common symptom of osteoarthritis of the hip pain is felt especially by the local standing, walking on stairs or a long walk. This pain can radiate to the groin, sometimes to the thigh and knee, in some cases there are limitations to mobility in the joint, the patient may have problems with the assumption foot to foot. May restrict the mobility of the visit, extension and rotation to the inside. The patient may have a functional short leg as a result of contracture in the pond. Symptoms can also include stapes flexio-adduction contracture in external rotation [20, 22, 28].

Pathophysiology of lower limb joints. Proper ponds have a low coefficient of friction and the actual operation does not undergo premature wear. Condition and function of cartilage depend on the pressure exerted on it and its release at the time passing by a pond in his work. Pathophysiological process in osteoarthritis is a progressive, manifested inter alia, increased synthesis of bone tissue [21, 22, 26].

As more and more severe bone formation in the layer of subchondral change its physical properties. The bone then becomes stiffer, less compliant, microfractures may occur. As a result of metaplasia of cells of peripheral osteophytes synowial form. In addition, bone cysts arise and come to rugged and hyaline cartilage defects. There is also a process of proliferation of the synovial membrane and its mild inflammation [22, 23, 26].

Congruence is a very strong fit two joint surfaces together. The greater congruence, including a pond more than a rolling sliding motion. Each, the smallest structural change causes the

cartilage that is affected slide and the whole pond is distorted, leading to degenerative changes. It occurs in the so-called. Codmann paradoxical symptom. When we put the patient on spine and bow the knee to the hip joint angle of 90 degrees, and then execute his visit to the side and snap, it should set the leg in external rotation without moving any such distributions made before the rotation. Any disturbance of these moves we will restrict mobility and function of the hip. Just that there will no longer limit the extension and other moves will not be performed in physiological ranges. In addition, it will be overloaded foster joint surfaces not designed for data movement, ie, during the course of motion, joint carries the load on the concrete, adapted to this part of the articular cartilage. During one of the movements, when the other is abnormal loads are transferred to the inadequate to the articular surface fragments. During the rehabilitation of this joint endeavor above all to play all the movements, for example, limit the movement of internal rotation may result in dislocation and even fracture endoprosthesis. [22, 23, 26, 29].

Diagnosis of the disease. The diagnosis of osteoarthritis is relatively simple, it should be remembered for other more common diseases of RA spondyloarthropathy. Distribution of articular symptoms different from a typical location points to secondary osteoarthritis and requires further diagnostic procedure of the disease. Results of laboratory tests allow to rule out other causes of arthritis (rheumatoid arthritis, gout). ESR is usually normal or slightly accelerated. Synovial fluid is clear [24, 29, 44].

The most important additional test for the diagnosis of the disease is X-ray taken in the anteroposterior projection.

Typical changes indicating the degenerative process are the following radiological signs: 1 density of subchondral layer of woven bone (osteosclerosis subchondralis); 2 joint space narrowing; 3 woven bone rebuilding dominated by clumps; 4 cystic formations (so-called degenerative geodes); 5 intra-marginal shafts and bone (osteophytes); 6 inside the articular cartilaginous-bony body; 7 bony eminence on articular surfaces; 8 distortion joint ends. [1, 2, 6, 9, 23, 24, 28, 44].

These changes in points 1 to 4 belong to the destructive changes of cartilage and bone subchondral. The earliest changes are sclerotic subchondral and joint space narrowing. The next symptoms are typical changes in the more advanced degenerative process. Do joint manufacturing reactions include changes named in points 5, 6, 7 Joint ends, while distortion is extremely advanced osteoarthritis symptom and result of malignancy and bone destruction and deepening the defective distribution of forces. These are very common mushroom distortion, flattening of epiphysis, setting varus, valgus, subluxation and dislocation. A characteristic feature of advanced degenerative disease is also a significant degree of joint space narrowing or even its complete obliteration. Coxarthrosis progression can be assessed by measuring joint space width, which is of prognostic significance. It is believed that the loss in image X-ray joint space above 0.4 mm within 2 years may indicate a need for future knee replacement [23, 28, 44]. The above-mentioned symptoms are radiological characteristics not only for coxarthrosis, but also act as astigmatic in any other location, the process of degenerative arthritis. A characteristic symptom of X-ray for osteoarthritis of the hip, although rare, is the so-called bottom of the pan duplication. It occurs in cases of degenerative process involving the lower pole of the acetabulum. Currently, the radiological assessment in 1986 recommended a 4-point scale Altman. According to this standard specifies the 0 deg, 1 deg - benign, 2° - moderate changes, and 3 deg - advanced. In the assessment of the hip and acetabulum separately for the femoral head should be taken into account osteophytes, joint space width, subchondral sclerotic and mutual orientation of the bones forming the joint. [6, 25, 28, 29, 44].

Imaging using computed tomography or magnetic resonance imaging, primarily for economic reasons, the diagnosis of osteoarthritis of the hip is less important [26, 28].

Treatment and rehabilitation. Prophylaxis. Prevention is the most effective form of combat problems arising from the locomotor dysfunction. If we want to prevent degenerative diseases and disorders often accompanying painful need through targeted behavior and specific exercises to align motor deficit. The most important methods to prevent the emergence of hip pain should be kinesio prophylaxis, or treatment of motion. It must be remembered that the effects do not

occur rapidly and are dependent on the systematic exercise. It is also outside the gym during daily household or occupational activities, to follow certain rules of conduct and then we can expect a proper preventive effect. [3, 27].

Here are some recommendations [2, 6, 22, 27, 36]:

-To avoid congestion in the nonphysiological position, eg long-term;
seat or condition;
- Change in working conditions (if possible);
- Reduction in body weight (for obesity);
- Preventive examinations;
- Movement: swimming, cycling, dancing;
- Keeping a healthy lifestyle.

Pharmacological treatment. The course of osteoarthritis is a progressive, goal of this treatment is to alleviate symptoms, especially pain and to enable the introduction of exercises to improve. Drug treatment includes pain killers, drugs acting on the cartilage, muscle tension lowering drugs and glucocorticoids. With analgesics first used drugs acetaminophen or nonsteroidal anti-inflammatory group. These measures in the recommended doses, are generally safe to use. In the treatment of disease are important medications to reduce muscle tension (miorelaxation) eg tolperyzon, tetrazepam, baclofen is used in osteoarthrosis in small doses, and provide relief in those cases where the pain is intensified by increased muscle tension associated with a pond pathologically changed [22, 28, 31]. These preparations are potent, available only on prescription. In the case of a large effusion or inflammatory glucocorticoids benefit the potent anti-inflammatory, analgesic and immunosuppressive. Glucocorticoids, however, are double-edged sword. On one hand, quickly reduce inflammation, but on the other hand lead to a longer apply different side effects occur: osteoporosis, diabetes, skin atrophy, acne, edema, cataract, fragile blood vessels. Therefore, you should restrict their use to a minimum. The disease is also useful for drugs affecting the structure of cartilage such as glucosamine [29, 31, 33].

Physiotherapy. The aim of treatment is primarily physiotherapeutical minimize pain, reduce pain, somatic tissue, it has to counteract reduced mobility. It should also influence the prevention of contractures in the muscles and prevent muscle weakening. Physical treatments act on the body to trigger specific physiological responses. For example, contraction or dilation of blood vessels, reduce sensitivity to pain. Treatment is always used in series, allowing you to consolidate the positive effects and improving the ability of the regulatory body. Physiotherapy is not always able to replace the action of pharmacological agents, but in many cases allows them to be limiting. [10, 14, 29].

Electrotherapy. Each current in sensory tolerance to the analgesic effect. You can maximize the performance shaping its intensity and mileage. [30].

TENS currents. TENS (Transcutaneus Electrical Nerve Stimulation) is a special type of electrical stimulation uses low-frequency pulsed currents mainly to treat pain. TENS is a noninvasive method, introduced in 1965 by the Canadian Ronald Melzak and Wall's. The Briton Patrick currents TENS stimulation pulses applied rectangular, triangular, unipolar or bipolar, and also arranged, packages'. Commonly used are asymmetrical biphasic pulses. Clinically significant importance are two types of TENS, called. conventional (high-frequency, HF-TENS) acupuncture and TENS (low-frequency, LF-TENS) There are also burst TENS (explosive), Brief Intense TENS (hiperstimulative) or modulate. [30, 42, 43].

In conventional TENS applies a high frequency (50-200 Hz) and low current, the patient felt mild within 25-30 mA. The proposed treatment time varies from 30 minutes to several hours a day. Analgesic effect after the application of conventional TENS appears quickly, but it does not last long: 30-60 min. Apply this type of therapy in acute pain.

TENS at low frequencies (1-10 Hz) is also called acupuncture. Apply current above the threshold of tolerance. The treatment time should not exceed 45 minutes. Analgesic effect in this case appears late, but it lasts longer, even up to 240 min. The mechanism of action involves

activation of descending antynocept. This therapy is used in the fight against chronic pain. Physiotherapists have a choice of two-or stimulation with fourelektrod. Commercially available electrodes are of different size and shape, must be easy to fix. They should not be smaller than 4x2 cm, not to cause burns. Often used elektrtrody coal or special hypoallergenic materials. [22, 31, 44].

Trabert currents. Very popular because of its analgesic efficacy gained so."Trabert currents" are often labeled as the "UR (Ultra Reiz - ultra-stimulants - in German) or" 2-5 Electricity "(name derived from the definition of power: 2 ms pulse / pause 5 ms). Currents of "UR" gained its rightful place in electrotreatment since the publication 50 years ago (in 1957) by Dr. H. Trabert their experimental work on the currents analgesics. Trabert currents are the most known and used, mostly due to the fact that many, especially newer electrotherapy devices, it has in its composition. The indications for the use of those currents are especially osteoarthritis. Measure current Trabert is multifaceted, is a potent bodźcowym, leading to reduced impact of pain, especially a few hours after the procedure. This effect is more noticeable in the daily repetition of treatments, especially when near the area of pain will be applied on the negative electrode (cathode). Action Trabert currents in this case consists of a strong inhibitory influence conduction of pain impulses in the area called. nerve roots. Another important factor in the biological action of UR is the current weakness of sympathetic activity (sympathetic) and relaxing effect on the spastic (which are in constant voltage) spinal muscles. It must be noted that muscle spasticity is the reason for the severity of pain in the diseased area, which creates a kind of closed circle: muscular tension> pain> muscular tension> pain and so preventing the exit of the loop. Muscle tension hinders the flow of blood to the patient space, as well as removing waste products, which often leads to worsening of the disease process. If you stop this vicious circle Trabert currents can initiate the process leading to a cure with the additional use of other treatment methods such as medication, manual therapy or rehabilitation. The third important feature of the therapy is the introduction of these currents in muscle tremor with a frequency of 143 Hz stimulus frequency compatible with them current. It is said in this case a stimulating massage shock (impuls), causing muscle relaxation. [22, 31, 32, 42, 43].

Laserotreapia. Biostimulation laser is non-invasive, no type of thermal treatment, which activates the natural defense mechanisms and repair. Laser action in addition to analgesia, anti edema and anti-inflammatory action is the activation of pharmacological agents [33]. Stimulatory action of the laser leads to protein synthesis and cell regeneration. Analgesic effect is associated with reduced inflammation and the release of endorphins, the body of substances produced by analgesics [3, 16, 24].

Magnetotherapy. Magnetic therapy is a pulsating magnetic field of low frequency. Advantages of the magnetic field penetration evenly through all parts of the body. Ability to perform procedures through clothing, bandages, plaster, etc., which do not constitute an obstacle to the magnetic field, the metal is not a contraindication to the surgery, this method does not magneto thermal [35]. The beneficial effect of magnetic fields is expressed accelerated bone reconstruction, better use of oxygen in the body, reducing pain perception. Inductance of the magnetic field varies from 0,5 min -10 min, the frequency from 1 to 50 Hz. The duration of treatment is an average of 20 min. Depending on the period of the disease, the following parameters. During the acute intensity of up to 3 mt and the frequency to 5 Hz. However, in the subacute state intensity is up to 5 mt and the frequency to 20 Hz. When it comes to chronic disease intensity is up to 10 mt and the frequency to 50 Hz [3, 22, 36, 45].

Kinesitherapy. Plays an important role in the treatment of degenerative diseases. Its aim is to not allow to create distortions and reduce pain. Exercises are also identified as factors supporting performance. Type of exercise must be properly selected so as not to cause exacerbation of the disease process [37]. There are the following types of exercises occurring in improving patients with osteoarthritis: 1. Steps-passive exercises involve the active participation of the patient with muscle relaxation trening. 2. Active exercises are aimed at strengthening the muscle strength to maintain the full range of motion and prevent distortion. Active exercises are appropriate to maintain or increase the full range of motion in joints and muscle strengthening. They are used at

normal or not significantly impaired muscle strength. These exercises are conducted in isolated positions, are an integral part of the treatment of degenerative diseases. The disease used systematic daily exercise to maintain a full range of motion in the joints. A set of exercises is chosen in such a way that the movements were performed in each position. [10, 38, 44, 45].

Methodological basis of research. Research Objectives: The aim of this study was to confirm the effectiveness of physiotherapy treatment Tens currents and magnetic fields in the case of osteoarthritis of the hip joints. [34, 38, 39, 40].

The aim of the research work was to investigate the improvement of patient's health status in osteoarthritis of hip after physiotherapy treatment and laser Trabert currents.

Hypotheses. Analyzing the factors constituting the theoretical part of the work, you can - based on their knowledge and the effects that so far brought a similar survey conducted in rehabilitation centers around the world - put the following hypotheses on the effects of physical therapy. [25, 34, 38, 39, 40, 41].

1. The analysis of our own experience of cooperation with rehabilitation clinic in Gołańczy can be considered as third respondent will feel the improvement in the efficiency levels of physiotherapy after the surgery performed.
2 As a working assumption we can assume that half of the patients after surgery performed physiotherapy will feel a sharp reduction in pain.
3. Greatest level of improvement in terms of increased range of motion and efficiency can be expected as a result of the application in the form of physical therapy Tens currents and magnetic fields.

Subject of research. The object of study is to evaluate the impact of physical therapy in terms of analgesic action, antoedema and anti-inflammatory, and so their impact on improving the quality of life of patients suffering from degenerative hip joints. The study was conducted in private in the Department of Rehabilitation Refiks in Gołańcz. The research material was obtained by examining a group of 30 patients suffering from osteoarthritis of the hip. The survey was conducted during the period from 02.11.2010 till 29.04.2011. In order to control the results of the treatment rehabilitation of patients were observed twice a study. The first destination survey - initial - was conducted in the early days of registering the patient for treatment physiotherapy. Study second - Comparative - before the end of rehabilitation treatment. The study group included 24 women, representing its 80% and 6 men, 20% aged from 47 to 82 years. The average age was 62 years. Patients were typical of a group of people who suffer from osteoarthritis, both taking into account the age and sex.

Research methods [22, 24, 40]

The study consisted of two parts.
I. The physical examination included:
- Personal data
- Age
- Diagnosis and course of disease.

II. The study included symptoms:

1. Measurement of mobility in the hip joint:

Range of motion-flexion
- Extension
- Abduction
- Adduction
- External rotation
- Internal rotation;

2. Test Lovett

3. Functional tests:

a. Test the end of the fingers

b. Test Anvil
c. symptom Drehmann
d. The test of pain when shot in the thigh axis
e. test two scales
4. scale of pain.
III. The method of subjective testing.
1. Measurement of mobility in the hip joint [22, 24, 40, 42]:

Flexion.
P.c. - supination, stabilization of the pelvis.
Axis protractor - greater trochanter of the femur.
Arm moving - head arrows.
Immobile arm - along the trunk, parallel to the ground, facing the axilla.
Movement – flexion.
Norma - between 115° and 125°.

Extension.
P.c. - pronation, stabilization of the pelvis, feet off the ground.
Axis protractor - as above.
Rami e mobile - as above.
Rami e still - as above.
Motion – Extension.
Norma - between 10° and 30°.

Abduction – hip.
P.c. - supination, stabilization of the pelvis.
Axis protractor - spike belt front upper.
Rami e mobile - along the long axis of the thigh to the kneecap.
Rami an immovable - perpendicular to the long axis of the body, located on both the front upper iliac spines.
Movement – visit.
Norma - 40° and 50°.

Adduction – hip.
P.c. - eg.
Axis protractor - as above.
Rami e mobile - as above.
Rami e still - as above.
Movement - Bring
Norma - 25 ° and 30 °

External rotation – hip.
P.c. - sit with hanging shank, thigh and stabilization femur or autostabilization.
(Supports hand).
Axis protractor – patella.
Movable arm - directed vertically downwards along the long axis of the tibial.
Arm immobile - in parallel to the plane.
Movement - external rotation.
Norma - 25° and 40°.

Internal rotation – hip.

P.c. - eg.
Axis protractor - as above.
Movable arm - as above.
Arm motionless - as above.
Movement - ext rotation.
Norma - 30° and 40°.

2.Lovett test:
1 - perceptible contraction of the muscle,
2 - a clear contraction of the muscle, the muscle ability to perform movement of relief,
3 - active movement of overcoming the weight of a section of the body,
4 - active movement with some resistance,
5 - active movement with full resistance suitable for the patient.

3.Functional tests [4, 10, 18, 22, 24, 40]:

Test Anvil
Execution: The patient lies on his back, the legs are straight. The examiner with one hand gently lifted leg straight and the other struck his fist on the heel in the axial direction.
Interpretation: Impact force moves to the hip, pain in the groin or thigh near the hip show the hip joint disease (osteoarthritis inflammation).
Test the end of a finger
Performance: test - sitting - bend the leg in knee and hip and draws her hand to the body.The second lower limb is straight. A respondent recommended homologous hand reach for toes without bending legs at the knee. The test is made in this way, the opposite pair of limbs.
Interpretation: If there is contracture test is not able to touch toes, complaining of pain at the same time pulling on the back of the thigh. Distance from the end of the middle finger do the big toe, while perpendicular to the ground set foot ruler can be measured in centimeters. We estimate the resulting distance and differences between the two parties.

Symptom Drehmann:
Execution: The patient lies on his back. The examiner grasps the lower limb and foot at the height of the knee and flexion exercise. If during the bending rotation of the limb grows outside of the hip, we are dealing with his illness. The movement sometimes causes pain.
Interpretation: In young people a positive sign Drehmann speaks primarily Slipped capital femoral epiphysis. During exfoliation causes flexion of the hip joint while the external rotation. The test may be positive for infection of the hip, degenerative changes beginning on or tumors.
Test two scales:
Many healthy people in a standing position is not borne equally on both legs, so a slight wobble. Using two bathroom scales can be indicatively assess differences in the burden of both limbs. After scaling of both weights and set them parallel to each other at a distance of 5 cm in the test should set foot on one and the second weight, adopt a relaxed posture, with lowered upper limbs and eyes facing forward. Then checked by using a weight division abandoned the occipital tuberosity. At the same load on both lower limbs of healthy weight people should be centered between the two scales. The examiner stands behind the test, read the clock weight load on each leg strength, expressed in kilograms. The wrong I recognize the difference in the burden of both feet ranging in adults 5 kg, and in children 3 kg. Dividing the value read by the reading much smaller, is obtained which is called the quotient. indicator of the symmetry of the load of the lower limbs. The correct value of the assumed rate of 1 – 1,5.

Test pain when shot in the thigh axis:

Design: A patient in the supine position - one lower limb erect, the other bent at the knee and rotated outwards in the hip. Lateral ankle bent leg patella lies over the other limb. The examiner covers both hands distal thigh and pushes and pushes it in the axial direction.
Interpretation: This movement increases the pressure in the hip joint in the direction of the pelvis. Groin pain indicates hip joint diseases such as osteoarthritis.
Scale of Pain. Visual analogue scale is the simplest method used to assess pain. Virtually pain scale is 10 cm in a straight line on which the patient selects a point that corresponds to his perception of pain. Point "0" means the total absence of pain and "10" is the strongest pain. [41].
Physiotherapy performed. Laser was performed by laser-1, D68-point energy of radiation dose of 8 to 12 J / cm 2, in the case of the hip, this dose is changed to 6 to 10 J / cm 2.Contact method is used only in the case of laser on the skin intact, with the head lightly touches the skin, possibly with a mild emphasis. Treatments with the magnetic field was performed using the device Magnoter D56 A BL. The following parameters were used applicator 60 cm: the frequency of 50-60 Hz, treatment time 10 min, induction of 40 - 99%, the shape of the field - sinusoidal.
Treatments **Tens and Trabert currents** were performed using Inter D64 camera. The duration of action of both current was 15 minutes. The intensity of currents varied depending on the patient's feelings.
Results and analysis of the results. The study included two measurements:
1 - the measurement conducted in the early days of patient registration
the rehabilitation treatment;
2 - measurements carried out at the end of treatment.

1. The research group for patients undergoing therapy with Tens currents and magnetic fields.
The study involved 15 people including 13 women and 2 men.

Results and the analysis of the results. Two measurements included examinations:
1 - measurement conducted on the first days of registering the patient
for the streamlining treatment;
2 - measurement conducted at the end of the treatment.

1. Examining the system of patients subjected to therapy with Tens electricities and the magnetic field.
15 persons were put through an examination including 13 women and 2 men.

Table 1.1. Assessment of the extent of the movement of bending in the hip joint in the system of 15 patients before and after treatments with Tens electricities and the magnetic field.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Before	113.1333	15	7.53910	1.94659
	After	114.4000	15	8.11348	2.09489

Test for dependent attempts

	Differences in dependent attempts					t	df	Significance (double-sided)
	Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
				Lower limit	Upper limit			
Vapour 1 Before - after	-1.26667	1.48645	, 38380	-2.08983	-, 44350	-3.300	14	, 005

In the examined system of 13 women a growth of the degree of the range of the movement was noticeable - most often about 1°, in one case the growth took out 5°. At three patients no changes in the get range of the movement were only observed.
Growth at both men observed of the range of the movement against one step.

Table 1.2. Assessment of the extent of the movement of the extension in the hip joint in the system of 15 patients before and after made with treatments with Tens electricities and the magnetic field.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Before	15.3333	15	3.33095	, 86005
	After	16.4667	15	3.75817	, 97035

Test for dependent attempts

		Differences in dependent attempts					t	df	Significance (double-sided)
		Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
					Lower limit	Upper limit			
Vapour 1	Before - after	-1.13333	, 83381	, 21529	-1.59508	-, 67159	-5.264	14	, 000

In the examined system of women they noticed that at 4 women the range of the movement had risen after made treatments by 1º, and at 6 women, about 2 st, and at 3 women didn't change.
At both examined men the range of the movement grew about 1°.

Table 1.3. Assessment of the extent of the movement of visiting in the hip joint in the system of 15 patients before and after made with treatments with Tens electricities and the magnetic field.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Before	26.4000	15	6.02139	1.55472
	After	27.6667	15	6.22973	1.60851

Test for dependent attempts

		Differences in dependent attempts					t	df	Significance (double-sided)
		Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
					Lower limit	Upper limit			
Vapour 1	Before - After	-1.26667	, 88372	, 22817	-1.75605	-, 77728	-5.551	14	, 000

In 13-persons group at three patients enlarging the range of the movement wasn't only stated - in other cases the rise reached from one to three ranks (in one case).
At both men, being in an examined system the growth of the range of the movement of visiting was one degree.

Table 1.4. Assessment of the extent of the movement of driving in the hip joint in the system of 15 patients before and after performed treatments with Tens electricities and the magnetic field.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Before	22.0000	15	3.20713	, 82808
	After	23.2000	15	3.78342	, 97688

Test for dependent attempts

		Differences in dependent attempts					t	df	Significance (double-sided)
		Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
					Lower limit	Upper limit			
Vapour 1	Before - After	-1.20000	1.14642	, 29601	-1.83487	-, 56513	-4.054	14	, 001

As a result of treatments it reached the improvement in the move of driving at almost of all examined women - in two cases no changes were only registered. Enlarging the range of the movement has most often reached 1º, but in one case was twice as bigger, and at one of patients a growth of the range of the movement of driving was registered - for five deg.
Made treatments led for enlarging the range of the movement at both men about 1°.

Table 1.5. Assessment of the extent of the movement of the outside rotation in the hip joint in the system of 15 patients before and after performed treatments with Tens electricities and the magnetic field.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Before	23.6000	15	3.20268	, 82693
	After	24.6667	15	3.59894	, 92924

Test for dependent attempts

		Differences in dependent attempts					t	df	Significance (double-sided)
		Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
					Lower limit	Upper limit			
Vapour 1	Before - After	-1.06667	, 59362	, 15327	-1.39540	-, 73793	-6.959	14	, 000

Only in two cases in the examined system, counting 13 women, didn't reach the change in the move. In other cases a growth of the range of movements was registered about 1 - 2° of physiotherapy treatment in the end performed.
At both examined men a range of the outside rotation increased appropriately about 1 and 2º.

Table 1.6. Assessment of the extent of the movement of the internal rotation in the hip joint in the system of 15 patients before and after performed treatments with Tens electricities and the magnetic field.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Before	25.6000	15	3.56170	, 91963
	After	26.4000	15	3.62137	, 93503

Test for dependent attempts

		Differences in dependent attempts					t	df	Significance (double-sided)
		Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
					Lower limit	Upper limit			
Vapour 1	Before - After	-, 80000	, 41404	, 10690	-1.02929	-, 57071	-7.483	14	, 000

At two of 13 women participating in examinations no changes were only stated in the move, in each of remaining cases sought the internal rotation for increasing the range on level 1°.
At both examined men after made treatments the range of the movement in the pond during the move of the internal rotation increased about 1°.

Table 1.7. Lovett test. Made in system 15 pacijentów before and after performed treatments with Tens electricities and the magnetic field. Examining strength of muscles.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Gluteal large before	3.0000	15	, 75593	, 19518
	Gluteal large after	3.2667	15	, 70373	, 18170
Vapour 2	Femur lumbar before	3.0000	15	, 65465	, 16903
	Femur lumbar after	3.3333	15	, 72375	, 18687
Vapour 3	Four-sided before	3.0000	15	, 75593	, 19518
	Four-sided after	3.3333	15	, 61721	, 15936
Vapour 4	Gluteal small before	3.2000	15	, 67612	, 17457
	Gluteal small after	3.3333	15	, 72375	, 18687
Vapour 5	Adductor muscle before	2.9333	15	, 70373	, 18170
	Adductor muscle after	3.2000	15	, 77460	, 20000
Vapour 6	Tenser of fascias before	3.1333	15	, 74322	, 19190
	Tenser of fascias after	3.3333	15	, 72375	, 18687

Test for dependent attempts

		Differences in dependent attempts					t	df	Significance (double-sided)
		Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
					Lower limit	Upper limit			
Vapour 1	Gluteal large before Gluteal large after	-, 26667	, 45774	, 11819	-, 52015	-, 01318	-2.256	14	, 041
Vapour 2	Femur lumbar before Femur lumbar after	-, 33333	, 61721	, 15936	-, 67513	, 00847	-2.092	14	, 055
Vapour 3	Four-sided before Four-sided after	-, 33333	, 48795	, 12599	-, 60355	-, 06312	-2.646	14	, 019
Vapour 4	Gluteal small before Gluteal small after	-, 13333	, 35187	, 09085	-, 32819	, 06152	-1.468	14	, 164
Vapour 5	Adductor muscle ahead of the adductor muscle after	-, 26667	, 45774	, 11819	-, 52015	-, 01318	-2.256	14	, 041
Vapour 6	Tenser of fascias before tenser of fascias after	-, 20000	, 41404	, 10690	-, 42929	, 02929	-1.871	14	, 082

The conducted test allowed to the statement that the force of a cramp improved at 4 women, and at 9 didn't change.
At men force of the contraction mięsni underwent the improvement at a certain gentleman, and at second didn't change.

Scale of pain

Made in the system of 15 persons before and after made with treatments with Tens electricities and the magnetic field. Patients assessed the scale of pain in the first treatment and last day after performing treatments. In the system before the commenced physiotherapy treatment to 15 persons examined as many as 10 assessed its pain (in the scale from 0 to 10) on 9, two persons on 7, remaining cases on 4, 6, 8. After performed treatments power of felt pain by patients dropped - 6 persons assessed their pain on 6, three - on 4, and two - on 3. Four remaining persons one after the other assessed their pain on 2, 5, 7 and 8.

Scale of pain

Before the treatment after treatments the conducted examination confirmed that made treatments with Tens electricities and the magnetic field definitely reduced a feeling of pain at patients suffering from the degenerative disease.

Test of the tip of fingers

Before treatments none of men subjected to therapy was to touch getting up upon of hallux of the foot, however after treatments a certain gentleman managed to touch the hallux. Amongst women before performed treatments only four were to perform getting up order and after performed treatments it didn't change

Anvil test

The test was carried out in the recumbency, lower limbs were straightened. Examined one with hand raised the straightened limb, and second banged his fist on the heel in axial direction. Amongst fifteen examined persons before performing the physiotherapy treatment, men complained about pain near the left axil. After series carried out of treatments a state of one of men surrendered to the improvement - stopped feeling pain near the examined pond. Amongst patients one person felt no pain of ponds in regions examined. Seven persons felt pain in regions of the right hip joint while carrying the test out. Five - felt persons pain in regions of the left hip joint. However after performed treatments with Tens electricities and the magnetic field a significant improvement took place, while carrying the test out to the right hip joint only felt pain two examined. And one person only felt pain in regions of the left hip joint. A following graph illustrates results.

The test of pain at pushing in the axis will pretend.

This test was conducted before performing the physiotherapy treatment and after finishing them. 15 persons underwent the examination. The test consisted in it, that patient - in the position lying on its back - one straightened, second lower limb bent in the knee joint and rotowana outside in the hip joint, the lateral malleolus of a bent lower limb lies above the turnip of the second limb - embraces with both hands, he will pretend the distal part and pushes in axial direction. This movement increases the pressure in the hip joint in the direction of the pelvis. Pain in the groin attests to diseases of the hip joint. E.g. degenerative changes. Identical results were stated like at the Anvil test.

Announce Drehmann

The examination was conducted in the recumbency on the back. While conducting this examination the physiotherapist performs bending a lower limb, getting hold of the foot. If during the move an outside rotation increases, it attests to diseases in the hip joint. 13 patients participated in examinations - at every of them an outside rotation was stated in the examined pond. Examining the manifestation was repeated upon completion of treatments - an improvement was an effect at over halves of patients (the integral disappearance of the rotation was noticed at 7 patients, at remaining 6 the rotation underwent the reduction). Out of 2 patients - of men, before taken treatments the outside rotation was stated at one of them, and in the end of physiotherapy treatment this rotation entirely disappeared. It attests to the high effectiveness of applied treatments in the field of restoring the range of the movement for persons suffering from diseases of the hip joint.

Test of two scales

A difference in straining both feet being a kg at adults 5 is regarded wrong [41]. Dividing the value of the greater lecture by the value of the smaller reading, a quotient being a so-called rate of the symmetricalness is received straining lower limbs. Too correct values of this indicator are assumed within the limits of 1 - 1.5.

Table 1.8. Test results of two scales for the group of 15 patients. Difference of burdening limbs before performed treatments and after performed treatments with Tens electricities and the magnetic field. Rate of the symmetricalness of burdening lower limbs before performed treatments after performed treatments with Tens electricities and the magnetic field.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Before	5.4667	15	2.77403	, 71625
	After	3.0667	15	2.08624	, 53866
Vapour 2	Before	1.1140	15	, 07944	, 02051
	After	1.0607	15	, 04267	, 01102

Test for dependent attempts

	Differences in dependent attempts					t	df	Significance (double-sided)
	Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
				Lower limit	Upper limit			
Vapour 1 Before - After	2.40000	2.16465	, 55891	1.20126	3.59874	4.294	14	, 001
Vapour 2 Before - After	, 05333	, 06597	, 01703	, 01680	, 08987	3.131	14	, 007

After the performed physiotherapy treatment the rate of the symmetricalness of burdens sat more comfortably in the examined system of women at 8 women, and at 5 didn't change.

The noticeable change of the improvement in the rate of the symmetricalness of straining lower limbs appeared at a certain gentleman.

Physiotherapy treatment

In the same system examined (15 persons, including two men) during the first physiotherapy treatment the scale of the Tens amperage fluctuated during 15 of minute's treatment - at women - from 30 to 89 mA (the average amperage was 59.5 mA), at men - from 34 to 65 mA (the medium intensity amounted to 49.5 mA). In line with guidelines of therapy with Tens electricities straining in next treatments should to decrease, due to bases

of feeling pain by the patient. In the examined system during the last treatment with Tens electricities at women the intensity fluctuated in the period from 22 to 78 the average of straining the treatment lasting 15 mA minutes amounted to 50 mA. (in case of men the amperage was 30 to 61 mA but the average amounted to 45.5 mA in the course of lasting 15 the minute's treatment.) it confirms the thesis about the painkilling operation of Tens electricities - in case of women it turned out to be far more effective (reducing the necessary intensity by the nearly 19 percent what also projects for subjective feeling pain) than at men (not quite 9 percent). In case of the magnetic field the intensity amounted in first treatment 5 to mt but the frequency up to 30 Hz in time 10 min. In the last made treatment of the magnetic field the intensity already took out 10 mt but the frequency rose up to 50 Hz (the time grew longer for 15 faces). Such parameters of the treatment were applied with all patients being in this research group.

2. Examining the system of patients subjected to therapy with electricities Träbert and with laser.

Evaluation of ranges of the movement. Examined system of 15 persons including 11 women and 4 men.

Table 2.1. Assessment of the extent of the movement of bending in the hip joint in the system of 15 patients before and after treatments with electricities Träbert and with laser.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Before	112.7333	15	6.59509	1.70285
	After	113.4000	15	6.12722	1.58204

Test for dependent attempts

	Differences in dependent attempts					t	df	Significance (double-sided)
	Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
				Lower limit	Upper limit			
Vapour 1 Before - After	-, 66667	, 89974	, 23231	-1.16492	-, 16841	-2.870	14	, 012

In one case - in the examined system - the range of the movement grew about 3 st, at four patients increasing the range of the movement by 1 Sr. was stated, in remaining (six) cases increasing the range of the movement of treatments in the end made wasn't noticed.
After the made physiotherapy treatment increasing the range of the movement in the hip joint was noticed at a certain gentleman about 2 °, at one about 1 °, and at two the range of the movement in the pond didn't change.

Table 2.2. Assessment of the extent of the movement of the extension in the hip joint in the system of 15 patients before and after treatments with electricities, Träbert and laser, deg.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Before	16.3333	15	4.18614	1.08086
	After	17.2667	15	4.25049	1.09747

Test for dependent attempts

	Differences in dependent attempts					t	df	Significance (double-sided)
	Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
				Lower limit	Upper limit			
Vapour 1 Before - After	-, 93333	, 79881	, 20625	-1.37570	-, 49097	-4.525	14	, 000

An examination caused similar results increasing the traffic of the extension. In the system of women had tested, out of 11 persons, in two cases a growth of the range of the extension was observed about 2 deg., and in five cases about 1 deg. at four examined no changes were noticed in the extension.
In the four-person system in two cases the range of the movement rose by two steps, and individually - about 1 deg, and at one didn't change.

Table 2.3. Assessment of the extent of the movement of visiting in the hip joint in the system of 15 patients before and after made with treatments with electricities Träbert and with laser.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Before	30.2000	15	5.23996	1.35295
	After	31.0000	15	4.85504	1.25357

Test for dependent attempts

	Differences in dependent attempts					t	df	Significance (double-sided)
	Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
				Lower limit	Upper limit			
Vapour 1 Before - After	-, 80000	, 86189	, 22254	-1.27730	-, 32270	-3.595	14	, 003

At six patients of the examined system she demonstrated the improvement - the range of the movement of visiting rose by 1 Sr., however at five patients no changes were registered. A little bit other there were effects of applied treatments in the system of four men, participating in examinations. In one case treatments only caused no noticeable effect - i.e. range of the movement visiting generally speaking didn't change. Three remaining patients demonstrated the improvement in the range of the movement in the hip joint at a certain gentleman about 1 st, at second about 2 st, and at third about 3 Sr.

Table 2.4. Assessment of the extent of the movement of driving in the hip joint in the system of 15 patients before and after made with treatments with electricities Träbert and of laser.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Before	24.6667	15	3.17730	, 82038
	After	25.6667	15	3.67747	, 94952

Test for dependent attempts

	Differences in dependent attempts					t	df	Significance (double-sided)
	Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
				Lower limit	Upper limit			
Vapour 1 Before - After	-1.00000	, 92582	, 23905	-1.51270	-, 48730	-4.183	14	, 001

In one case - in the examined system - the range of the movement rose by 2 Sr., at five patients increasing the range of the movement by 1 Sr. was stated, in remaining (four) cases increasing the range of the movement of treatments in the end made wasn't noticed.
In the system of men in one case no improvement was only observed - in other cases changes dated back 1-2°.

Table 2.5. Assessment of the extent of the movement of the outside rotation in the hip joint in the system of 15 patients before and after performing treatments with electricities Träbert and with laser.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Before	24.8667	15	3.83344	, 98979
	After	25.8000	15	3.68782	, 95219

Test for dependent attempts

	Differences in dependent attempts					t	df	Significance (double-sided)
	Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
				Lower limit	Upper limit			
Vapour 1 Before - After	-, 93333	1.90738	, 49248	-1.98960	, 12294	-1.895	14	, 079

In one case - in the examined system - the range of the movement rose by 2 Sr., at five patients increasing the range of the movement by 1 Sr. was stated, in remaining (five) cases increasing the range of the movement of treatments in the end made wasn't noticed.
As similarly as in the system of women, also amongst patients of the change in the move in hip joint took place after made treatments at two men the range of the movement rose by 1 st, at one about 2 st, and at third about 3 Sr.

Table 2.6. Assessment of the extent of the movement of the internal rotation in the hip joint in the system of 15 patients before and after performing treatments with electricities Träbert and with laser.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Before	25.0667	15	4.28397	1.10612
	After	26.0000	15	4.17475	1.07792

Test for dependent attempts

	Differences in dependent attempts					t	df	Significance (double-sided)
	Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
				Lower limit	Upper limit			
Vapour 1 Before - After	-, 93333	, 88372	, 22817	-1.42272	-, 44395	-4.090	14	, 001

Examining the internal rotation causes similar results as examining the outside rotation - in one case - in the examined system - the range of the movement grew about 2 st, at five patients increasing the range of the movement by 1 st was stated, in other cases increasing the range of the movement of treatments in the end made wasn't noticed.
Amongst 4 patients of the change in the move in hip joint took place after made treatments at two men the range of the movement rose by 1 st, at one about 2 st, and at third about 3 Sr.

Table 2.7. Lovett test. Made in the system of 15 patients before and after performing treatments with electricities Träbert and with laser. Examining strength of muscles.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Gluteal large before	3.3333	15	, 48795	, 12599
	Gluteal large after	3.6000	15	, 50709	, 13093
Vapour 2	Femur lumbar before	3.0667	15	, 45774	, 11819
	Femur lumbar after	3.5333	15	, 51640	, 13333
Vapour 3	Four-sided before	3.1333	15	, 35187	, 09085
	Four-sided after	3.4667	15	, 51640	, 13333
Vapour 4	Gluteal small before	2.9333	15	, 45774	, 11819
	Gluteal small after	3.2667	15	, 59362	, 15327
Vapour 5	Adductor muscle before	3.0000	15	, 37796	, 09759
	Adductor muscle after	3.2000	15	, 41404	, 10690
Vapour 6	Tenser of fascias before	2.9333	15	, 59362	, 15327
	Tenser of fascias after	3.2000	15	, 56061	, 14475

Test for dependent attempts

		Differences in dependent attempts					t	df	Significance (double-sided)
		Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
					Lower limit	Upper limit			
Vapour 1	Gluteal large before Gluteal large after	-, 26667	, 45774	, 11819	-, 52015	-, 01318	-2.256	14	, 041
Vapour 2	Femur lumbar before Femur lumbar after	-, 46667	, 51640	, 13333	-, 75264	-, 18070	-3.500	14	, 004
Vapour 3	Four-sided before Four-sided after	-, 33333	, 48795	, 12599	-, 60355	-, 06312	-2.646	14	, 019
Vapour 4	Gluteal small before Gluteal small after	-, 33333	, 48795	, 12599	-, 60355	-, 06312	-2.646	14	, 019
Vapour 5	Adductor muscle ahead of the adductor muscle after	-, 20000	, 41404	, 10690	-, 42929	, 02929	-1.871	14	, 082
Vapour 6	Tenser of fascias before tenser of fascias after	-, 26667	, 45774	, 11819	-, 52015	-, 01318	-2.256	14	, 041

In case of three patients and one patient no changes, being an effect of applied treatments were observed. At 11 remaining persons, participating in the examination and surrendered therapy with electricities Träbert and with laser, observed changes.

Scale of pain

Made in the system of 15 persons before and after made with treatments with electricities Träbert and with laser. Patients assessed the scale of pain in the first treatment and last day after performing treatments. In the system before the commenced physiotherapy treatment to 15 persons examined as many as 8, (over half), assessed its pain (in the scale from 0 to 10) on 8, four persons on 9, remaining persons assessed one by one on 10, 7, 5. After performed treatments power of felt pain by patients dropped - one the person only assessed his/her scale of pain on 8, five persons assessed their pain on 7, three - on 6, and two - on 4,. Four remaining persons one after the other assessed their pain being divisible into groups two personal on 2 and 3. Reducing a feeling of pain was noticeable, but not in the meaning degree - in most cases a fall was registered only against one step in dziesięciopunktowej of scale. Of course he provides it about the certain level of the effectiveness of performed treatments, however smaller than it is possible in order to expect.

Test of the tip of fingers

Made in the system of 15 persons before and after made with treatments with electricities Träbert and with laser. Patients passed the test on the first treatment day and in last after performing treatments. The test of the tip of fingers showed no changes at patients, which one could categorize as the influence of performed treatments. Out of 15 examined patients one person was only able to touch the hallux of the foot. Performed treatments didn't change this state and after finishing them this one patient could only carry the test of the tip of fingers out.

Anvil test

The test was carried out in the recumbency, lower limbs were straightened. Examined one with hand raised the straightened limb, and second banged his fist on the heel in axial direction. The performed examination before beginning series of treatments showed, that all patients - irrespective of the sex and the range of disease were able to make not feeling this exercise simultaneously of pain. The influence of performed treatments turned out to

be significant - only one (out of four) still pain felt examined men during the test, and out of eleven patients pain continued at five persons. A following table illustrates results.

The test of pain at pushing in the axis will pretend.

This test was conducted before performing the physiotherapy treatment and after finishing them. 15 persons underwent the examination. The test consisted in it, that patient - in the position lying on its back - one straightened, second lower limb bent in the knee joint and rotowana outside in the hip joint, the lateral malleolus of a bent lower limb lies above the turnip of the second limb - embraces with both hands, he will pretend the distal part and pushes in axial direction. This movement increases the pressure in the hip joint in the direction of the pelvis. Pain in the groin attests to diseases of the hip joint. E.g. degenerative changes. Out of 15 patients pain continued - after performed treatments - only at six persons.

Announce Drehmann
The examination is conducted in the recumbency on the back.
The physiotherapist catches a lower limb for the foot and makes the bend. If during making this move an outside rotation increases, it attests to diseases of the hip joint.
Examining the Drehmann manifestation performed before series of treatments showed that out of 15 patients one person hadn't only demonstrated the outside rotation. However treatments caused the anticipated effect - the rotation stayed only with four patients.

Test of two scales
A difference in straining both feet being a kg at adults 5 is regarded wrong. Dividing the value of the greater lecture by the value of the smaller reading, a quotient being a so-called rate of the symmetricalness is received straining lower limbs. Too correct values of this indicator are assumed within the limits of 1 - 1.5.

Table 2.8. Results of the measurement of differences of two scales. Difference of burdening limbs before performed treatments and after performed treatments with electricities Träbert and with laser.
Rate of the symmetricalness of straining lower limbs before and after performed treatments with electricities Träbert and of laser.

Statistics for dependent attempts

		Average	N	Standard deviation	Standard error of the average
Vapour 1	Before	4.0667	15	1.53375	, 39601
	After	2.6000	15	1.24212	, 32071
Vapour 2	Before	1.1440	15	, 14725	, 03802
	After	1.0633	15	, 06114	, 01579

Test for dependent attempts

		Differences in dependent attempts					t	df	Significance (double-sided)
		Average	Standard deviation	Standard error of the average	95% confidence interval for the difference of averages				
					Lower limit	Upper limit			
Vapour 1	Before - After	1.46667	1.68466	, 43498	, 53373	2.39960	3.372	14	, 005
Vapour 2	Before - After	, 08067	, 15140	, 03909	-, 00317	, 16451	2.064	14	, 058

Over half of patients they showed the wrong difference in straining both feet, treatments let the correct difference the reinstatement at almost of all patients, except for one person, at which no improvement was stated.
Similarly in the system of men, where three persons demonstrated the market big difference in straining limbs - at two patients deciding to make it smaller pretended.

Physiotherapy treatment
In the same system examined (15 persons, in it of four men) during the first physiotherapy treatment scale of the amperage Träbert hesitated during 15 of minute's treatment - at women - from 32 to 89 mA (the average amperage was 59.5 mA), at men - from 38 to 89 mA (the medium intensity amounted to 49.5 mA).
In the examined system during the last treatment with electricities Träbert at women the intensity fluctuated in the period from 20 to 80 the average of straining the treatment lasting 15 arc minutes amounted to mA 50 mA. (in case of men the amperage was 34 mA but the average took out into 72 53 mA in the course of lasting 15 the minute's treatment.)
It confirms the thesis about the painkilling operation of electricities Träbert - in case of women it turned out to be far more effective (reducing the necessary intensity by the nearly 9 percent what also projects for subjective feeling pain) than at men (growth of necessary straining by 5 percent).
In case of the laser in the entire examined system the performed treatment was first 8 J to the point, wavelength 815 nm, field 50 cm2. The treatment was also last at all patients the same - they made 12 J to the point, wavelength 815 nm., field 50 cm2.

3. Comparative analysis of applied therapeutic methods

Patients were divided in two groups and subjected to different therapy. One 15-osobowa the group was subjected to therapy with Tens electricities and the magnetic field, second - analogous quantitatively - group of therapy with electricities Träbert and with laser.
An inspection was one of purposes of the research work taken up which from these two therapeutic methods will turn out to be more effective in case of patients suffering from the degenerative disease of the hip joint. Okay, so to effect therapy in this decimal place of comparing effects applied:
Therapy with Tens electricities and the magnetic field (CTMF) and Therapy with electricities Träbert and laser treatment (CTLT).

Assessment of the extent of the movement of the bend in the hip joint

Table 3.1. Evaluation of differences of the range of the movement of bending therapy in the hip joint after performing treatments with Tens electricities and the magnetic field and therapy with electricities Träbert and with laser.

Statistics for groups

	gr	N	Average	Standard deviation	Standard error of the average
After	**CTMF**	15	114.4667	8.07878	2.08593
	CTLT	15	113.4000	6.12722	1.58204

Test for independent attempts

		Levene'a test of the homogeneity of the variance		Test t of the equality of averages						
		F	Significance	t	df	Significance (double-sided)	Difference of averages	Standard error of the difference	95% confidence interval for the difference of averages	
									Lower limit	Upper limit
After	An evenness of the variance was assumed	1.213	, 280	, 407	28	, 687	1.06667	2.61801	-4.29608	6.42941
	An evenness of the variance wasn't assumed			, 407	26.102	, 687	1.06667	2.61801	-4.31370	6.44704

After therapy with Tens electricities and the magnetic field the improvement didn't take place at 3 persons, however after therapy with electricities Träbert and with laser increasing the range of the movement in the hip joint didn't take place at 8 patients.

Assessment of the extent of the movement of the extension

Table 3.2. Evaluation of differences of the range of the movement of the extension in the hip joint after performing treatments of therapy with Tens electricities and the magnetic field and therapy with electricities Träbert and with laser.

Statistics for groups

	zgr	N	Average	Standard deviation	Standard error of the average
VAR00006	**CTMF**	15	16.5333	3.83344	, 98979
	CTLT	15	17.2667	4.25049	1.09747

Test for independent attempts

		Levene'a test of the homogeneity of the variance		Test t of the equality of averages						
		F	Significance	t	df	Significance (double-sided)	Difference of averages	Standard error of the difference	95% confidence interval for the difference of averages	
									Lower limit	Upper limit
VAR00006	An evenness of the variance was assumed	, 395	, 535	-, 496	28	, 624	-, 73333	1.47788	-3.76063	2.29397
	An evenness of the variance wasn't assumed			-, 496	27.707	, 624	-, 73333	1.47788	-3.76208	2.29541

In the evaluation to notice improvements in the range of the movement of the extension in the hip joint it is possible, that after therapy with Tens electricities and the magnetic field the growth of the range of the movement took out about 1 st at 6 persons, about 2 6 persons, but the range of the movement didn't also change st oneself at 3 persons. However after therapy with electricities Träbert and with laser growth of the range of the movement, appealed for 1 st at 5 persons, about 2 st at 4 persons, and didn't undergo the improvement at 5 persons.

Assessment of the extent of the move of visiting

Table 3.3. Evaluation of differences of the range of the movement of visiting therapy in the hip joint after performing treatments with Tens electricities and the magnetic field and therapy with electricities Träbert and with laser.

Statistics for groups

	zgr	N	Average	Standard deviation	Standard error of the average
VAR00010	**CTMF**	15	27.6667	6.22973	1.60851
	CTLT	15	31.0000	4.85504	1.25357

Test for independent attempts

	Levene'a test of the homogeneity of the variance		Test t of the equality of averages					
	F	Significance	t	df	Significance (double-sided)	Difference of averages	Standard error of the difference	95% confidence interval for the difference of averages

									Lower limit	Upper limit
VAR00010	An evenness of the variance was assumed	, 331	, 570	-1.635	28	, 113	-3.33333	2.03930	-7.51064	, 84398
	An evenness of the variance wasn't assumed			-1.635	26.423	, 114	-3.33333	2.03930	-7.52190	, 85523

In the evaluation to notice improvements in the range of the movement of visiting in the hip joint it is possible, that after therapy with Tens electricities and the magnetic field the growth of the range of the movement took out about 1 st at 11 persons, about 3 st at one person, and the range of the movement didn't change at 3 persons. However after therapy with electricities Träbert and with laser growth of the range of the movement, appealed for 1 st at 7 persons, about 2 st at 1 of persons, about 3 st at 1 person and didn't undergo the improvement at 6 persons.

Assessment of the extent of the move of driving

Table 3.4. Evaluation of differences of the range of the movement of driving therapy in the hip joint after performing treatments with Tens electricities and the magnetic field and therapy with electricities Träbert and with laser.

Statistics for groups

	zgr	N	Average	Standard deviation	Standard error of the average
VAR00014	**CTMF**	15	23.2000	3.78342	, 97688
	CTLT	15	25.6667	3.67747	, 94952

Test for independent attempts

		Levene'a test of the homogeneity of the variance		Test t of the equality of averages						
		F	Significance	t	df	Significance (double-sided)	Difference of averages	Standard error of the difference	95% confidence interval for the difference of averages	
									Lower limit	Upper limit
VAR00014	An evenness of the variance was assumed	, 078	, 782	-1.811	28	, 081	-2.46667	1.36230	-5.25722	, 32389
	An evenness of the variance wasn't assumed			-1.811	27.977	, 081	-2.46667	1.36230	-5.25732	, 32399

In the evaluation to notice improvements in the range of the movement of driving in the hip joint it is possible, that after therapy with Tens electricities and the magnetic field the growth of the range of the movement took out at 11 persons about 1 st, about 2 st at 1 of persons, and about 5 st at one person and the range of the movement didn't change 83 oneself at 2 persons. However after therapy with electricities Träbert and with laser growth of the range of the movement, appealed for 1 st at 6 persons, about 2 st at 3 persons, and didn't undergo the improvement at 5 persons.

Assessment of the extent of the move of the outside rotation

Table 3.5. Evaluation of differences of the range of the movement of the outside rotation in the hip joint after performing treatments of therapy with Tens electricities and the magnetic field and therapy with electricities Träbert and with laser.

Statistics for groups

	zgr	N	Average	Standard deviation	Standard error of the average
VAR00018	**CTMF**	15	24.6667	3.59894	, 92924
	CTLT	15	25.8000	3.68782	, 95219

Test for independent attempts

		Levene'a test of the homogeneity of the variance		Test t of the equality of averages						
		F	Significance	t	df	Significance (double-sided)	Difference of averages	Standard error of the difference	95% confidence interval for the difference of averages	
									Lower limit	Upper limit
VAR00018	An evenness of the variance was assumed	, 008	, 929	-, 852	28	, 402	-1.13333	1.33047	-3.85868	1.59202
	An evenness of the variance wasn't assumed			-, 852	27.983	, 402	-1.13333	1.33047	-3.85876	1.59209

In the evaluation to notice improvements in the range of the movement of the outside rotation in the hip joint it is possible, that after therapy with Tens electricities and the magnetic field the growth of the range of the movement took out at 10 persons about 1 st, about 2 st at 3 persons, and the range of the movement didn't change at 2 persons. However after therapy with electricities Träbert and with laser the growth of the range of the movement appealed for 1 st at 6 persons, about 2 st at 2 persons, and about 3 st at one person, and didn't undergo the improvement at 6 persons.

Assessment of the extent of the move of the internal rotation

Table 3.6. Evaluation of differences of the range of the movement of the internal rotation in the hip joint after performing treatments of therapy with Tens electricities and the magnetic field and therapy with electricities Träbert and with laser.

Statistics for groups

	zgr	N	Average	Standard deviation	Standard error of the average
t1112po	**CTMF**	15	26.4667	3.70071	, 95552
	CTLT	15	26.0000	4.17475	1.07792

Test for independent attempts

		Levene'a test of the homogeneity of the variance		Test t of the equality of averages						
		F	Significance	t	df	Significance (double-sided)	Difference of averages	Standard error of the difference	95% confidence interval for the difference of averages	
									Lower limit	Upper limit
t1112po	An evenness of the variance was assumed	, 898	, 352	, 324	28	, 748	, 46667	1.44046	-2.48398	3.41731
	An evenness of the variance wasn't assumed			, 324	27.603	, 748	, 46667	1.44046	-2.48589	3.41923

In the evaluation to notice improvements in the range of the movement of the internal rotation in the hip joint it is possible, that after therapy with Tens electricities and the magnetic field the growth of the range of the rush took out for 1 st at 13 persons, and the scope of the movement didn't change at 2 persons. However after therapy with electricities Träbert and with laser the growth of the range of the movement appealed for 1 st at 7 persons, about 2 st at 2 persons, and about 3 st at one person, and didn't undergo the improvement at 5 persons.

Lovett test

Table 3.7. Lovett test of differences of power muscles hip joint after performing treatments of therapy with Tens electricities and the magnetic field and therapy with electricities Träbert and with laser.

Statistics for groups

	zgr	N	Average	Standard deviation	Standard error of the average
	CTMF	15	3.2667	, 70373	, 18170
Gluteal large after	**CTLT**	15	3.6000	, 50709	, 13093
	CTMF	15	3.3333	, 72375	, 18687
Femur lumbar after	**CTLT**	15	3.5333	, 51640	, 13333
	CTMF	15	3.3333	, 61721	, 15936
Four-sided after	**CTLT**	15	3.4667	, 51640	, 13333
	CTMF	15	3.3333	, 72375	, 18687
Gluteal small after	**CTLT**	15	3.2667	, 59362	, 15327
	CTMF	15	3.2000	, 77460	, 20000
Adductor muscle after	**CTLT**	15	3.2000	, 41404	, 10690
	CTMF	15	3.3333	, 72375	, 18687
Tenser of fascias after	**CTLT**	15	3.2000	, 56061	, 14475

Test for independent attempts

		Levene'a test of the homogeneity of the variance		Test t of the equality of averages						
		F	Significance	t	df	Significance (double-sided)	Difference of averages	Standard error of the difference	95% confidence interval for the difference of averages	
									Lower limit	Upper limit
	An evenness of the variance was assumed	1.248	, 273	-1.488	28	, 148	-, 33333	, 22396	-, 79210	, 12543
Gluteal large after	An evenness of the variance wasn't assumed			-1.488	25.451	, 149	-, 33333	, 22396	-, 79418	, 12751
	An evenness of the variance was assumed	2.108	, 158	-, 871	28	, 391	-, 20000	, 22956	-, 67024	, 27024

Femur lumbar after	An evenness of the variance wasn't assumed			-, 871	25.321	, 392	-, 20000	, 22956	-, 67249	, 27249
	An evenness of the variance was assumed	, 245	, 624	-, 642	28	, 526	-, 13333	, 20778	-, 55896	, 29229
Four-sided after	An evenness of the variance wasn't assumed			-, 642	27.154	, 526	-, 13333	, 20778	-, 55956	, 29289
	An evenness of the variance was assumed	1.299	, 264	, 276	28	, 785	, 06667	, 24169	-, 42841	, 56174
Gluteal small after	An evenness of the variance wasn't assumed			, 276	26.968	, 785	, 06667	, 24169	-, 42926	, 56260
	An evenness of the variance was assumed	6.892	, 014	, 000	28	1.000	, 00000	, 22678	-, 46454	, 46454
Adductor muscle after	An evenness of the variance wasn't assumed			, 000	21.396	1.000	, 00000	, 22678	-, 47108	, 47108
	An evenness of the variance was assumed	2.513	, 124	, 564	28	, 577	, 13333	, 23637	-, 35086	, 61753
Tenser of fascias after	An evenness of the variance wasn't assumed			, 564	26.353	, 577	, 13333	, 23637	-, 35223	, 61889

Comparing both Lovett tests it is possible to state, that after therapy with electricities Träbert and with laser of 11 persons increased I go out of my way of myospasm, and 4 not. However after therapy with Tens electricities and the magnetic field at 5 persons an improvement took place and at 10 not.

Scale of pain

Evaluation of pain

After performed treatments power of felt pain by patients dropped - 6 persons assessed their pain on 6, three - on 4, and two - on 3. Four remaining persons one after the other assessed their pain on 2, 5, 7 and 8.

After performed treatments power of felt pain by patients dropped - one the person only assessed his/her scale of pain on 8, five persons assessed their pain on 7, three - on 6, and two - on 4,. Four remaining persons one after the other assessed their pain being divisible into groups two personal on 2 and 3.

Test of the tip of fingers

In one and for the second research group an improvement didn't take place after performed therapy.

Anvil test

After performed therapy with Tens electricities and the magnetic field pain stayed with 3 persons, and at 11 persons the state surrendered to the improvement. However after therapy with electricities Träbert and with laser at 6 persons pain continued while carrying the test out and at 9 pain disappeared while carrying the test out.

The test of pain at pushing in the axis will pretend

After performed treatments with Tens electricities and the magnetic field pain continued while carrying the test out at 3 persons, and at 12 persons pain wasn't felt while examining. However after treatments with electricities Träbert and pain while carrying the test out remained the laser at 6 persons, and at 9 wasn't perceptible while examining.

Announce Drehmann

After performed treatments with Tens electricities and the magnetic field the outside rotation continued at 6 persons, and disappeared at 9 persons. And in case of therapy with electricities Träbert and with laser the outside rotation disappeared at 10 persons and stayed with 4 persons.

Test of two scales

Table 3.8. Test results of two scales for the group of 15 patients. Difference of straining limbs after performing treatments of therapy with Tens electricities and with the magnetic field and of therapy with electricities Träbert and with laser. Rate of the symmetricalness of straining lower limbs after performing treatments of therapy with Tens electricities and the magnetic field and of therapy with currents Träbert and with laser.

Statistics for groups

	zgr	N	Average	Standard deviation	Standard error of the average
After	**CTMF**	15	3.0667	2.08624	, 53866
	CTLT	15	2.6000	1.24212	, 32071
After	**CTMF**	15	1.0607	, 04267	, 01102
	CTLT	15	1.0633	, 06114	, 01579

Test for independent attempts

		Levene'a test of the homogeneity of the variance		Test t of the equality of averages						
		F	Significance	t	df	Significance (double-sided)	Difference of averages	Standard error of the difference	95% confidence interval for the difference of averages	
									Lower limit	Upper limit
After	An evenness of the variance was assumed	4.304	, 047	, 744	28	, 463	, 46667	, 62691	-, 81750	1.75083
	An evenness of the variance wasn't assumed			, 744	22.818	, 464	, 46667	, 62691	-, 83077	1.76410
After	An evenness of the variance was assumed	, 392	, 536	-, 139	28	, 891	-, 00267	, 01925	-, 04210	, 03677
	An evenness of the variance wasn't assumed			-, 139	25.024	, 891	-, 00267	, 01925	-, 04231	, 03698

Discussion

It is difficult to find opponents of Tens currents, but sometimes it becomes a form of discussion of their application - R Liana, M Chudański, I Ponikowska in an article devoted to the use of current Tens, Trabert and Kotz [42] in various therapeutic interventions have focused primarily on the possibilities of wide application electrostimulation. It is known that is used to treat articular Tens in the course of rheumatoid arthritis and osteoarthritis, slipped disc, as well as postoperative pain and childbirth. Trabert currents can be applied topically (spinal pain syndrome, osteoarthritis, post-traumatic) and segmentar (spinal pain syndrome, neuralgia, osteoarthritis, muscle pain, increased muscle tension, post-traumatic musculoskeletal system, peripheral circulatory disorders), in addition, percutaneous electro is used in peripheral nerve disorders (neuralgia, kauzalgia, phantom pain), pain after peripheral nerve injury. This type of treatment is also used in obstetric cases, and even at home in the sale of special equipment are available for use by patients). As demonstrated by studies in NZOZ Refiks in Gołańcz, results in analgesia as well as improving mobility, applying currents Trebert and Tens, do not overlap. The reasons are two - first, the individual responses of organisms used in individual patients on currents, on the other hand the same way for their use causes other effects. It is true that studies have confirmed that both in terms of analgesia, as well as improving the efficiency of current patients have an advantage over Tens and Trabert currents, but in a few individual cases (thirty surveyed people) was the reverse. This determines the need for greater individualization of therapy and used for further research into real, practical effects of both types of treatments electrotherapeutic. At this level, it is difficult, because the attempt to define the scope of diseases in which specific therapies should be used. The authors [42] also drew attention to the important from the point of view, proper application of the principle of treatment - whether in a given situation is better to use topical therapy Trabert currents, or rather segmentar. Changing these will change the scope of impact, which affects the effectiveness of treatments. Studies similar in scope to those that have become the basis for this study were also carried out J Kuciel-Lewandowska and N Jarosz [43]. Their results in the form of the article "Evaluation of the effectiveness of TENS therapy and Trabert currents in patients with low back

pain," published in Acta Balneologica, basic limitation of the study was to close them only to assess the analgesic effect of both therapies. The obtained results in this area, although the difference consisting in the use of electrical stimulation to a completely different disease, and another section of the patient's body were similar to the analgesic effect of research presented in this paper. A significant exception was, however, say that a slight advantage in this area have Trabert currents. After application of therapy studied for my patients who have previously assessed as severe pain, reported on his succession to medium or light. At the same time resulted in slightly better results in their study therapy Trabert currents. A study presented in this work in the field of analgesic therapy indicate a slightly different result - this is Therapy currents Tens effect brought by nearly 20 percent. better. Analyzing the test results, it can be concluded that they exhibit greater efficacy in a situation where the patient indicates a very strong pain. Trabert currents are more effective when the patient feeling pain scale is much lower. Also, studies of other therapists have shown a slightly higher effective Analgesic Tens currents. [43, 44].

The analogy of the results for osteoarthritis of the hip and spine diseases in terms of analgesic use is reaching even further. As already mentioned Tens currents was more efficient in case of severe pain. Their effectiveness in a situation where we are dealing with acute pain in the lumbar spine when the image is dominated by increased muscle tone, the use of currents reduces muscle tension and rapid control of pain and accelerate the healing process. It is worth noting that despite the results of providing a high efficiency of such treatments and in many different diseases of the use of physical treatments the same as the method is often questioned (eg B. Bolach, M. Kożniewski, E. Bolach, Some factors determining the effectiveness of physiotherapy in patients with lumbar spine discopathy. Physiotherapy) [44]. Of course it can not be tempted to claim that it can replace normal physiotherapy treatment, but the results indicate clearly that it constitutes an important element of the patient's recovery and his return to health, or at least recover some efficiency. Questioning the achievements of physical treatments is often justified in extreme situations, when in fact due to the patient does not bring the desired effect already. Occurs at this point, an additional element of the proper use of such treatments - the age of the patients. Most patients, rehabilitation facilities characterized by mean age, especially when we are dealing with disorders of the joints, in cases where age is an element of risk. A Bilska and B Mielańczuk in his work "of physiotherapy treatments used in people over 65 years" [45] pay particular attention to this aspect of physiotherapy activities. The study allowed the confirmation of one of theses authors, - the elderly, characterized by progressive deterioration of the nervous system reach far worse during rehabilitation than those who avoided dementia, despite the age. It should be noted, however, that the therapies are not limited solely to the use of Tens or Trabert currents. So far, there was created a sufficient basis to confirm the experimental situation in which the use of Tens currents can have the opposite effect than expected, especially in terms of analgesic. Therefore, caution should be exercised when using this type of fugitives towards the elderly, but also to continue research on their effects on elderly patients. Especially in the aspect of a rapidly aging society.

Investigations of the effect of physiotherapy sometimes lead to very divergent conclusions. From the almost total negation of effects that can be obtained through the use of physiotherapy treatment (Bolach, Koźniewski and Bolach) [44] through cautious enthusiasm and a number of concerns, particularly regarding the use of treatments currents Trabert and Tens the elderly (Bilska and Mielańczuk) [45], to the conviction of a high and analgesic efficacy of electrostimulation (Liana, Chudański and Ponikowska). [42]. The research and practice in rehabilitation facilities indicate that none of the extreme solutions do not fully correspond to reality. Frequently applied therapy does not bring the expected results, or they turn out to be too superficial and short-lived. On the other hand, each survey undertaken clearly indicating a decrease feelings of pain in most patients, it basically refutes the thesis of the lack of the effectiveness of treatments, particularly in terms of analgesic. Certainly impact the effectiveness of various treatments require many more studies that take into account not only the direct impact of pain, but also to raise the efficiency of people suffering from arthritis and other diseases of the motor system.

Conclusions

1.Every third respondent feels the level of performance improvement after physiotherapy treatments performed.
2.The results show that half of patients after physiotherapy felt a sharp reduction in pain.
3.Physiotherapy Tens currents and magnetic fields and currents Trabert therapy and laser field a statistically significant substantial relief in functional status of patients and reduce pain.
4.Studies have shown that a higher level (trend) therapy resulted in improvement of the magnetic field and current Tens, but this difference is not statistically significant.
5.It should do your research on a larger group of patients.

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Original Text published © The Author (s) 2012. Mikolajewska Emilia. The most common problems in activities of daily living in post-stroke patients = Najczęściej spotykane ograniczenia w wykonywaniu czynności codziennego życia po udarze. Journal of Health Sciences. 2012;2(1):83-87. ISSN 1429-9623 / 2300-665X. Open Access Open Journal Systems of Radom University in Radom, Poland ISSN 1429-9623 / 2300-665X. 2012.

THE MOST COMMON PROBLEMS IN ACTIVITIES OF DAILY LIVING IN POST-STROKE PATIENTS

Najczęściej spotykane ograniczenia w wykonywaniu czynności codziennego życia po udarze

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Keywords: rehabilitation; ischemic stroke; activities of daily living; quality of life.

Abstract

Aim: All dimensions of quality of life: functional, psychological and social seem be decreased as a result of stroke. Aim of this study is to evaluate incidence of the most common problems in activities of daily living (ADLs).
Material and Methods: Sixteen patients after ischemic stroke, females and males, were assessed using selected part of the Barthel Index in the area of **transfers from bed to chair and back, mobility on level surfaces and stairs climbing.**
Results: In the area of transfers 18,75 % of patients were independent, and the same percentage of patients was unable to transfer from bed to chair and back. In area of mobility on level surfaces 18,75 % of patients were independent, and the same percentage of patients was assessed as immobile. In the area of stairs climbing 18,75 % of patients were independent, and the same percentage of patients was assessed as unable to climb the stairs.
Discussion: Results of the research confirm high incidence of ADLs limitations within the most basic activities, critical in everyday life: moving from wheelchair to bed and return, walking on level surface, going up and down stairs, but both very good and very poor results were rather rare.

1. Introduction

The total number of stroke cases in Poland exceeds 70 000 per year. Ischaemic stroke is the most common constituting 80-85 % of all stroke cases [1-5]. Moreover risk of the recurrence of ischemic stroke is estimated to 40 % (in 5 years). About 50 % of post-stroke survivors have limited independence and need help of other people in activities of daily living (ADLs) [6, 7]. It can severely influence their quality of life. Aim of this study was to evaluate incidence of the most common problems in activities of daily living (ADLs).

2. Material and Methods

Investigated group consisted of sixteen patients post ischemic stroke. The patients' profiles are presented in Table 1. Inclusion criteria were as follows: age above 18 years, diagnosis: ischemic stroke and time after cerebrovascular accident (CVA) – from 4 weeks to 2 years. Inclusion of patients was each time confirmed by medical records. Size and anatomical involvement of infarct varied depend on the patient.

Table 1. Patients' overall profile.

	Number and percentage
Side of paresis:	
Left	8 (50 %)
Right	8 (50 %)
Sex:	
Females	8 (50 %)
Males	8 (50 %)
Age [years]:	
Min	32
Max	81
SD	12,64
Mean	52,87
Median	55
Time after cerebrovascular accident (CVA):	
4 weeks – 2 years	16 (100 %)

The measurement of the ADLs using selected items of Barthel Index [8] were performed in each patient on admission (before the therapy). Reliability of the Barthel Index is assessed "valid" [9, 10, 11].

My study has focused on determination of post-stroke patients' abilities in the area of ADLs: moving from wheelchair to bed and return, walking on level surface, going up and down stairs. These elements are often impaired as a result of the stroke. Moreover achievement of the selected items of the Barthel Index constitutes good starting point to develop further, more advanced activities. There is another important remark: selected items can be measured using help of other people or assistive devices, etc.

Table 2. Barthel Index – part of the test [8]

ACTIVITY	**SCORE**
TRANSFERS (bed to chair and back): 0 = unable, no sitting balance 5 = major help (one or two people, physical), can sit 10 = minor help (verbal or physical) 15 = independent	
MOBILITY (on level surfaces): 0 = immobile or < 50 m 5 = wheelchair independent, including corners, > 50 m 10 = walks with help of one person (verbal or physical) > 50 m 15 = independent (but may use any aid, e.g. stick) > 50 m	
STAIRS: 0 = unable	

5 = needs help (verbal, physical, carrying aid) 10 = independent	
TOTAL SCORE (0-40):	

The ADLs Barthel Index - Guidelines:

The assessment can be used to determine a baseline level of functioning and can be used to monitor improvement in activities of daily living over time. The items are weighted according to a scheme developed by the authors. The person receives a score based on whether they have received help while doing the task. The scores for each of the items are summed to create a total score. The higher the score the more "independent" the person. Independence means that the person needs no assistance at any part of the task. If a persons does about 50% independently then the "middle" score would apply.

The results, where available, are expressed as mean, median, minimal value (min), maximal value (max) and standard deviation (SD). Statistical analysis of data was performed using the Statistica Software. A probability (p) value < 0.05 was considered as statistically significant.

3. Results

Results among 16 patients (100 %) involved in the study were as follows:

Table 1. Results for whole group of patients

Activity	Number of patients with score			
	0	5	10	15
Transfers	3 (18,75 %)	3 (18,75 %)	7 (43,75 %)	3 (18,75 %)
Mobility	3 (18,75 %)	4 (25 %)	6 (37,5 %)	3 (18,75 %)
Stairs	4 (25 %)	9 (62,5 %)	3 (18,75 %)	not available

In the area of transfers (bed to chair and back) 18,75 % of patients were independent (score=15), and the same percentage of patients was unable to transfer from bed to chair and back (score = 0). Any limitations in the area of transfers were observed in 81,25 % of patients.

In area of mobility on level surfaces **18,75 % of patients were independent (score=15), and the same percentage of patients was assessed as immobile. Any limitations** in area of mobility **were observed in 81,25 % of patients.**

In the area of stairs climbing 18,75 % of patients were independent (score=10), and the same percentage of patients was assessed as unable to climb the stairs. Any limitations in area of **stairs climbing were observed in 81,25 % of patients.**

4. Discussion

Post-stroke patients often need for effective rehabilitation because of limitations in ADLs. Based on the previous research:

- at least 22 % stroke survivors walks only with help of other people [12],
- at least 26 % stroke survivors is dependent on other people in ADLs [12],
- the most common functional limitations affect the most basic activities: bathing, dressing, housekeeping, mobility and communication abilities [13, 14],
- resulting quality of life decreases [15].

Results of my research confirm rather high incidence of ADLs limitations within the most basic activities, critical in everyday life: moving from wheelchair to bed and return, walking on level surface, going up and down stairs. Both very good and very poor results were rather rare. Moderate problems with mobility on level surfaces not exclude stair climbing with help. Differences between results depending on sex or side of paresis were statistically negligible.

Low mean and median values of age, respectively 52,87 and 55 years, indicate, that investigated group consisted of relatively young people (compared e.g. with research of Tasiemski et al. [16], where mean age = 63,76 ± 10,23) with bigger recovery potential.

My aim was to assess functional status of patients suffering stroke. All of them before my research participated in any form of rehabilitation (both early and long-term, depends on time after CVA). No doubts further long-term rehabilitation can significantly improve their functional status, but I showed general view and severity of their functional problems influencing further life and its quality.

Very important issues seem be possibilities of continuation of education and professional career [17, 18]. Significantly full adaptation of foreign research' results can be risky. Based on Polish research [16], only 12 % of post-stroke survivors is satisfied because of his/her material situation. This way community activities and entertainment can be beyond reach. The most popular are: reading the books, listening to the music, watching TV and Internet surfing [16]. There is discussed, if there is a result of smaller possibilities (functional, financial, level of support in community, etc.) or decreased self-assessment and possible depression.

To sum up analysis of stroke survivors' quality of life seems be underestimated issue. Influence of stroke is huge both for the patient and his/her family/carers. No doubts all dimensions of quality of life: functional, psychological and social seem be decreased as a result of stroke.

Limitation of this research is lack of control group. Based on this study I am going to continue my research, using control group and providing better evidence. Proposed direction of further research is also dividing research into two: in group of geriatric (≥ 60 years) patients and younger, to compare the results, more precisely investigating influence of age to recovery potential. What more the same research provided simultaneously in hospital rehabilitation (usually more severe cases), outpatient rehabilitation and home rehabilitation settings can assess functional levels in all these groups of post-stroke patients.

5. Conclusions

No doubts there is need to provide further studies in the area od ADLs in post-stroke patients as independent sources of knowledge. It seems ADLs limitations and resulting life quality' decrease can influence effectivity of rehabilitation and further life of stroke survivors and their families.

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THE MOST COMMON PROBLEMS IN WHEELCHAIR SELECTION – OWN OBSERVATIONS

Najczęściej spotykane błędy w doborze wózka dla niepełnosprawnych w świetle badań własnych

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Keywords: rehabilitation; disabled people; wheelchair; wheelchair selection;

Abstract

Aim: Wheelchair seems be basic equipment for disabled people, older and (usually temporary) weak people. Aim of this study is to identify and evaluate incidence of the most common problems in wheelchair selection.
Material and Methods: Eight wheelchair users, males, were assessed using measurement of three main parameters: seat width, seat depth and footrest length.
Results: There were observed: improper seat width in 5 cases (62,5 %), improper seat depth in 5 cases (62,5 %), improper footrest length in 7 cases (87,5 %).
Discussion: Improper wheelchair selection can cause lower effectivity of rehabilitation, lower patient's functional abilities and severe secondary changes. No doubts further research is need for verification my findings and establishing the most effective ways of prevention.

1. Introduction

Wheelchair seems be basic equipment for disabled people, older and (usually temporary) weak people. It fulfills two main tasks (depends on health status of the user):

1. provides independent mobility, usually as primary means of mobility,
2. provides required trunk/body support [1, 2, 3].

This way wheelchairs give a chance to independent life.

Idea of wheelchairs have existed at least since 15th century but rapid development of wheelchairs started about 150 years ago. No doubts wheelchair as element of contemporary rehabilitation is an assistive device, especially for patients with walking disabilities and limitations [1, 2, 3].

Typical users of wheelchairs are post-stroke patients, patients after spinal cord injuries (SCI), people with various severe neurological syndromes, balance disorders, etc. No doubts patients with different set of symptoms have different needs in the area of both wheelchairs, other assistive devices and additional equipment. Wheelchair selection decision making process should be provided based mainly on:

assessment of the patient's functional abilities and limitations,
medical health status, indications and contraindications,
goals of the therapy,
patient oriented goal-setting procedures (both during and after therapy),
patient's independence, preferred activities and life quality,
wheelchair customization possibilities [1, 2, 3, 4, 5, 6, 7, 8].

Research of Hunt et al. [9] showed that among patients after SCI 97 % of manual wheelchairs' users and 54 % of powered wheelchairs' users have customizable wheelchairs [8]. This situation makes wheelchair selection and training very important part of rehabilitation, especially long-term rehabilitation. Dynamic development of wheelchairs makes it more difficult with each year [10, 11, 12].

Despite this knowledge and research proper wheelchair selection is not a rule, influencing further rehabilitation, independence and whole life of patients. This research is focused on rarely present in contemporary scientific literature problem of wheelchair selections. Technical developments cause the extension of new kinds of wheelchairs [13, 14, 15]. What more increase of general consciousness cause increased use of wheelchair, especially active wheelchairs, among individuals with disabilities. Aim of this study is to identify and evaluate incidence of the most common problems in wheelchair selection.

2. Material and Methods

The study involved eight patients, males, including post-stroke, traumatic brain injuries (TBI) and SCI. Mean age was relatively high: 58 (median 56,5, min. 43, max. 72, SD=10,05).

Assessment was provided using three main parameters: seat width, seat depth and footrests length, measured as provided in previous articles [4, 6, 7].

3. Results

The results are presented in table 1.

Table 1. Results of the research.

Patient No.	Seat width (proper: +, improper: -)	Seat depth (proper: +, improper: -)	Footrests length (proper: +, improper: -)
1.	+	+	-
2.	+	+	-
3.	-	+	-
4.	+	-	-
5.	-	-	-
6.	-	-	-
7.	-	-	+
8.	-	-	-

Results in 8 patients (100 %) involved in the study were as follows: improper seat width in 5 cases (62,5 %), improper seat depth in 5 cases (62,5 %), improper footrest length in 7 cases (87,5 %). In 3 cases (37,5 %) all three measured parameters were perceived improper, in 3 other cases two parameters (but not the same) were perceived improper. In all cases at least one parameter were perceived improper. Moreover there were observed severe resulting secondary changes, discussed below.

4. Discussion

Improper wheelchair selection can cause lower effectivity of rehabilitation, lower patient's functional abilities and severe secondary changes (including decubitus ulcers).

Some of observed problems can be a result of lack of periodic assessment of user-wheelchair system co-operation. Patient can e.g. put on weight, but in significant percentage of observed cases it should be corrected by proper assessment and wheelchair adjustment (without change of wheelchair or any part of it).

Every incorrectness in selection of three aforementioned basic parameters can cause unfavorable changes, and as a consequence: pain of spine and hips, body deformities, increased risk of decubitus ulcers and falling down, etc (table 2). These secondary changes and their treatment can

severely influence e.g. efficacy and length of rehabilitation. What more this situation can cause users reluctance to wheelchair and influence his/her independence and life quality.

Table 2. Selected possible secondary changes as a result of the most common problems in wheelchair selection.

Parameter	Kind of problem	Results and selected possible secondary changes
Seat width	Seat too wide	Users pelvis is not in parallel with floor Spine deformities Scoliosis
	Seat too narrow	Patient seems be „to big" to his/her wheelchair Wheelchair can be unstable Increased pressure to trochanter Further: risk factor of decubitus ulcers
Seat depth	Seat too deep	Pressure of the seat can cause problems with blood circulation within lower limbs Patient can slip from the seat and even fall down on the floor In patients with CNS disorders retroverted pelvis can change muscle tone.
	Seat too flat	Insufficient support for lower limbs Patient seems be „to big" to his/her wheelchair, can slip from the seat
Footrests length	Footrests too long	In consequence: Grasp reflex of toes Shortening of Achilles tendon
	Footrests too short	Shanks have not enough room, and as a consequence: Rotation of hip joints and spine Trunk and whole body deformities Scoliosis Slipped discs Hip joints dysplasia

There is lack of studies to compare outcomes of my research. Moreover there is lack of one widely approved criteria of the assessment, even within attempts of ISO, ANSI/RESNA or other (like HAAT model). What more no single tool received good ratings in all areas of measuring activity and participation of wheelchairs users [16].

5. Conclusions

Presented research shows particular role of wheelchairs in rehabilitation of disabled people. There is need for pay particular attention to design and selection of wheelchairs, including active wheelchairs. No doubts there is need for increase number of research and publication in presented area. It can significantly influence effectivity of the rehabilitation, including long-term neurological rehabilitation.

There is strong belief, that further research is need for verification my findings and establishing the most effective ways of prevention. Based on this study I am going to continue my research providing better evidence. Nevertheless my results can be important step toward better understanding of the most common problems in wheelchair selection.

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ROLE OF BRAINSTEM WITHIN HUMAN BODY SYSTEMS – COMPUTATIONAL APPROACH

Rola pnia mózgu w ramach systemów ciała człowieka – podejście obliczeniowe

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Total: Number of characters: 26 000 (with abstracts, summaries and graphics)=0,65 spreadsheets publishing.

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Keywords: cognitive neuroscience; neurophysiology; computational models; clinical applications.

Abstract

The brainstem seems be incredible complex part of the human nervous system, both because of its structure and functions. A clear understanding of this area is crucial for contemporary neurology, neurosurgery and neurorehabilitation. Computational neuroscience can provide the newest tool to do it: computer models of brainstem.

This way higher level of brainstem processes' analysis can be available. This article aims at investigating the extent to which the available opportunities are being exploited, including direction of further research.

How to cite item:
Mikoajewska E, Mikolajewski D. Role of brainstem within human body systems – computational approach. Journal of Health Sciences. 2012; (2)1: 95–106.

or

Mikolajewska E, Mikolajewski D. (2012). Role of brainstem within human body systems – computational approach. Journal of Health Sciences. (2)1: 95–106.

Introduction

The brainstem seems be incredible complex part of the human nervous system. Generally brainstem consists of the midbrain, pons, and medulla oblongata. The brainstem contains:

- 9 (of the 12) cranial nerves,
- at least 96 (pairs) identified nuclei (number identified nuclei varies depend on source),
- reticular formation,

and is crossed by ascending, descending, and cerebellar pathways [1, 2].

Numerous brainstem syndromes have been described - majority of them as a result of vascular insults (brainstem infarctions, hemorrhages, etc.), but nonvascular too (demyelinating disease, intramedullary neoplasms, brainstem encephalitis, central pontine myelinolysis, etc.) [1, 2]. Brainstem infarcts comprise approximately 10 -15 % of all first ischemic brain strokes [3, 4, 5].

Even focal brainstem lesions can cause "crossed" syndromes, i.e. simultaneously:

- ipsilateral cranial nerve dysfunction,
- contralateral motor or sensory tract dysfunction.

Morbidity after brainstem damages varies up to 50 % and depends mainly on cause, location (focus of injury, vascular accident, etc.), their influence to key human body functions and very quick, individual therapy. Significant prognostic sign is perceived health status (including functional assessment, e. g. Functional Independence Measure - FIM), young age of patient in admission, normal results of imaging (fMRI) and low number of medical complications [4]. Therapy of survivors after brainstem damages is a long-term, complex, patient-oriented process [4, 5]. Severe consequences of brainstem stroke include consciousness disorders, ataxia, dysarthria, diplopia, dysphagia, etc. [5]. There has been observed surprisingly little research published on the rehabilitation of patients with brainstem damages, including stroke [5]. No doubts key issues in research are:

- clinical guidelines in brainstem damages, including diagnosis,
- randomized controlled trials including both life-saving procedures (including neurosurgery) and long-term rehabilitation procedures,
- mechanisms of brainstem activation and functioning, including brainstem influence to higher levels of nervous system (subcortical areas, e.g. thalamus, cortex),
- not known limited neuroplastical abilities (because e.g. diversity of the structure) of the brainstem.

A clear understanding of the importance of brainstem area for the central nervous system (CNS) is compromised. There is essential to provide full knowledge about the location of the mayor tracts and nuclei and their functions within human body. What more: crucial in neurological diagnosis is the knowledge of precise anatomical localization of a lesion affecting the brainstem [6]. Computer simulations in medical and biological sciences can be relatively new, but helpful approach in it [7].

MEDLINE / PubMed (U.S. National Library of Health) [8] database was searched to identify relevant articles. Fig. 1 shows the frequency of specified key words combinations. This research was limited to the English language articles and encompassed the period from 01.01.1991 to 31.12.2011.

MeSH (Medical Subject Headings) [9] defines keyword “brain stem” as “the part of the brain that connects the cerebral hemispheres with the spinal cord. It consists of the mesencephalon, pons, and medulla oblongata” [9]. Both forms: “brain stem” and “brainstem” are used in scientific literature. There are eight another keywords in the MeSH including the “brain stem” word:

1. evoked potentials, auditory, brain stem - introduced 1991,
2. brain stem neoplasms – introduced 2000,
3. brain stem hemorrhage, traumatic – introduced 2000,
4. brain stem infarctions - introduced 2000,
5. auditory brain stem implants - introduced 2003,
6. auditory brain stem implantation - introduced 2003,
7. athabaskan brainstem dysgenesis - introduced 2010,
8. hypotonia, congenital nystagmus, ataxia and abnormal auditory brainstem response - introduced 2010 [9].

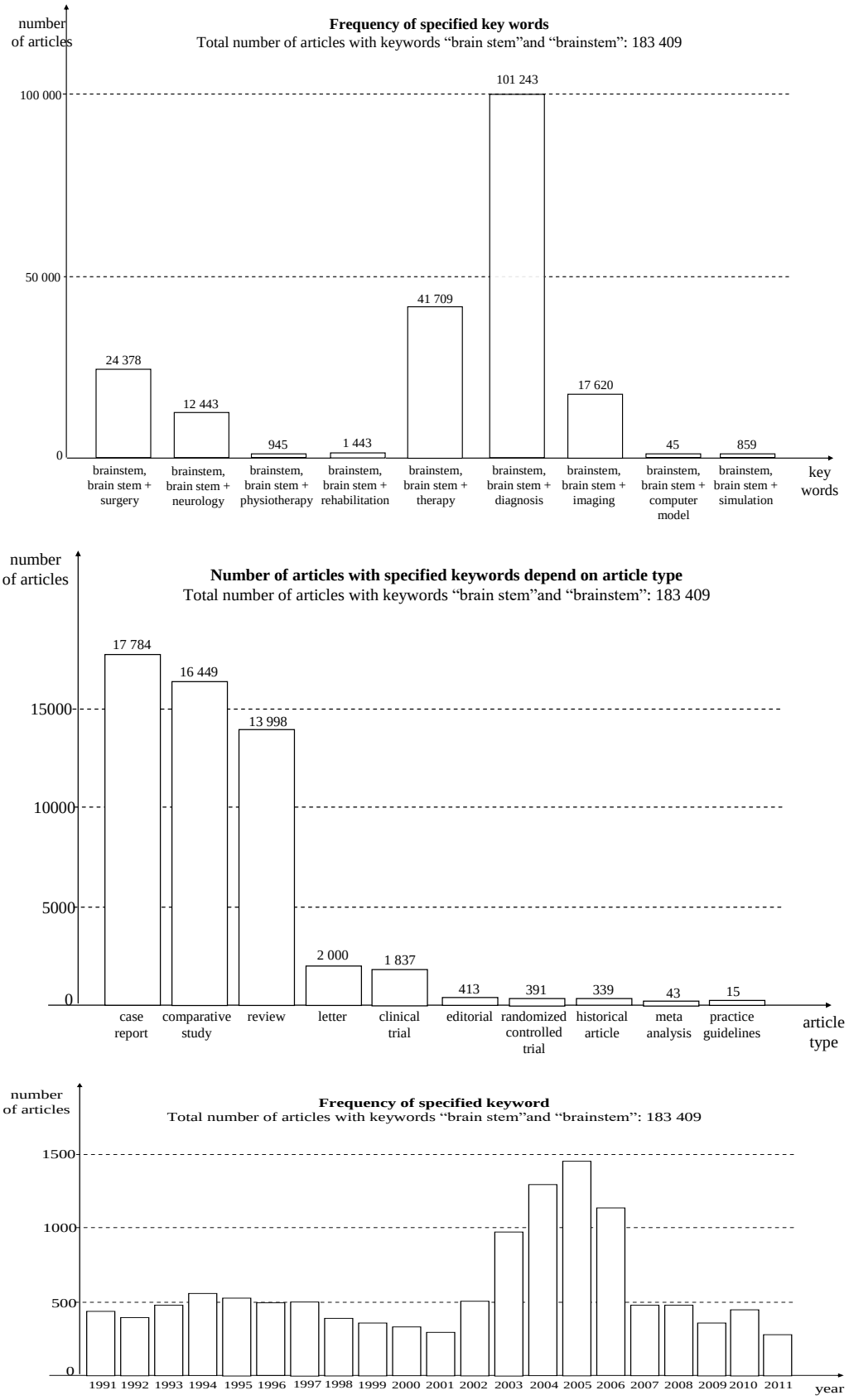

Fig. 1. Results of authors' investigation of the PubMed database (U.S. National Library of Medicine) [8]

Number of articles with keywords “brainstem” and “brain stem” seems be huge (183 409), but there were observed:

1. significant increase in the articles’ number since 2003 to 2006 versus significant decrease in the articles’ number starting in 2007, what seems be stagnation,
2. a lot of case reports, reviews and comparative studies versus very few clinical trials and shortage of randomized controlled trials and practice guidelines,
3. very few articles in the area of rehabilitation and physiotherapy of patients with brainstem damages (strokes, injuries, etc.), despite these cases are rather severe and need long-term rehabilitation for survivors.

Very few articles in the area of simulations and computer models of the brainstem structure, functions and damages can be a result of fact, that computational neuroscience is relatively new approach, not always popular in medical applications. What more computational models of cerebral cortex are more popular and, in selected cases, easier than computational models of brainstem.

Aforementioned conclusions indicate where research is concentrated now. Computational neuroscience tries to change the decrease in number of brainstem research. Our results can provide the newest tool and activate other scientists into providing further research. Even moderate stimulation can be effective in the area of brainstem research, because of significant technical development, providing higher level of brainstem processes’ analysis. This article aims at investigating the extent to which the available opportunities are being exploited, including own concepts, research and observations.

Current concepts

From (neuro)anatomical point of view the gray matter of the brainstem consists of clumps and clusters throughout the brainstem. It forms the cranial nerve nuclei, the reticular formation, and pontine nuclei [6]. The white matter of the brainstem consists of fiber tracts (i.e. axons of neuronal cells). These tracts pass down from the cerebral cortex and up from peripheral nerves and the spinal cord to the highest parts of the brain [6]. The internal structure of brainstem is organized in three laminae: tectum, tegmentum, and basis [6].

From functional point of view brainstem serves as the connection between the cerebral hemispheres with the spinal cord and the cerebellum. But brainstem is responsible for basic vital functions, such as breathing, blood pressure, control of consciousness, and sleep [6]. The involvement of reactive oxygen species such as superoxide is implicated in the pathogenesis of hypertension [10]. Lesions of the brainstem nuclei are likely to be associated with loss of consciousness and fatal hyperthermia [11]. The brainstem noradrenergic systems can play important role in stress, anxiety and depression [12]. Moreover brainstem (its selected nuclei, pathways and other structures) fulfills important role in:

- homeostasis balance,
- regulation of muscle tone,

- pain,
- hunger modulation,
- sight and control over eye movements,
- hearing,
- chewing.

Role of reticular formation e.g. in ascending reticular arousal system (ARAS) is still widely discussed.

Because brainstem has very complex structure neurological examination can only assess of some of its aspects. Huge number of nuclei, pathways and other structures makes difficult using simple assessment. MRI techniques make possible to locate the main structures (and their damages) that justify the symptoms of the patient [6]. Imaging of the brainstem seems be a great challenge because of:

- Brainstem is a very complex structure – complexity of gray matter nuclei mixed to white matter tracts, near bony structures, surrounded by vessels, makes difficult both analysis and diagnosis, especially small lesions [13];
- There are useful advanced techniques: spectroscopy, diffusion and perfusion sequences [13];
- Efficient MR imaging examination should be tailored to the patient's history. There seems be a lot of features and landmarks important in interpreting MRI [3].

In contemporary neurosurgery intraoperative neurophysiological monitoring (IOM) is used in to improve surgical results while minimizing morbidity [14]. In the brainstem case IOM consists of simultaneously:

2. brainstem monitoring techniques, i.e. continuous "on-line" assessment of the functional integrity of neural pathways, e.g. free-running electromyography (EMG) and muscle motor-evoked potential (mMEP), including corticobulbar mMEPs for monitoring functional integrity of corticobulbar tracts [14].
3. brainstem mapping techniques, i.e. functional identification and preservation of anatomically ambiguous nervous tissue, recognizing anatomical landmarks, but without detecting some injuries [14].

For brainstem neurosurgery purposes available techniques has not yet been fully standardized and some limitations still exist [14].

Computational models of the brainstem

Integration of research results involving neurobiology, neurophysiology, neurosurgery, bioinformatics, biocybernetics, neurocybernetics, cognitive science and biomedical engineering can provide better understanding complex functions and dysfunctions of the brainstem. Computational research be very useful as link between theoretical analysis and experimental (clinical) research.

These way computational models can save time, efforts and money by:

- instant application of the newest knowledge (e.g. from experimental research),
- building (one or even simultaneously several) models for complex structures/phenomenons, better capturing general issues (tendencies, mechanisms) within simulated structure/phenomenon,
- if need - quick development of models families using effective computational environments,
- focusing on the most promising concepts and ideas,
- in complex models: integrating of various levels of processing: molecular, cellular, systems and behavioral in a (neuro)biologically relevant way,
- better understanding of very complex processes, e.g. neural systems dynamics,
- better understanding of (neuro)biological systems' limitations and damages (e.g. for diseases or injuries simulation purposes) [6, 15].

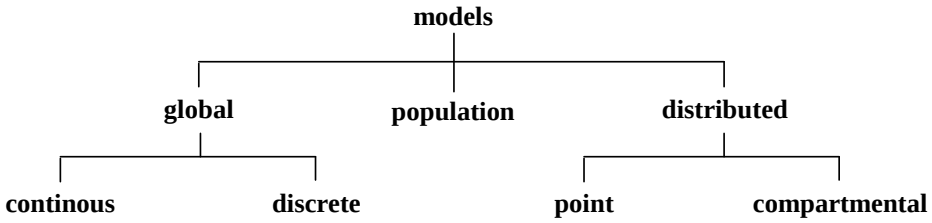

Fig. 2. Classification of neurophysiological models depending on scale [7, 15].

To provide the best available efficiency and avoid mistakes we should be aware, that there is very hard to provide computational model fitted to the simulated structure/phenomenon. General models of complex structures are usually not relevant to (neuro)biology at all levels of the application. What more – too simple models can miss important details of simulated processes. From the other side detailed models are usually very complicated, difficult to study and hard to

develop. No doubts larger research projects require an interdisciplinary team experienced in it to provide useful effects [7, 15].

Because of the lack of general research standards in computational simulations of the human nervous system there is hard to compare results form different simulation environments, e .g. for analysis and development purposes. One of proposed solutions of this problem has been discussed in [15].

The most important group of brainstem models are general models of action selection within it:

- model of Humphries et al.: brainstem reticular formation as a cluster model of "small worlds" [16],
- model of Olmsted: the reticular formation is placed by supervised trial-and-error learning scheme with motivation modulation [17],
- model of Merker: brainstem as a part of target selection, action selection, and motivation system to optimize integration for action in real time [18].

The other group consists of models of respiratory rhythm generator, provided in early 1990s by Smith at al. [19], developed by Ramirez et al. [20], Feldmann et al. [21, 22] and Butera et al. [23, 24]. One of the most advanced models of respiratory rhytm generator shows model of Rybak et al. based on co-operation of pre Bötzinger Complex, Pontine Respiratory Group and Ventral Respiratory Column. This model allows e.g. for cough simulation [25]. Advanced researches on respiratory rhythm generator are conducted in Department of Informatics of Nicolaus Copernicus University.

Mathematical models of brainstem are difficult to develop, but there were observed two main successful attempts:

- based on control systems, e.g. nonlinear oscillators, used to simulation of brainstem failures – disadvantage can be complicated mathematical description [26],
- linear model of Robinson et al. [27] – disadvantage can be necessity of experimental selection of model' parameters [27].

Quantitative physiologically based modeling of brainstem dynamics theory linked with EEG signatures of sleep was provided for better understanding of the ascending arousal system of the hypothalamus and brainstem by Robinson et al. [28]. It proved its reliability by verification against experimental data, including e.g. normal conditions, sleep deprivation, stimuli, stimulants and jetlag [28].

Directions of further research

There are main two wide discussed historical approaches in computational modeling, derived both from philosophy of mind, artificial intelligence and cognitive science:

1. connectionism, perceiving brain structure critically important in how the mind works, i. e. simulations of nervous systems should be provided using models similar to brain structure, e.g. artificial neural networks (we simulate both structure and functions),
2. functionalism, perceiving brain as a hardware for mind (software), so it is possible to reconstruct mind (software) on another type of hardware, e.g. artificial intelligence (we simulate only functions).

Evolution of both aforementioned approaches provided a lot of their various types, both strict and eclectic, no one is prevailing. Choice of one of them can limit used software and hardware. At least several of them can provide (neuro)biologically realistic models of neurons, based e.g. on Hodgkin-Huxley model. The most popular environments used for brain and brainstem simulation are: GENESIS, NEURON and Emergent [29].

(Neuro)biologically realistic model of brainstem functions is very hard to do, but direct (without scalling) simulation is unable because of brain/brainstem complexity. What more shortages in knowledge of brainstem (neuro)anatomy makes necessary to provide hypothetic values and connection within it. This situation makes difficult effective compartment of various solutions.

There are two leading approaches in construction of brainstem models:

- development of simulation from general mechanisms to detailed (easier do identify and build),
- development of simulation from detailed mechanisms to bigger general models (through integration).

Large number of signals and parameters within the model make hard to discover components the carrying meaningful information. Attractors' dynamics visualization is relative new approach in brain and brainstem research. Using Fuzzy Symbolic Dynamics (FSD) allow for analysis of emerging model dynamics and influence of parameters' changes (reflecting e.g. damages). It can be studied to verify a lot of hypotheses and understanding of the multidimensional dynamical behavior, especially within complex systems, hard to examine in the other way [30, 31]. The newest and not fully explored approach can be use of liquid state machines [32, 33, 34, 35, 36].

Conclusion

Despite deep knowledge and clinical experience brainstem seems be one of the less known part within the human nervous system. Computational models of brainstem seems be good solution for better understanding of the complex processes within it. Despite provided computer models, contemporary evidences seems be insufficient. There is need for further interdisciplinary research in the area of computational brainstem models.

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Zagoroulko Alexandr, Novikov Nikolay, Usenko LV, Petrashenoc EV, Krishtaphor AA, Tsarev AV, Nenadyschuk VA, Mishonova LI. Resuits of imited clinical trials of ukrainian surfactant suzacrin in patients with acute lung injury syndrome. [in] Czerwińska Pawluk Iwona Ed., Muszkieta Radosław Ed., Napierała Marek Ed., Zukow Walery Ed. Annual Reports of Education, Health and Sport 9781329876002. RSW. Radom. 2013. 107-122. ISBN 9781329876002. 220 p. © The Author(s) 2013. This articles is published with Open Access at Annual Reports of Education, Health and Sport. RSW. Radom. Poland.

Original Text published © The Author (s) 2012. Zagoroulko Alexandr, Novikov Nikolay, Usenko LV, Petrashenoc EV, Krishtaphor AA, Tsarev AV, Nenadyschuk VA, Mishonova LI. Resuits of imited clinical trials of ukrainian surfactant suzacrin in patients with acute lung injury syndrome. Journal of Health Sciences. 2012;2(1):107-121. ISSN 1429-9623 / 2300-665X. Open Access Open Journal Systems of Radom University in Radom, Poland ISSN 1429-9623 / 2300-665X. 2012.

RESUITS OF IMITED CLINICAL TRIALS OF UKRAINIAN SURFACTANT SUZACRIN IN PATIENTS WITH ACUTE LUNG INJURY SYNRDOME

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Number of characters: 34 000 (with abstracts). Number of images: 2 x 1000 characters (lump sum)= 2 000 characters.
Total: Number of characters: 36 000 (with abstracts, summaries and graphics)=0,9 spreadsheets publishing.

Key words: clinical trials; surfactant; suzacrin; patient; acute lung injury synrdome.

Abstract

There is lmited clinical trials including 60 patients, who satisfied the accepted criteria of inclusion, took part in the research. The purpose of the given research was to study the efficiency and tolerance of the preparation "Suzacrin, emulsion in 7.5 ml bottles" produced by "Docpharm" Ltd. as compared with a 0.9% NaCl solution for treatment of acute respiratory distress syndrome. The patients of the basic group (n=30) received preparation "Suzacrin, emulsion in 7.5 ml bottles" produced by "Docpharm" Ltd. endotracheally once a day within 3 days in a dose calculated by special formula by endotracheal instillation. The patients of the control group (n=30) received a 0.9 % NaCl solution endotracheally in doses calculated for Suzacrin.

The analysis of the lung compliance dynamics and its comparison in patients of the basic and control groups have shown that application of Suzacrin, emulsion in 7.5 ml bottles, produced by "Docpharm" Ltd, improves the lung distensibility, that is one of the basic tasks of intensive care at acute respiratory distress syndrome at various critical conditions. Thus it has been marked that the improvement of compliance is observed from the third hour after the first introduction and is kept during the whole period of observation.

The analysis of some clinical parameters characterizing the condition of the respiratory system has shown that application of Suzacrin, allows to considerably reduce quantity and improve quality of sputum, to decrease the intensity of dyspnea.

The analysis of the laboratory data has shown absence of effect of the researched and referred preparations on parameters of general clinical and biochemical analyses of blood, that confirmed high tolerance and harmlessness of Suzacrin.

The application of Suzacrin, emulsion in 7.5 ml bottles produced by "Docpharm" Ltd. in patients with acute respiratory distress syndrome causes the expressed clinical effect manifested by

considerable decrease of lung resistance and increase of oxygenation index

Suzacrin, emulsion in 7.5 ml bottles produced by "Docpharm" Ltd. is an effective and safe artificial surfactant and can be recommended to wide application in complexes of an intensive care of adult patients with acute respiratory distress syndrome developing on a background of various critical conditions.

ETHICAL ASPECTS

The given clinical trial has been carried out according to the Law of Ukraine "On Medications" and in accordance with ethical principles of the Declaration of Helsinki after the approval of protocol of clinical trial by Ethics Committee of SPC (State Pharmacology Center) of Ministry of Public Health of Ukraine.

As the patients participating in the trial were in a bad condition and could not adequately perceive the information and take decisions, the complete information on character of clinical trial, researched preparation, and probable risk connected with intake of the preparation contained in "Information for Patient" was given to authorized persons empowered to act for them. All authorized persons included in the research have confirmed in written form their consent to participation of the patients in the trial.

1. INTRODUCTION

1.1. Description of the researched preparation

1.1.1. General description and structure of preparation

The researched preparation Suzacrin represents an emulsion, which has the marked superficially active properties, due to which the preparation reduces a surface tension in alveoli, thus preventing their collapse at the end of exhalation. The structure of preparation includes: phospholipids, sodium chloride, surfactant-associated proteins, carbohydrates, lipide impurities (cholesterol and its ethers, fatty acids and neutral fats). Sodium chloride makes up from 65 to 70 mg; the structure of organic components comprises up to 375 mg (76 %) of pure phospholipids, which are proportioned between dipalmitoilphosphatidylcholine - about 85 %, proteins including surfactant apoproteins - up to 20 mg (4 %), and carbohydrates - up to 10 mg (2 %); lipide impurities (cholesterol and its ethers, fatty acids, and neutral fats) make up about 75 mg (15 %).

The preparation, offered for use, has been produced on the basis of preparation of exogenous surfactant "Sucrim", registered in Ukraine.

1.1.2. Indications for administration

- pneumonias of various etiology - with the purpose of making up a secondary deficiency of endogenic surfactant (a substitution surfactant therapy) for 1-6 days from the onset of disease;
- hypoventilation, atelectasis or hypoinflation of parts of the lungs, which remains after a partial resection for various clinicoanatomic forms of pulmonary tuberculosis;
- chronic obstructive pulmonary diseases;
- pulmonary traumas;
- in case of long (over 1-2 hours) operative interventions - with the purpose of prevention of respiratory complications after inhalation narcosis with application of anesthetics producing a negative effect on lung surfactant (ether, fluothane);
- at long application of ALV (more than 12 hours) with high concentration of oxygen (over 60 % in a gas mixture) - with the purpose of prophylaxis of respiratory impairment and secondary deficiency of endogenic surfactant;
- in case of septic conditions, inhalations of toxic substances, peritonites, aspiration, massive and numerous transfusions, fat embolism, profuse hemorrhages, pancreatites, cardiogenic shock, severe traumas - with the purpose of treatment of respiratory distress syndrome in adults (acute respiratory distress syndrome - ARDS).

1.1.3. Methods of administration and dose

Before the use a bottle should be carefully turned over several times to receive a more homogeneous emulsion. There is no need to stir up the bottle intensively or to shake its content in order to avoid foam formation. Warm up emulsion up to 37ºC.

Technology of introduction of preparation:

Emulsion of the preparation is introduced by a syringe through a catheter fixed in an endotracheal tube in such a way that the opening of the catheter should be at a level of the distal end of the tube. The complete instillation is provided with subsequent injection of air into the catheter. The introduction of preparation is allowed by piercing the endotracheal tube with a syringe needle.

Rate of introduction – a free drop-by-drop introduction (for more uniform distribution of preparation in the lungs). The effect is already observed in 10 minutes after introduction (it can be manifested even in one minute) as a rise of SAO_2. During the first 2 hours it is necessary to refuse aspiration through the respiratory tube.

A dose is calculated according to the formula: M = 0.37xXxR, where: M – amount of Suzacrin in mg, X - mass of the patient in kg, R - sexual mass coefficient, which helps to convert the body mass of patient in kilograms into mass of the lungs in grams: for men it makes up 27, for women - 23; 0.37 – a coefficient, which determines the necessary amount of preparation Suzacrin per one gram of lung mass.

Depending on evidence of clinical effect and necessity for artificial respiration, the preparation can be consistently introduced two more times in the same dose. The repeated introduction should be carried out not earlier than six 6 hours after the previous one (for this time about half of introduced exogenous surfactant is subjected to disintegration and elimination from alveoli, as a result at repeated introduction of Suzacrin there is no risk of a lipide overload of the lungs, which could have caused deterioration of a gas exchange in alveoli, occurrence of edema and hemorrhage, that increases the possibility of development of bacterial pneumonias. On the other hand, the repeated introduction of Suzacrin six hours after the previous one allows to eliminate the recurrent deficiency of endogenic surfactant and maintain a physiological level of surfactant in the lungs.

The maximum permissible introduction of preparation is three times.

1.1.4. Side effects

On introduction by syringe, a short-term obstruction of respiratory tract with immediate manifestation of hypoxia symptoms is possible. In the thorax the large bubbling rales can be auscultated on inspiration. This condition can be controlled by the increase of pressure in the respiratory tract within 30-60 seconds. To prevent the development of obstruction, the preparation should be introduced slowly.

1.1.5. Contraindications

Contraindications for adults have not been established. The efficiency of preparation decreases in case of:

- congenital defects of respiratory system;
- accompanying endocrinological conditions (diabetes mellitus, thyrotoxicosis);
- some developmental defects of the digestive system, e.g. formation of tracheoesophageal fistula;
- various immunodeficiency states (immunodeficiency syndromes with thymus hypoplasia);
- pathology of blood system (thrombocytopenia, thrombastenia, haemophilia, etc.);
- posthemorrhagic anemia.

Suzacrin is <u>contraindicated</u> to premature newborn babies for prevention and treatment of respiratory distress syndrome because of high concentration of exogenous phospholipids per 1 ml of emulsion!

1.1.6. Special indications for administration

It is applied only endotracheally, through inhalation and through bronchoscope.

1.1.7. Interaction with other preparations

At acute inflammatory diseases of the lungs (pneumonia) Suzacrin potentiates the action of used antibiotics (introduced both locally, and parenterally) at the expense of improvement of aeration of respiratory parts of the lungs in the focus of infection.

1.2. Goals of Research

The purpose of the given research was to study the efficiency and tolerance of the preparation “Suzacrin, emulsion in 7.5 ml bottles” produced by "Docpharm" Ltd. as compared with a 0.9 % NaCl solution for treatment of acute respiratory distress syndrome.

1.3. Objectives of Research

1. To study common clinical benefits and efficiency of “Suzacrin, emulsion in 7.5 ml bottles” produced by "Docpharm" Ltd.
2. To estimate tolerance of “Suzacrin, emulsion in 7.5 ml bottles” produced by "Docpharm" Ltd.
3. To compare the efficiency of “Suzacrin, emulsion in 7.5 ml bottles” produced by "Docpharm" Ltd with 0.9 % NaCl solution.

2. Substantiation of the Trial

The necessity of carrying out the given clinical research is proved by the needs of native practical medicine for effective and safe artificial surfactant, which can be applied at treatment of acute respiratory distress syndrome.

3. PLAN of the TRIAL

3.1. Design of the test

3.1.1. Type of research

The given research was carried out as an open, randomized, parallel clinical investigation.

3.1.2. General description of research

The present research was done in accordance with demands of State Pharmacological Center of Ministry of Public Health of Ukraine made to limited clinical trials with observance of the confirmed protocol and principles of GCP.

60 patients, who satisfied the accepted criteria of inclusion, took part in the research.

As the patients participating in the trial were in a bad condition and could not adequately perceive the information and take decisions, the information on clinical trial was given to the authorized persons, who were provided with explanation for terms of research; they all got acquainted with the “List of Information for Patient” and gave a written consent to participation of the patients in the trial of preparation “Suzacrin, emulsion in 7.5 ml bottles” produced by "Docpharm" Ltd.

Before inclusion in research each potential participant of the trial has undergone a clinical-laboratory examination according to the scheme described in the protocol. After the primary examination only those patients, who satisfied the criteria of inclusion, were included into the trial.

Each subject of the trial got an identification number corresponding to a serial number of inclusion into the given trial. The identification number was written in the Individual registration form. All participants were randomly subdivided into basic (30 persons) and control (30 persons) groups.

There were no cases of premature withdrawal of the patients from research. One patient had died before termination of research in connection with initially bad condition. The death was not connected with taking the preparation.

All patients-participants of research received a base therapy including: respiratory support by an oxygen breathing apparatus - respirator ”Phase-8" (parameters of ventilation: respiratory volume - 5-8 ml/kg of body mass, minute volume of respiration - 14-15 l, PEEP - 5-7 cm H_2O, FiO_2 - not more than 0.5, pressure on inspiration - not more than 35 cm H_2O), membrane stabilizers and antiinflammatory agents (glucocorticosteroids), antibacterial agents, infusion-transfusion therapy, agents for restoration of rheological properties of blood, parenteral alimentation, reparative agents.

The base therapy was identical in basic and control groups.

The patients of the basic group received preparation “Suzacrin, emulsion in 7.5 ml bottles” produced by "Docpharm" Ltd. endotracheally once a day within 3 days in a dose calculated by special formula. The patients of the control group received a 0.9 % NaCl solution endotracheally in doses calculated for Suzacrin.

The data, determined as criteria of efficiency and tolerance, were rated on corresponding scales, statistically processed and compared in groups (see Table 1. and Table 2.).

3.1.5. Duration of research

The duration of research of each patient in each group made up 5 days.

3.2. Choice of investigated population

3.2.1. Number of the subjects under trial and method of randomization

Sixty patients were included in research. They were subdivided into experimental group - 30 patients, and control group - 30 patients. The subdivision of patients into groups was carried out randomly according to the protocol. The subjects for experimental research were recruited from the patients with various critical conditions accompanied by acute respiratory distress syndrome, who were being treated in departments of anesthesiology and intensive care of Dnepropetrovsk regional hospital named after II Mechnikov, clinic of anesthesiology and intensive care department of Dnepropetrovsk state medical academy.

3.2.2. Criteria of inclusion:

- men and women;
- aged 18-65;
- availability of acute respiratory distress syndrome at serious traumas (compliance of the lungs is less than 40 ml/cm H_2O, index of oxygenation PO_2/FiO_2 makes up 300 units and less);
- the informed written consent of the patient or lawful representative of the patient (a relative) to participation in research.

3.2.3. Criteria of exclusion

- pregnancy, lactation;
- known hypersensitivity to components of the researched preparation;
- congenital defects of respiratory system;
- accompanying endocrinological diseases (diabetes, thyrotoxicosis);
- defects of the digestive system;
- immunodeficiency states (immunodeficiency syndromes with thymus hypoplasia);
- blood system pathology (thrombocytopenia, thrombastenia, hemophilia, etc.);
- any clinically significant deviations of laboratory parameters requiring additional investigation and interpreting the data;
- participation in any other clinical trial.

3.2.4. Terms of exclusion of patients from research

- individual intolerance of the researched preparation;
- the occurrence in the patient of serious and/or unexpected side effects during research;
- significant deterioration of common condition during research;
- refusal of the patient to participate in research.

At carrying out the research none of the patients left.

3.3. Scheme of treatment by the researched preparations

In addition to base therapy, the patients of the basic group were administered the researched preparation Suzacrin, emulsion in 7.5 ml medical bottles, produced by "Docpharm" Ltd. The introduction was carried out by endotracheal instillation. The emulsion of the preparation was introduced by syringe through a catheter fixed in an endotracheal tube in such a way that the opening of the catheter should be at a level of the distal end of the tube. The complete instillation is provided with subsequent injection of air into the catheter. The rate of introduction is a free drop-by-drop introduction. The course of treatment was 1 instillation per day during 3 days.

For the patients of the control group the base therapy was supplemented with endotracheal introduction of a 0.9 % NaCl solution endotracheally in doses calculated for Suzacrin.

The dose of introduced preparation was calculated according to the formula: M=0.37x X xR, where:

M – amount of Suzacrin preparation in mg,

X - a body mass of the patient in kg,

R - sex mass factor, which helps to convert body mass of the patient in kilograms into mass of the lungs in grams: for men it makes up 27, for women - 23;

0.37 - coefficient which determines the necessary quantity of Suzacrin preparation per one gram of lung mass.

3.4. Accompanying therapy

Neither before research, nor during its realization, any other preparations influencing a surface tension of sputum were applied. A base intensive care received by the patients of both groups included: respiratory support by an oxygen breathing apparatus - respirator ”Phase-8" (parameters of ventilation: respiratory volume - 5-8 ml/kg of body mass, minute volume of respiration - 14-15 l, PEEP - 5-7 cm H_2O, FiO_2 - not more than 0.5, pressure on inspiration - not more than 35 cm H_2O), as well as medicinal preparations: antibacterial drugs (ampiox or cephtriaxon), infusion-transfusion therapy with crystalloid and colloid solutions in volume of daily liquid needs, agents for restoration of rheological properties of blood and improvement of microcirculation (rheopolygluchinum, pentoxyphyllin, heparin in a preventive dose), decongestants, membrane stabilizers and vein tonics, vitamin therapy (vitamins C, B_1), prophylaxis of gastric ulcers (rhantak).

3.5. Estimation of efficiency and tolerance.

For estimation of Suzacrin efficiency the following scale was used according to Table 3.

3.5.2. Estimation of tolerance

The tolerance of the researched preparation will be estimated by the researcher immediately after introduction of the preparation, one hour after introduction, 3 hours and 1 day after each introduction. The tolerance will be estimated on the basis of objective data received by the researcher and subjective complaints of the patient. Besides, once a day the investigation of laboratory parameters characterizing a common condition of the patient will be carried out.

The tolerance of the preparation will be estimated by the researcher according to the following scale in Table 4.

3.6. Processing the research data

The statistical processing was carried out separately in groups with the use of parametrical statistics methods, t-criterion of Student and non-parametrical criteria and then the received data was compared in groups. The following data were estimated: the parameters within each group according to the scheme of research; differences of efficiency and tolerance parameters in groups; presence and frequency of adverse reactions in groups of comparison.

4. RESULTS of RESEARCHES and THEIR ANALYSIS

4.1. Characteristics of the patients

Those patients, who met the criteria of inclusion/non-inclusion and were treated for various critical conditions aggravated by acute respiratory distress syndrome, were included in research.

The structure of the basic and control group according to age and weight statistically did not differ. The subdivision of patients into groups according to sex and weight is presented in Table 5 and Table 6.

The analysis has shown that the groups by ratio of men and women, and also by age, weight and body height statistically did not differ, that allowed to use the data received during clinical

research for the analysis of efficiency and tolerance of Suzacrin, emulsion in 7.5 ml bottles, in comparison with endotracheal introduction of a 0.9 % NaCl solution.

The majority of participants of both groups were patients with a polytrauma and severe craniocerebral trauma. There were a little bit less patients with acute disturbances of blood circulation of ischemic and hemorrhagic type.

The summary information on nosological forms observed in the patients who participated in clinical research is submitted in Table 7.

The groups of subdividing the patients with various nosological forms were comparable.

4.2. Characteristics of efficiency

4.2.1. Estimation of efficiency by compliance dynamics

The compliance of the lungs manifests the distensibility of the lung tissue and depends appreciably on a surface tension of sputum in bronchioles and alveoli. Physically the compliance value consists in determination of air volume which should be introduced into the respiratory tract in order to increase pressure in it by 1 cm H_2O. The dynamics of lung compliance in patients participated in the clinical research is submitted in Table 4, Fig. 1.

The analysis of the lung compliance dynamics and its comparison in patients of the basic and control groups have shown that application of Suzacrin, emulsion in 7.5 ml bottles, produced by "Docpharm" Ltd, improves the lung distensibility, that is one of the basic tasks of intensive care at acute respiratory distress syndrome at various critical conditions. Thus it has been marked that the improvement of compliance is observed from the third hour after the first introduction and is kept during the whole period of observation.

4.2.2. Estimation of efficiency by oxygenation index

The oxygenation index, being an integrative parameter, reflects the ability of apparatus of external respiration to maintain the level of oxygen in blood, adequate to needs of organism. Its level depends on a number of factors, the leading one being the area of alveolar surface, depending on a surface tension of sputum in alveoli.

The dynamics of oxygenation index in patients of the basic and control groups is submitted in Table 8, Fig. 2.

4.2.3. Clinical estimation of the preparation efficiency

The analysis of some clinical parameters characterizing the condition of the respiratory system (Table 9) has shown that application of Suzacrin, emulsion in 7.5 ml bottles, produced by "Docpharm" Ltd, allows to considerably reduce quantity and improve quality of sputum, to decrease the intensity of dyspnea.

The analysis of the chosen parameters of the respiratory system condition has shown the presence of marked positive effect of the researched preparation as compared with endotracheal application of a 0.9 % NaCl solution on liquefaction of sputum and improvement of its rheological properties.

The general estimation of efficiency of Suzacrin, emulsion in 7.5 ml bottles, produced by "Docpharm" Ltd, is defined by researchers as "high".

4.3. Characteristics of tolerance

The analysis of parameters of the central hemodynamics (Table 10, 11) at application of Suzacrin, emulsion in 7.5 ml bottles, produced by "Docpharm" Ltd. has revealed the absence of side effects at its application.

The dynamics of parameters of the central hemodynamics reflects absence of effect of the researched preparation on the level of arterial pressure and heart beat rate of the patients who took part in the clinical research, that confirms high tolerance of the researched preparation.

In all stages of investigation the allergic reactions were not observed.

The analysis of the laboratory data has shown absence of effect of the researched and

referred preparations on parameters of general clinical (Table 12) and biochemical (Table 13) analyses of blood, that confirmed high tolerance and harmlessness of Suzacrin, emulsion in 7.5 ml bottles produced by "Docpharm" Ltd.

The parameters of clinical analysis of urine in patients of both groups did not differ from reference values.

In view of clinical examination and laboratory data it has been determined that the tolerance of Suzacrin, emulsion in 7.5 ml bottles produced by "Docpharm" Ltd. is high (Table 14). The efficiency of the researched preparation in patients with SARF can be estimated as high, especially in comparison with endotracheal introduction of a 0.9 % NaCl solution, acting as placebo.

5. CONCLUSIONS

1. The application of Suzacrin, emulsion in 7.5 ml bottles produced by "Docpharm" Ltd. in patients with acute respiratory distress syndrome causes the expressed clinical effect manifested by considerable decrease of lung resistance and increase of oxygenation index.

2. At use of Suzacrin, emulsion in 7.5 ml bottles produced by "Docpharm" Ltd., its good tolerance by patients and absence of appreciable side effects are marked.

- Suzacrin, emulsion in 7.5 ml bottles produced by "Docpharm" Ltd. is an effective and safe artificial surfactant and can be recommended to wide application in complexes of an intensive care of adult patients with acute respiratory distress syndrome developing on a background of various critical conditions.

Table 1. Schematic display of stages and procedures.

Days of research	Screening		Stages of examination						
	-1	0	1	1.0-1.3	2	2.0-2.3	3	3.0-3.3	4
History taking and preliminary estimate of patient's correspondence to criteria of inclusion/ exclusion	*								
Receiving written Informed Consent	*								
Introduction of researched preparation			*		*		*		
Objective examination: 3. HR, ABP, $AP_{systolic}$, CVP; 4. body temperature; 5. heart and lung auscultation[1]; 6. inspection of skin and visible mucous membranes		*	*	*	*	*	*	*	*
Laboratory investigations: general blood analysis general urinalysis biochemical blood analysis ABB and content of blood gases		*			*		*		*

Investigation of ventilation and gas exchange parameters		*	*	*	*	*	*	*	*
Revealing and recording of possible side effects			*	*	*	*	*	*	*
Estimation of efficiency and tolerance			*	*	*	*	*	*	*

Note:

[1] Availability and intensity of the following signs have been estimated and recorded:

- Sibilant rales (1- present; 0- absent);
- Dullness on percussion (1- present; 0- absent);
- Sputum (0 - absent, 1 - mucous, 2 - mucopurulent, 3 - purulent).
- Amount of sputum (0 - absent, 1 - insignificant, 2 - moderate, 3 - significant);
- Dyspnea (0 - absent, 1 - slight, 2 - moderate, 3 – severe).

Table 2. Stages of investigation:

A Stage Code	Day	Stage
0	0	The initial state (screening)
1	1	Before introduction
1.0		Immediately after introduction
1.1		1 hour after introduction
1.3		3 hours after introduction
2	2	Before introduction
2.0		Immediately after introduction
2.1		1 hour after introduction
2.3		3 hours after introduction
3	3	Before introduction
3.0		Immediately after introduction
3.1		1 hour after introduction
3.3		3 hours after introduction
4	4	1 day after the last introduction

Table 3. Estimation of efficiency.

Degree of efficiency	Clinical indexes.
High efficiency	1. Increase of lung compliance by 16 % and over in relation to a reference value. 2. Increase of PaO_2/FiO_2 by more than 20 % in relation to a reference value.
Moderate efficiency	1. Increase of lung compliance by 2-15 % in relation to a reference value. 2. Increase of PaO_2/FiO_2 by less than 20 %.
Absence of effect	1. Increase of lung compliance by less than 2 % in relation to a reference value. 2. Increase of PaO_2/FiO_2 by less than 5%.

Table 4. The scale of tolerance of the preparation.

Estimate	Degree of concurrent reactions
High (good)	Concurrent reactions are not marked.
Satisfactory	The insignificant concurrent reactions not causing serious problems to the patient and not requiring cancellation of the preparation are observed.
Unsatisfactory	Undesirable pronounced concurrent reactions producing appreciable negative effect on the patient's condition, requiring cancellation of the preparation and taking additional medical measures are observed.

Table 5. Subdivision of patients in groups according to sex.

Gender	**Groups**		**Total**
	basic	control	
Men	16	17	33
Women	14	13	27
IN TOTAL	30	30	60

Table 6. Subdivision of patients in groups according to age and weight.

Parameters	**Groups**		**Average value**
	basic	control	
Age, years	32.6±12.2	34.1±11.2	33.4±11.5
Weight, kg	83.5±17.6	87.2±15.8	85.4±16.6
Body height, cm	166.8±9.3	167.5±10.8	167.6±10.1

Table 7. The summary characteristics of nosological forms.

Diagnosis	**Group**		**Total**
	basic	control	
Polytrauma	9	11	20
Pancreatonecrosis	2	1	3
Acute intestinal obstruction	2	0	2
Sepsis	3	4	7
Severe craniocerebral trauma	7	8	15
Acute disturbance of cerebral circulation of a hemorrhagic type	5	4	9
Acute disturbance of cerebral circulation of an ischemic type	2	2	4
In total	30	30	60

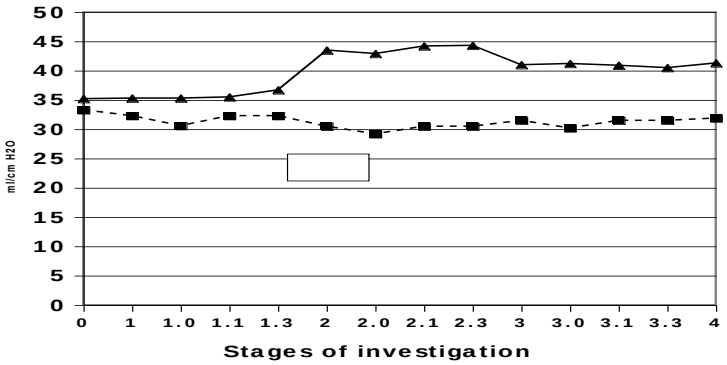

Fig. 1. The dynamics of lung compliance at application of Suzacrin in comparison with endotracheal introduction of a 0.9 % NaCl solution

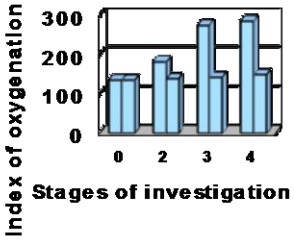

Fig. 2. The dynamics of oxygenation index at application of Suzacrin in comparison with endotracheal introduction of a 0.9 % NaCl solution

Table 8. The compliance of the lungs in patients of the control and basic groups at stages of clinical research.

Stage of investigation	**Parameters in groups**			
	Compliance of the lungs		**Oxygenation index**	
	Basic	Control	Basic	Control
0	35.2±2.4	33.3±2.6*	136.6±11.4	135.4±12.7*
1	35.3±2.6	32.3±3.4*		
1.0	35.3±2.7	30.6±2.9*		
1.1	35.5±3.1	32.3±3.2*		
1.3	36.7±2.9	32.3±3.3*		
2	43.5±3.5***	30.5±3.2**	183.3±13.0	138.5±12.1**
2.0	42.9±3.2	29.2±2.9**		
2.1	44.2±2.9	30.5±3.4**		
2.3	44.3±3.0	30.5±3.1**		

Note: * - in groups at p> 0.05

** - in groups at p < 0.05

*** - in comparison with the previous stages at p < 0.05

Table 9. The condition of the respiratory system in patients of the basic and control groups at stages of clinical research.

Stage	Average parameters in groups (I – basic, II – control)									
	Dry rales		Dullness on percussion		Presence of sputum		Amount of sputum		Dyspnea	
	Basic	Control	Basic	Control	Basic	Control	Basic	Control	Basic	Control
	I	II	I	II	I	II	I	II	I	II
0	1	1	1	1	2	2	3	3	2	2
1	1	1	1	1	2	2	3	3	2	2
1.0	1	1	1	1	2	2	3	3	2	2
1.1	1	1	1	1	2	2	3	3	2	2
1.3	1	1	1	1	2	2	3	3	2	2
2	1	1	1	1	2	2	2	3	1	2
2.0	1	1	1	1	2	2	2	3	1	2
2.1	1	1	1	1	2	2	2	3	1	2
2.3	1	1	1	1	2	2	2	3	1	2
3	1	1	1	1	1	2	1	3	1	2
3.0	1	1	1	1	1	2	1	3	1	2
3.1	1	1	1	1	1	2	1	3	1	2
3.3	1	1	1	1	1	2	1	3	1	2
4	1	1	1	1	1	2	1	2	1	1

Note: the coding of signs was made according to the following scheme:

- Dry sibilant rales (1- presence; 0- absence);
- Dullness on percussion (1- presence; 0- absence);
- Sputum (0 - absent, 1 - mucous, 2 - mucopurulent, 3 - purulent).
- Amount of sputum (0 - absent, 1 - insignificant, 2 - moderate, 3 - appreciable);
- Dyspnea (0 - absent, 1 - slight, 2 - moderate, 3 - severe).

Table 10. Parameters of the central hemodynamics in patients of the basic group at stages of clinical research.

Stage	**Parameters**			
	ABPsystolic, mmHg	ABPdiastolic, mmHg	HR, beat per min	CVP, mmH_2O
0	118.4±5.4	75.4±2.2	111.5±4.8	78.3±6.8
1	123.6±4.8	78.2±1.7	99.5±4.2	79.4±5.8
1.0	118.5±4.9	73.4±1.4	103.4±4.7	80.4±5.8
1.1	125.4±4.6	78.0±1.9	107.3±4.4	78.9±5.2
1.3	125.2±4.2	78.2±1.4	100.3±4.0	78.4±6.4
2	115.4±5.1	73.8±2.1	103.5±5.2	76.4±6.1
2.0	115.4±4.6	73.7±1.4	104.0±4.6	77.7±5.8
2.1	115.0±4.7	73.7±1.2	106.7±4.8	76.6±5.7
2.3	115.5±5.1	70.9±1.9	103.0±4.3	78.1±6.1
3	123.3±4.8	77.2±1.5	96.8±5.8	75.8±6.0
3.0	120.1±4.3	77.4±1.7	94.2±5.1	75.4±6.1
3.1	120.4±4.4	77.7±1.2	88.7±4.5	76.5±5.7
3.3	121.6±4.1	76.1±1.4	88.5±4.5	77.2±5.4
4	123.8±4.9	78.5±1.8	89.2±5.0	77.4±5.8

Table 11. Parameters of the central hemodynamics in patients of the control group at stages of clinical research

Stage	**Parameters**			
	ABPsystolic, mmHg	**ABPdiastolic, mmHg**	**HR, beat per min**	**CVP, mmH2O**
0	117.4±5.0	73.4±2.2	110.5±4.5	80.3±5.8
1	123.5±4.3	75.2±2.1	101.5±4.2	80.4±5.8
1.0	119.8±4.6	73.3±1.9	105.4±4.3	80.4±5.7
1.1	120.0±4.1	76.0±1.9	105.3±4.8	79.9±5.4
1.3	123.1±4.7	76.6±1.7	104.3±4.4	78.2±5.9
2	119.6±4.8	73.8±2.0	107.5±4.6	77.4±5.8
2.0	118.4±4.4	73.5±1.8	107.0±4.5	77.1±5.7
2.1	118.0±4.7	73.4±1.7	106.7±4.2	76.9±5.7
2.3	117.2±4.2	73.7±1.7	105.0±4.3	77.1±6.0
3	120.3±4.6	75.8±1.5	101.8±5.1	76.3±5.7
3.0	119.1±4.7	75.3±1.6	99.2±4.3	76.2±5.8
3.1	118.8±4.8	75.5±1.5	98.7±4.8	76.5±5.8
3.3	118.6±4.4	75.3±1.5	98.5±4.6	77.6±5.6
4	121.8±4.8	77.3±1.3	99.2±5.1	77.3±5.4

Table 12. Changes in the clinical analysis of patients' blood at application of Suzacrin in patients with SARF

Groups	Parameters	Stages of research			
		0	2	3	4
Control	Erythrocytes	4.0±0.3	4.0±0.4	3.9±0.3	4.1±0.2
	Leucocytes	7.5±1.8	7.7±1.4	7.4±1.5	7.9±1.5
	Eosinophils	2.0±0.9	1.7±0.8	2.2±1.5	1.6±0.9
	Stab neutrophils	4.9±3.9	4.7±3.2	2.9±1.6	2.8±1.3
	Segmentonuclear leukocytes	64.0±7.3	66.9±10.9	65.9±7.7	65.8±7.8
	Lymphocytes	25.9±7.3	20.6±8.1	21.6±5.3	21.8±3.4
	Monocytes	5.5±1.8	4.6±1.2	5.4±2.0	5.0±1.7
Basic	Erythrocytes	4.0±0.5	4.1±0.6	4.1±0.4	4.2±0.4
	Leucocytes	7.4±2.0	7.2±1.4	7.9±1.1	7.5±0.9
	Eosinophils	1.9±1.1	1.3±0.4	1.0±0.2	1.6±1.2
	Stab neutrophils	3.1±2.4	4.0±2.7	2.9±1.9	2.0±0.7
	Segmentonuclear leukocytes	68.9±6.3	72.1±5.9	69.5±5.2	64.3±7.8
	Lymphocytes	23.4±7.6	17.3±7.6	20.3±6.3	25.6±7.6
	Monocytes	19.6±4.5	10.7±2.5	10.5±0.8	10.9±1.0

Note: in groups and in stages within groups at $p > 0.05$

Table 13. Dynamics of parameters of hepatic and renal complexes in patients of investigated groups

Groups	Parameter	Stages of research			
		0	2	3	4
Control	Bilirubin, total	17.5±4.8	10.6±1.9	11.4±2.6	10.9±2.1
	Bilirubin direct	5.6±2.3	3.0±0.5	3.0±0.5	3.3±0.7
	Bilirubin indirect	12.5±3.4	7.6±1.8	8.4±2.4	7.5±1.7
	ALT	0.54±0.13	0.70±0.22	0.68±0.21	0.67±0.19
	AST	0.37±0.11	0.62±0.30	0.58±0.23	0.53±0.25
	Creatinine	67.8±22.9	71.6±39.5	74.1±23.5	75.6±18,0
	Urea	4.1±1.7	4.7±1.2	4.8±1.5	4.7±1.2
	Urea nitrogen	8.1±3.0	8.9±2.6	7.9±2.7	7.7±2.3
	Weight of urine	1010±5	1011±4	1012±3	1013±3
	Proteins of urine	0.80±0.76	0.66±0.54	0.57±0.40	0.53±0.44
Basic	Bilirubin, total	19.6±4.5	10.7±2.5	10.5±0.8	10.9±1.0
	Bilirubin direct	5.2±1.1	3.2±0.8	3.1±0.2	3.2±0.3
	Bilirubin indirect	13.9±3.9	7.5±1.9	7.4±0.7	7.6±1.0
	ALT	0.60±0.19	0.59±0.31	0.50±0.21	0.46±0.17
	AST	0.46±0.23	0.56±0.32	0.49±0.22	0.42±0.17
	Creatinine	72.6±21.0	77.4±13.2	77.8±13.6	76.9±14.7
	Urea	4.1±2.5	4.6±1.2	4.3±0.9	4.3±0.9
	Urea nitrogen	7.9±4.3	8.7±4.6	8.6±2.9	8.7±3.0
	Weight of urine	1012±3	1012±5	1011±4	1013±4
	Proteins of urine	0.62±0.57	0.53±0.43	0.53±0.50	0.43±0.42

Note: in groups and in stages within groups at $p > 0.05$.

Table 14. Efficiency and tolerance of the researched and referred preparations.

Parameter	Groups	
	Basic	control
Efficiency	high	moderate
Tolerance	high	high

Mikolajewska Emilia. Eclectic vs. Specific approach within contemporary neurological physiotherapy = Podejście eklektyczne a ścisłe we współczesnej fizjoterapii neurologicznej. [in] Czerwińska Pawluk Iwona Ed., Muszkieta Radosław Ed., Napierała Marek Ed., Zukow Walery Ed. Annual Reports of Education, Health and Sport 9781329876002. RSW. Radom. 2013. 123-132. ISBN 9781329876002. 220 p. © The Author(s) 2013. This articles is published with Open Access at Annual Reports of Education, Health and Sport. RSW. Radom. Poland.

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ECLECTIC VS. SPECIFIC APPROACH WITHIN CONTEMPORARY NEUROLOGICAL PHYSIOTHERAPY

Podejście eklektyczne a ścisłe we współczesnej fizjoterapii neurologicznej

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Key words: rehabilitation; physiotherapy; eclectic approach to intervention; specific intervention techniques;

Abstract

Development of medicine and assistive technology, and increased expectations of the community cause need for new, more effective physiotherapeutic methods and techniques.

This challenge is particularly noticeable in neurorehabilitation and neurological physiotherapy. Observed progress shows a great deal of promise to significant recovery, even in the most severe neurological cases.

Traditional specific intervention techniques can be displaced by eclectic approach to intervention. Aim of this article is familiarize with both aforementioned approaches and discuss possible occupations and threats.

Introduction

Development of therapeutic methods and techniques within neurological physical therapy provided two main approaches:

1. traditional classical specific intervention techniques, based usually on strict procedures and clinical guidelines,
2. eclectic approach to intervention, based on the stable core of the methods and open to:
   - development,
   - conjunction elements of various methods, useful in particular condition – medical authorities providing procedures and clinical guidelines should be aware of these possibilities.

Aim of this article is familiarize with both aformentioned approaches and discuss possible occupations and threats.

A critical appraisal of articles has been carried out, based on PubMed database (U.S. National Library of Medicine) (Fig. 1). Limited number of articles in the area of eclectic approach in physiotherapy shows necessity to provide deeper analysis of this issue.

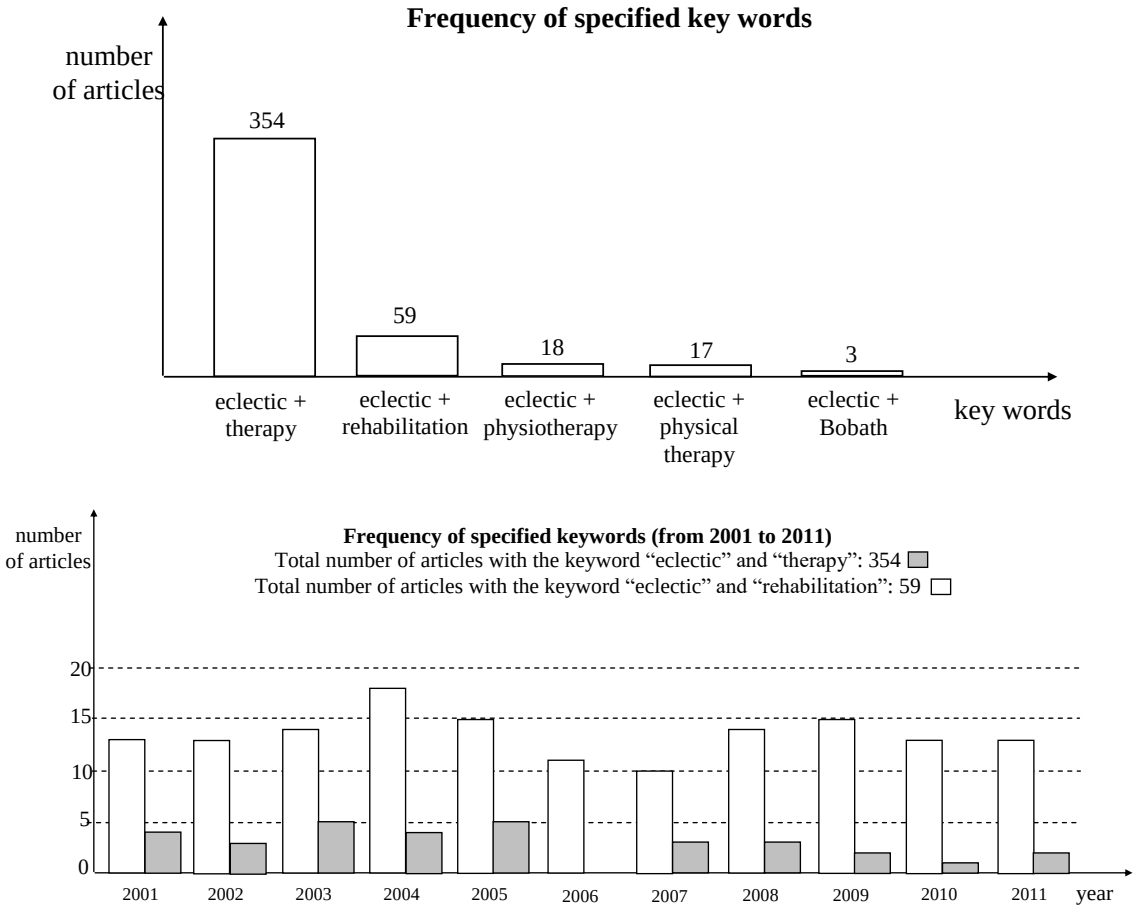

Fig. 1. Results of investigation of the PubMed database (U.S. National Library of Medicine) [1].

Biopsychosocial model of rehabilitation according to the Prof. Dega's rules - the first source of eclectic approach in neurological physiotherapy

Till the first half of the Twentieth century obligatory has been biomedical model of the health care. Generally this model perceives body as machine and the role of medical staff is to provide proper co-operation of the body parts. Biomedical model was usefull, cheap and effective, providing neccessary improvement of health care (e.g. decreasing morbidity and premature mortality). This model satisfied only basic needs of the society in the area of treatment, rather not prevention and quality of life. What more – individuality, social and emotional processes were neglected or missed. Although biomedical model is still useful e.g. on battlefield, during natural disasters, and in emergency cases.

Changes after the World War I (including big amount of disabled people and rise of rehabilitation), development of medicine and increase of conventional wisdom caused demand for new, better model of contemporary health care. This model, called biopsychosocial, takies into account both the physical, psychological and social aspects of human being. These ways physical, cognitive and emotional problems can be solved by specialized medical staff. Multidisciplinary terapeutic team can help in almost every condition – this is idea of holistic therapy.

Changed perception of health and disease need for new solutions. Polish School of Rehabilitation (M. Weiss, I. Wierzejewski, W. Dega, et al.), simultaneously with H. Rusk, proposed new, biopsychosocial model of rehabilitation as medical and social process. Its rules proposed by Prof. Dega, named father of the polish rehabilitation [2, 3] are as follows:

- commonness – i.e. every patient has access to rehabilitation,
- early beginning of the rehabilitation,
- complexity – medical rehabilitation is provided in every area of human being, both physical, psychical, social, emotional, etc.,
- continuity – rehabilitation as continuous process till the achivement of the best possible results of the therapy [2, 3].

This approach, wide accepted within contemporary medicine, helped significantly increase effectiveness of therapy and rehabilitation, life quality, etc. What more – this model has provided conditions to offer, as a part of health care, wide variety of therapeutic methods and techniques. Education and specialization of medical staff stimulated creation new, more useful and effective approaches.

Physiotherapy provided wide spectrum of own diagnostic tools, methods and techniques. Physical therapists became important part of multidisciplinary theraputic team within hospitals, in

ambulatory and home care settings. Prof. Dega's concept created common frame for "open for development" methods and techniques in rehabilitation. Each, usually well educated and experienced physical therapist can join various methods and techniques to provide eclectic approach to intervention. This approach, if tested (through clinical research), and wide approved can provide therapy in more effective way than previous specific intervention techniques.

The Bobath Concept – the second source of eclectic approach in neurological physiotherapy

The Bobath Concept is formed since 65 years by Karel and Berta Bobath and their successors, both EBTA, IBITA, NDTA, etc., and individual physical therapists, scientists and clinicians. According to the Bobaths will the Bobath Concept is still developing method in neurological physical therapy, always actual and useful in clinical practice, but open to newest scientific findings, thus never finished. This way shape of the Bobath Concept, build on the permanent Bobaths core, can change to provide some amount of flexibility according to the patient needs. The contemporary NDT-Bobath approach seems be unique individual method of each physical therapist, derived both from the Bobath Concept, the newest development of medical sciences, and knowledge and experience of the particular therapist. It seems that a lot of physical therapists, especially in neurological physiotherapy, use the Bobath Concept, but they do not know about it. To make sure in it I shortly analyse basic rules of the Bobath Concept:

- beginning the therapy as soon as possible,
- therapy 24/7 (24 hours/7days a week),
- adaptation of support level to the patient possibilitities and limitations,
- therapy without pain,
- muscle tonus normalization,
- therapy both affected and unaffected side (e.g. in hemiplegic patients),
- balance normalization,
- in situation, when as the result of the therapy deficits do not fade – focus on existing possibilities of the patient [4, 5].

Course of events during the therapy according to the Bobath Concept is as follows (sequencing can be sometimes not possible):

1. diagnosing patient's problems in the area of activity and structure,
2. support of patient's independence,
3. defining of the therapy goals: final and partial,
4. work under causes of functional problems,

5. avoiding of patological motor patterns,
6. re-assessment and, if necessary, re-defining of goals [4, 5].

What more – proposed by the Bobaths (in 1940s) approach seems be the first modern method dedicated patients with neurological disorders. Preceding methods are perceived derived from orthopaedic rehabilitaiton, thus not fully useful in neurological cases.

Within the Bobath Concept is seen split into two approaches: "traditional" (mainly Great Britain and part of Europe), derived from Bobaths and "eclectic" (mainly United States, Australia, South Africa), perceived more progressive.

Knowledge about NDT-Bobath method develop, deriving from the newest findings of (neuro)physiology, neurology, biomechanics, etc. Every book concerning the Bobath Concept provides more then 200-300 references as the basic core of it. NDT-Bobath courses provided by EBTA, IBITA, NDTA, etc. can shape only the core of the therapy. It seems every physical therapist (IBITA, EBTA, NDTA, etc. recognized), experienced in NDT-Bobath metod can develop the Bobath Concept, increasing effectivity of the therapy. His/her findings, if verified by the other studies, and accepted by experts, instructors, and international organizations, can become a part of the Bobath Concept all around the world. This approach allows the Bobath Concept stay leading therapeutic method in neurorehabilitation, with proved reliability and validity.

According to study of Paci [6] comparable results of the research can be provided only by experienced therapists, recognized (certified) by international organizations. For this moment critical problem seems be lack of own methodology of research and diagnostic tools provided by Bobaths. Contemporary tools can be not useful, because e.g. use of affected side in the therapy and two-handed activities according to the NDT-Bobath method rules are not the same as compensation with unaffected side. This issue can be very important for further independence of the patient. Wide discussed can be also decreasing of spatio-temporal gait parameters within first stage of the post-stroke therapy provided according to the Bobath Concept. But this is a result of paying particular attention to the gait quality (proper gait patterns). Higher quality and effort connected with this difficult experience in post-stroke patients can be reflected in slower walking, but this effort can pay off during next stages of the therapy, when progress will be much quicker, both in the gait quality and velocity.

Eclectic approach in neurological physiotherapy in research outcomes

Scientific research shows popularity of eclectic approach among physical therapists, even unattended. Study of Jette et al. [7] showed that in post-stroke rehabilitiation physiotherapists

selected an eclectic approach rather than specific intervention techniques in impairments remediation, functional limitations' compensation, motor control and motor learning approaches to facilitate all activities. Authors of the study perceived eclectic approach it largely consistent with existing stroke care guidelines and advances in the scientific theories of motor control and motor learning [7]. Study of Jones et al. [8] showed eclectic, individualized approach in post-stroke patients with identifying patient's preferences and personal goals. Balancing between traditional and eclectic NDT-Bobath approach in British NDT-Bobath therapists observed Tyson et al. [9, 10]. Significant can be fact, that unexperienced NDT-Bobath physiotherapists used traditional approach, while experienced – eclectic. Their clinical grade, post-graduate training or type of the patient was not important [9]. What more it was observed significant difference in definition, what is the core of NDT-Bobath method between British therapist and NDT-Bobath teachers/instructors [10]. This fact can suggest, how strong can be eclectic approach. Study provided by Lennon et al. [11] provided evidence, that 67 % British NDT-Bobath therapists in stroke rehabilitiation can be perceived traditional NDT-Bobath therapists, further 31 % - using eclectic approach. A lot of NDT-Bobath experts perceive this split into traditional (classic) and eclectic (modern) approach as stable [12, 13, 14]. Since the last publication of Bertha Bobath in 1990 [4], the concept has been developed and taught via both oral tradition on postgraduate courses and books of next generations of experts, instructors and therapists [13].

Within neurological physiotherapy similar split into at least two approaches: traditional and eclectic can be seen also in low back pain therapy [15], multiple sclerosis interventions [16], and Parkinsons's disease [17]. Polish contribution to the eclectic approach in post-stroke rehabilitation based on NDT-Bobath method is presented in [18].

Hitherto prevailing research within neurological rehabilitation do not proved decisive predominance of one particular method [6, 19, 20], including NDT-Bobath method, PNF, etc.

Clinical use

Aforementioned evidences show that eclectic approach is used, even unintentionally, in contemporary clinical practice. This can be good time to normalize it, provide better clinical guidelines and procedures to take advantages and avoid threats.

Occupations of eclectic approach in neurological physical therapy can be as follows:

- significant increase of physical therapy effectiveness,
- flexibility of the therapy, using wider variety of methods and techniques, even in very complicated cases or cases with possible severe side-effects,

- better scientific research findings of possible therapy forms, both basic and complementary.

But we should not forget about possible threats:

- use of untested or unapproved methods and/or techniques,
- use approved eclectic approach through unexperienced therpist.

To avoid aforementioned threats:

- Evidence Based Medicine (EBM) paradigm should be a rule in clinical practice [21, 22, 23, 24, 25, 26],
- ambitious, but less experienced physiotherapists should work under control of more experienced therapists or local authorities,
- possible changes in the eclectic approach should be tested (e.g. within clinical research), discussed by local authorities and published in scientific journal to provide scientific peer-review and general opinion of other specialists, experts and authorities,
- research articles in the area of eclectic approach should provide not only clinical trials, but very important and useful can be case studies, meta analyses and compartmental studies for less experienced therapists,
- indications and contraindications should be redefined,
- better and simplier assessment tools for clinical use (e.g. clinimetrics, gait assessment and analysis, etc.) should be provided, if possible and necessary.

This way allows avoiding mistakes or attempts to propose the same solution twice, without fading of creative search.

Directions of further research

Eclectic approach is open to external sources of knowledge and clinical experience. But this situation requires extended prudence both form physical therapists and current scientific and clinical authorities. Eclectic approach seems be permanent part of contemporary neurological physiotherapy. We should try to develop physical therapy in the direction of the mordern clinical science. This situation will bring along a lot of advantages and occupations:

1. for physical therapists: further development of own theraputic methods and techniques, diagnostic tools, scientific research methodology, clinical guidelines and standards,
2. for patients: continuous verification of methods, techniques and therapists in physiotherapy providing access to the best ways of treatment and wise, experienced therapists.

Individual, patient oriented therapy and common goal setting in contemporary neurological physiotherapy involves hypothesis that the relationship between patient and therapist has an important (including positive) influence on the results of therapy [27, 28]. This hypothesis needs for additional research, but can be another important part of eclectic approach.

Satisfaction of the patient means (in a long prospect) higher prestige of physical therapist as profession and higher weight of physiotherapy as scientific and clinical discipline.

Conclusion

No doubts eclectic approach is one of two dominant approaches within contemporary neurological physiotherapy. What more - eclectic approach seems be unavoidable direction of further development of contemporary and future physiotherapy. Wide variety of methods within physiotherapy and wider educational offer for physical therapists – a lot of them is certified therapists more than one worldwide known method. These therapists, working with the individual patient, join elements derived from various theraputic methods making their therapy eclectic, even unintentionally. Because of limited current evidences more research is need for determine validity, reliability and efficiency of eclectic interventions, including reports of long-term outcomes, possible occupations, and threats.

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BIOFEEDBACK AS THE ELEMENT OF THE NEUROREHABILITATION

Biofeedback jako element rehabilitacji neurologicznej

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Keywords: rehabilitation; neurorehabilitation; physiotherapy; biofeedback; clinical applications.

Abstract

Biofeedback is a technique using electronic equipment to provide patient with signals (visual, auditory, haptic, etc.) regarding normal and abnormal physiological events (responses, etc.). It can play very important role as independent or complementary method in neurologic rehabilitation.

The aim of this article is assessment of biofeedback' role and its influence to outcomes in neurological rehabilitation and physiotherapy by synthesizing published literature. Search of publications was conducted using specified keywords. Representative literature was synthesized to indicate the scope and weight of the current evidences. Possible occupations, threats, and directions of further research were discussed.

In conclusion because of limited current evidences more research is needed to determine validity, reliability and efficiency of various biofeedback interventions, including reports of long-term outcomes.

Introduction

Biofeedback (BFB) is a technique using electronic equipment to provide patient with signals (visual, auditory, haptic, etc.) regarding normal and abnormal physiological events (responses, etc.) [1, 2]. Biofeedback was first introduced in rehabilitation and physical therapy more than 35 years ago. It appeared to be the effective support of the therapy, demonstrating positive changes in function of patients in a lot of clinical conditions.

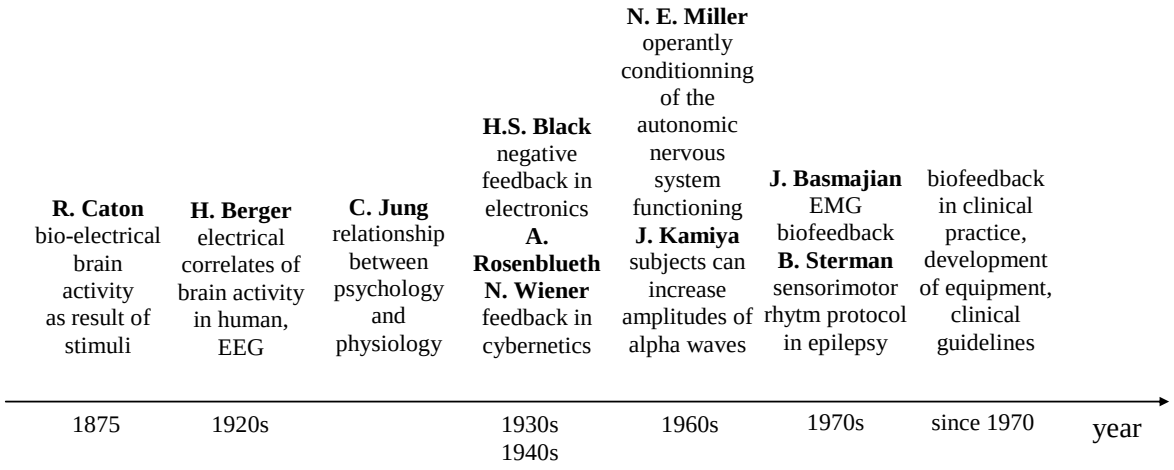


Fig. 1. Milestones in the history of biofeedback [1, 2].

Feedback – general view

General concept of feedback derives from natural patterns in biology and biological system regulation (homeostasis, etc.). “Artificial” feedback is perceived derived from cybernetic research in early 1930s and 1940s. There are two basic kinds of feedback from cybernetic point of view: positive and negative.

Idea of positive feedback is amplifying of changes causing that relatively small causes may result in big changes, e.g. slow down or completely stop current process as a result of cascade effect. This is because a change of variable causes response in the whole system changing that variable more in the same direction.

Idea of negative feedback is providing equilibrium point of the system i.e. the system tend to be stable. This is because a change of variable causes response in the whole system changing that variable in the opposite direction.

a)

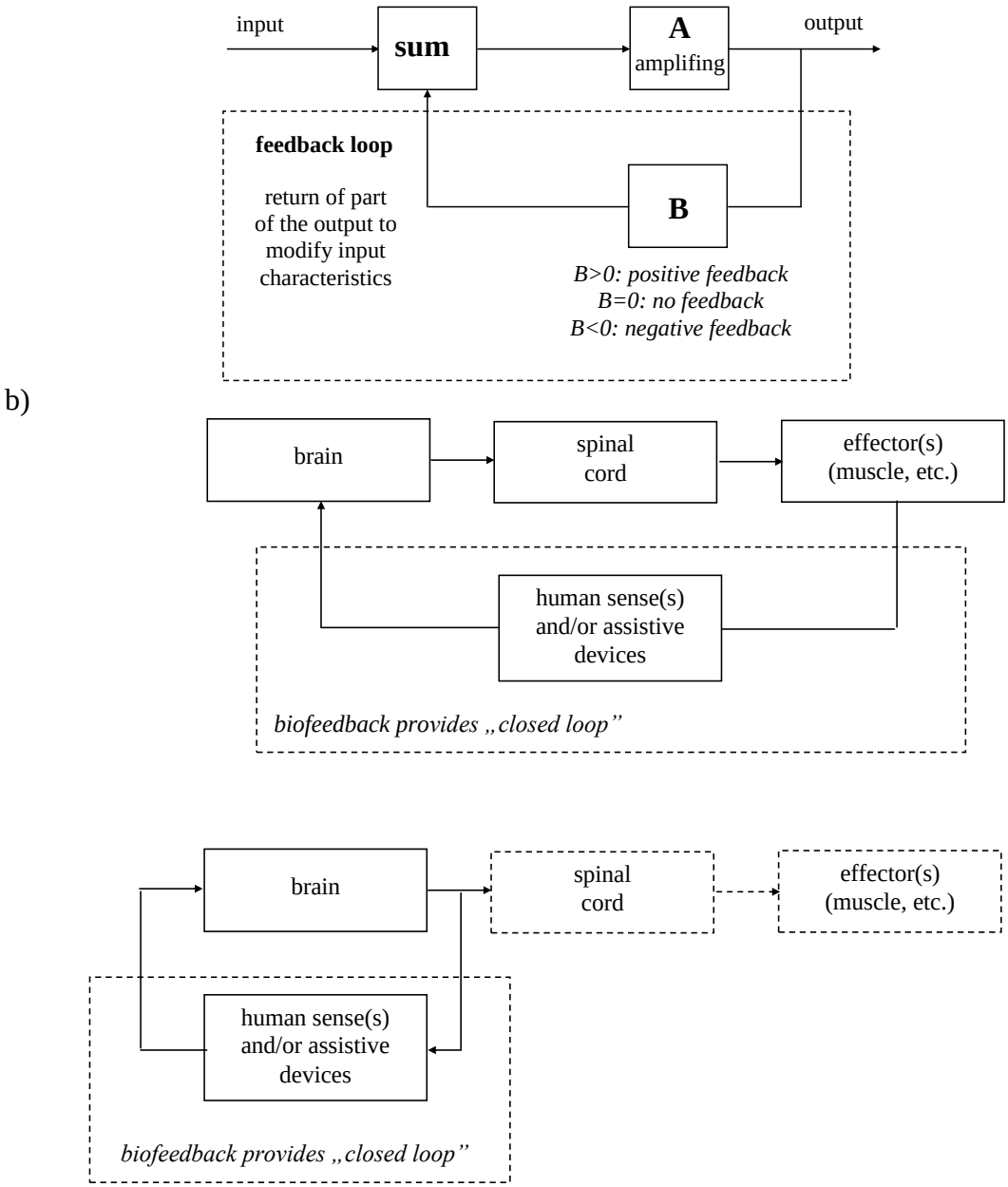


Fig. 2. Conceptual schemas for feedback: a) from cybernetic point of view, b) from neurorehabilitation point of view (two simple examples).

Usefulness of feedback is very common, both in biology (from simple cells to huge biosphere, e.g. climate science) and physiology, and in technical sciences (mechanics, electronics, cybernetics), physics, chemistry, and even in social sciences, education and economics.

Medical biofeedback devices (separate or built-in) provide interactive biofeedback software integrated into device. It usually allows for:

- quantitative responses for the patient and the therapist,
- monitoring the patient's functioning during exercises in real-time (depend on selected method of biofeedback, modality, etc.),

- acceptance of the biofeedback system as user-friendly and effective and practical both for patient and therapist.

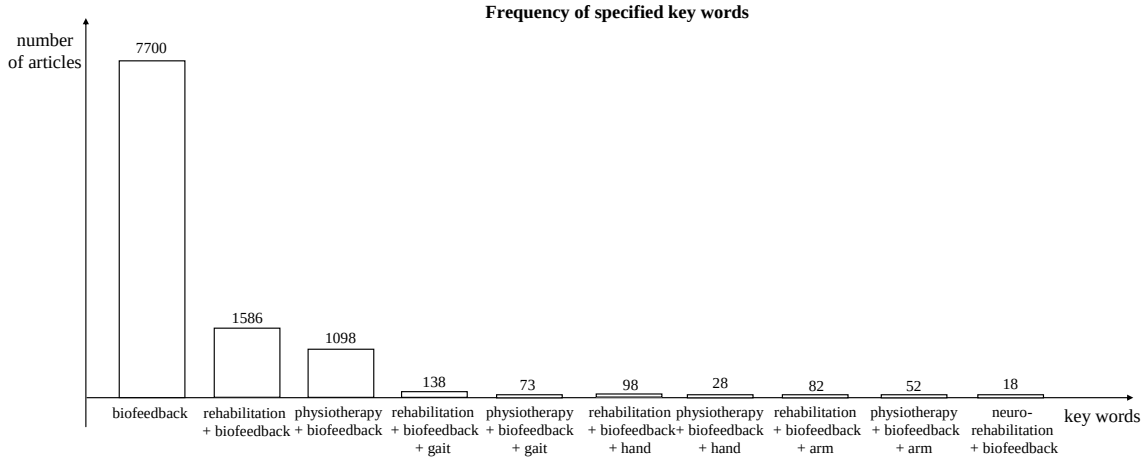
The purpose of this review was to summarize the newest findings involving biofeedback in contemporary neurorehabilitation and neurological physical therapy. This allows provide a general overview of usefulness of various forms of biofeedback in the therapy of patients with diagnosed neurological deficits, including effectiveness studies.

Biofeedback – contemporary view

PubMed (U.S. National Library of Health) [3] database was searched to identify relevant articles. This research was limited to the English language articles and encompassed the period from 01.01.2001 to 31.12.2011. Fig. 3. shows keywords were used in the searches and frequency of specified key words combinations.

The keyword "biofeedback" in the area of rehabilitation does not occur in the MeSH (Medical Subject Headings) - NLM controlled vocabulary thesaurus [4]. MeSH defines two other keywords:

- "biofeedback, psychology" introduced in 1977 and defined as "The therapy technique of providing the status of one's own autonomic nervous system function (e.g., skin temperature, heartbeats, brain waves) as visual or auditory feedback in order to self-control related conditions (e.g., hypertension, migraine headaches)" [4],



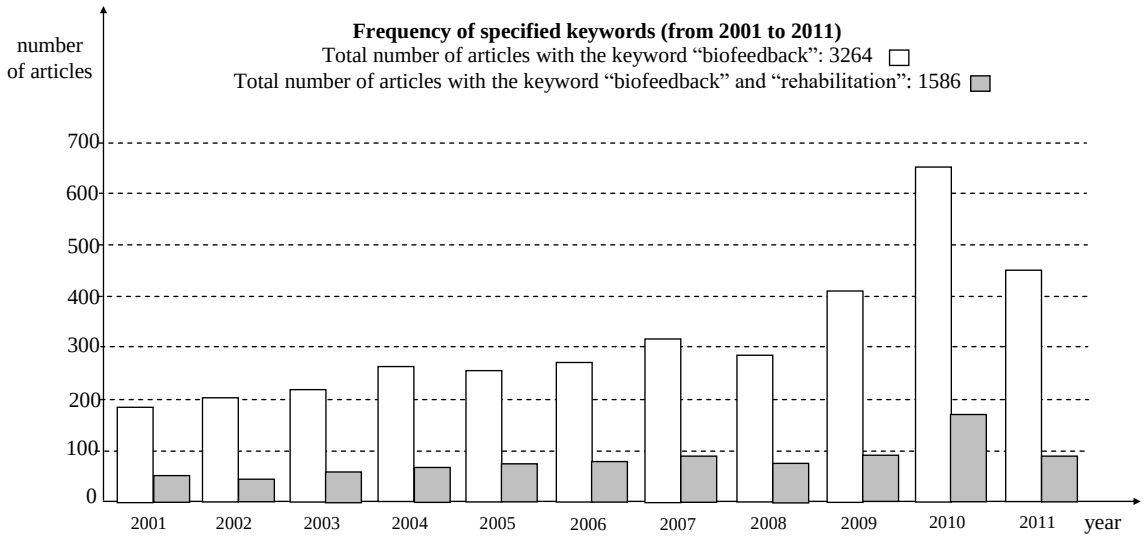


Fig. 3. Results of investigation of the PubMed database (U.S. National Library of Medicine) [3].

- “neurofeedback” introduced in 2011 and defined as “A technique to self-regulate brain activities provided as a feedback in order to better control or enhance one's own performance, control or function. This is done by trying to bring brain activities into a range associated with a desired brain function or status.” [4].

Table 1. Basic advantages and disadvantages of biofeedback.

Advantages and disadvantages for the patient	**Advantages and disadvantages for the therapist**
ADVANTAGES	
Complementing or (in selected cases) replacement of „classical" medical rehabilitation, physiotherapy and/or drugs	
Lack of side-effects	
Simplifying of the therapy	Makes easier explanation to the patient clue of the exercise
Easier focusing on the therapy	Decreases necessity of patient supervision
Additional motivation during therapy	Makes easier control under correctness of exercise performance
Positive influence to therapy effectivity and lifespan	Can increase effectivity of the therapy
Possibility (in selected cases) to use in home care, including telemedicine and telerehabilitation	
Usefulness in the therapy of children	
DISADVANTAGES	
Requires co-operation, commitment, strong will and obstinacy of the patient – because its effectivity can significantly decrease	
There is not useful in selected severe cases, e.g. patients with selected cognitive disorders, consciousness disorders, psychical disorders, etc.	
In selected cases: lack of full standardization (devices, methods, etc.) can make difficult confrontation of two or more different cases, methods, devices.	

Despite few publications with keywords "biofeedback" and "neurorehabiltiation" (18) biofeedback seems to be important part of neurorehabilitation, including stroke rehabilitation [5], incomplete spinal cord injury (SCI) [6], Parkinson's disease [7], even in telerehabilitation settings [8] (Table 2).

Table 2. The most common biofeedback applications in neurorehabiltiation according to PubMed database [1, 2, 3, 5, 6, 7, 8].

Disease/Syndrome	**Number of articles**
Stroke	215
Parkinson's disease (PD)	75
Cerebral palsy	61
Traumatic brain injury (TBI)	15
Multiple sclerosis	11
Spine cord injury (SCI)	9
Autism	2
Other: training with therapeutic Virtual Reality (VR) system	24
Other: training with Brain-Machine Interface (BMI)	7

Table 3. Selected contemporary methods of biofeedback [1, 2].

Method of biofeedback	Concept and application
Biofeedback EEG (neurofeedback)	**Concept:** stimulation of brain' neuroplastic abilities to improve its (and whole body) functioning thanks to acquiring by patient skills of control own brain waves according to e.g. picture.. **Device:** electroencephalograph with appropriate software. **Clinical use:** therapy of children with ADHD, therapy of patients with learning disorders, epilepsy, post-stroke, after traumatic brain injury; use in healthy subjects – to improve memory, etc.
Biofeedback EMG (ElectroMyoGraphy, myofeedback,)	**Concept:** stimulation of muscle activity thanks to acquiring by patent skills of control own muscles activity according to acoustic signal or light. **Device:** electromyograph with appropriate software. **Clinical use:** amplification (facilitation) of used muscle' bioelectric activity and inhibition of antagonists.
Biofeedback GSR (Galvanic Skin Response)	**Concept:** stimulation of electric skin conductivity as reflection of functioning of vegetative system thanks to acquiring by patient skills of control own skin temperature, moisture and resistance, heart rate and respiration according to graphic signals. **Device:** Personal Computer (PC) with device/interface for electrodes put on fingertips. **Clinical use:** very sensitive method for patients with hypertension, asthma, excessive sweating, in psychotherapy, use in healthy subjects – to improve memory, control of emotions etc.
Respiratory biofeedback	**Concept:** stimulation of respiratory parameters (e.g. rhythm, etc.) as reflection of stress, fear or pain thanks to acquiring by patient skills of their control based on graphic signals **Device:** Personal Computer (PC) with sensor of respiratory parameters (e.g. rhythm, etc.). **Clinical use:** support in the therapy of epilepsy, diseases of respiratory system, diseases of circulatory system.
Temperature biofeedback	**Concept:** stimulation of body temperature as reflection psychical and physiological status of the patient thanks to acquiring by patient skills of temperature control according to graphic signals **Device**: Personal Computer (PC) with sensor of temperature put on fingertip (example). **Clinical use:** therapy of rheumatic diseases, asthma, leg ischemia; used in relaxation learning, both in sick and healthy people.
Biofeedback HEG (Hem Encephalography)	**Concept:** stimulation of head temperature as reflection of level of local brain activity thanks to acquiring by patient skills of its control according to graphic signals **Device:** Personal Computer (PC) with infrared sensor of temperature put on part of head (example). **Clinical use:** therapy of autism.
Biofeedback SCP (Slow cortical potentials)	**Concept:** stimulation of slow cortical potentials (delta waves) as reflection of membrane polarization thanks to acquiring by patient skills of its control according to graphic signals.
Other methods e.g. Audio-biofeedback (ABF)	Under research

Wide variety of possible methods (devices, etc.) and possibility of use each of them in co-operation with other methods in medical rehabilitation emphasize importance of medical staff' knowledge and experience in choosing and application of the proper one.

Biofeedback in gait neurorehabilitation

Among 138 articles with keywords "biofeedback", "rehabilitation" and "gait" there were one of the most important articles is systematic review of effectiveness studies involving real-time kinematic, temporospatial, and kinetic biofeedback in gait abnormalities rehabilitation, but very limited in neurological rehabilitation, provided in 2010 by Tate and Milner [1]. MEDLINE, CINAHL and Cochrane Central Register for Controlled Trials databases were searched to provide full scope of English language articles published from 1965 to November 2007. Despite huge effort reported results were as follows:

- surprisingly only seven articles met the inclusion criteria,
- effectivity of all aforementioned methods of biofeedback during clinical practice was assessed as moderate to large – immediately after treatment,
- long-term effects of all aforementioned methods were not assessed – there is not known, if positive results were maintained,
- there is need to provide future studies ensuring adequate randomization and assessment of long-term results of biofeedback [1].

From the other side similar systematic review in geriatric rehabilitation, provided by Zijlstra et al. [9] showed the same problems with assessment of long-term effectiveness of biofeedback for interventions in older adults with balance and mobility disorders. There is need to pay particular attention, that six databases were searched: PubMed (1950-2009), EMBASE (1988-2009), Web of Science (1945-2009), the Cochrane Controlled Trials Register (1960-2009), CINAHL (1982-2009) and PsycINFO (1840-2009) and only 21 articles meet inclusion criteria. Short-term effectivity of biofeedback in geriatric patients was assessed as moderate.

Biofeedback in upper extremities' functions neurorehabilitation

Hands seems be the most precise and multipurpose tools of human body, so every ways to improve their functioning within neurorehabiltiation are precious. Biofeedback is one of them. But, based on literature review, there is few valuable articles about it. Review of the literature provided by Loureiro et al. [10] provides evidence supporting the use of constraint-induced therapy,

biofeedback therapy and robot-aided therapy to reduce functional impairment of upper limb (especially post-stroke). The problem lies in effective outcomes assessment and emphasizing method having a stronger impact to general effectivity of the therapy. A systematic review of the literature provided by Parker et al. [11] despite searching CINAHL, MEDLINE, PubMed, Science Direct and Cochrane Library databases showed only four relevant controlled trials in the area of use visual and/or auditory feedback for computer technology in home-based upper-limb stroke rehabilitation. Because of it can be key issue in home based neurorehabilitation in the absence of a therapist (or telerehabilitation) further evidences of its efficacy are required [11]. Study of Doğan-Aslan et al. [12] provided valuable evidence of higher effectiveness of electromyographic biofeedback conjuncted with neurodevelopmental and conventional methods in hemiplegia rehabilitation of wrist flexor muscle spasticity, upper extremity motor function, and ability to perform activities of daily living (ADLs). Similar results were achieved in study of Lourenção et. al. [13]. Higher effectivity in the therapy of spasticity, range of motion, and upper extremity function in hemiplegic patients was achieved thanks to electromyographic biofeedback, used in conjunction with occupational therapy and functional electrical stimulation. These evidences encourage use biofeedback as complementary way of rehabilitation within eclectic approach.

Other biofeedback applications in neurorehabilitation

Other biofeedback applications, despite often perceived as area of e.g. primary care or psychology, can be useful in clinical practice in neurorehabiltiation in:

- stress-related and pain conditions [14],
- various forms of somatic disturbance [14],
- increased learning effectivity because of self-relaxation ability [15].

Directions of further research

Biofeedback is relatively new way of rehabilitation. Wide use of really advanced technical solutions makes long-term predictions unbelievable. Main directions of further research in the area of biofeedback and associated technologies can be as follows:

- biofeedback as a part of BCI and neuroprostheses (brain-machine interfaces - BMIs) training in patients with severe neurologic deficits [16, 17, 18, 19] - these solutions hold promise for communication and/or restoration of limbs mobility in severe cases (e.g. in paralyzed subjects),

- biofeedback as a part of telerehabilitation and therapeutic virtual reality (VR) systems [5, 20],
- portable equipment to biofeedback, independent or built-in [21],
- development of eclectic approach in neurorehabilitation:
  - individual patient-oriented therapy using simultaneously NDT-Bobath, PNF, kinesiology taping, constraint-induced therapy (CIT) and many other approaches,
  - and their co-operation with biofeedback therapy and robot-aided therapy [10].

Wider clinical use of aforementioned solutions need for:

- reliable and valid ways of assessment, according to the Evidence Based Medicine (EBM) paradigm, including controlled trials with large patient cohorts and new diagnostic tools – no doubts biofeedback can not be the best solution in every neurological conditions,
- identification of possible threats and side-effects (including interaction with other therapeutic methods and devices, cognitive disorders, consciousness disorders, side effects of drug therapies, etc.),
- education (both graduate and postgraduate) of medical staff,
- standardized protocols of use of various methods of biofeedback,
- education of patients and their families/careers.

Technical development (e.g. diagnostic and exercise tools, software development, haptic interfaces) can provide new maybe not known yet opportunities. It seems that economic issues should not be underestimated – biofeedback has the potential to become inexpensive way of the therapy, where available and efficient.

Current use of biofeedback as a part of contemporary neurorehabilitation seems be limited, but no doubts these methods should be explored both as supplementary for “classic” rehabilitation and, in selected cases, as possible basic way of long-term therapy for patients with neurological conditions using telerehabilitation. Because of it further research, additional refinement of associated technological issues and assessment of clinical protocols are necessary. This way presented solutions can be safer, more effective, widely available, adaptable, and easy to use, providing increased patient’s independence and quality of life because of possible high levels of patients’ satisfaction and acceptance of biofeedback interventions.

Conclusion

Biofeedback plays key role as the family of methods within contemporary rehabilitation and neurorehabilitation. But there is need for reliable and valid assessment of medical and technological

issues, including safety and effectivity both in clinical practice in hospital settings and home care. Current evidences in neurological disorders are limited, so is necessary to enlarge number of studies focusing on the validity, reliability and efficiency, including reports of long-term outcomes. Biofeedback can be perceived very good solution in selected neurological cases, but no doubts there should be detected and carefully evaluated possible new constraints and threats.

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Novikov NYu, Glotov MA, Dzhansyz KN, Dontsova OV. The evaluation of clinical laboratory potential in diagnostics of lung surfactant deficiency. [in] Czerwińska Pawluk Iwona Ed., Muszkieta Radosław Ed., Napierała Marek Ed., Zukow Walery Ed. Annual Reports of Education, Health and Sport 9781329876002. RSW. Radom. 2013. 145-150. ISBN 9781329876002. 220 p. © The Author(s) 2013. This articles is published with Open Access at Annual Reports of Education, Health and Sport. RSW. Radom. Poland.

Original Text published © The Author (s) 2012. Novikov NYu, Glotov MA, Dzhansyz KN, Dontsova OV. The evaluation of clinical laboratory potential in diagnostics of lung surfactant deficiency. Journal of Health Sciences. 2012;2(1):149-154. ISSN 1429-9623 / 2300-665X. Open Access Open Journal Systems of Radom University in Radom, Poland ISSN 1429-9623 / 2300-665X. 2012.

THE EVALUATION OF CLINICAL LABORATORY POTENTIAL IN DIAGNOSTICS OF LUNG SURFACTANT DEFICIENCY

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Key word: click-test; clinical laboratory potential; diagnostics; lung surfactant deficiency.

Attachment: Click-test; Picture.avi

Abstract

Introduction. Surfactant deficiency (SD) takes part in a pathogenesis of all pulmonary diseases and pathological syndromes, accompanied by the phenomena of respiratory insufficiency, with performing of very important role there. An adequate medication of this disorder is a topical problem of emergency medicine.

The purpose of this study was to evaluate the effectiveness of the relative laboratory methods for diagnostics of SD and to define their potential for use in the routine clinical practice.

Materials and Methods. Methods. Standard methods such as Wilhelmy plate method, PB, SM, and Click-test are subjected for the analysis and their advantages and disadvantages for use in clinical practice are estimated. The comparative estimation of the results received by methods which are more suitable for routine clinical diagnostics of SD in all aged groups of patients was made.

Patients and specimens. Sufficient amount of endobronchial lavage fluid were obtained from 27 patients aged between 2 - 69 years with an acute necrotizing pneumonia, bronchitis, suppurative endobronchitis, sepsis, peritonitis, and severe cranial cerebral trauma in different hospitals of Simferopol during 2006. These patients underwent a bronchoscopy and lavage of tracheal bronchial tree according to the medical protocols of these diseases. Test has been carried out within 2 hours of samples' intake.

The obtained results have been subjected the correlation analysis with use of Spearman's rank correlation coefficient.

Results. At the first stage of research the group of the simple biophysical methods, accessible in the all hospitals and potentially suitable for estimation of LS condition in the routine clinical practice, has been picked out.

Thus the present research has shown that Click-test can be used as the express test for a clinical evaluation of SD for patients of all age groups suffering from various pulmonary diseases and syndromes accompanied by respiratory insufficiency.

Conclusions.

- Click-test is the express test which capable to diagnose a surfactant deficiency without using of special equipment within 5 minutes.
- Click-test and Stable microbubble test gave the similar results with close correlation that were determined by research of superficial activity of endobronchial lavage fluid.
- Click-test can be used in diagnostics of surfactant deficiency for patients of all age groups.

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Introduction.

Surfactant deficiency (SD) takes part in a pathogenesis of all pulmonary diseases and pathological syndromes, accompanied by the phenomena of respiratory insufficiency, with performing of very important role there. An adequate medication of this disorder is a topical problem of emergency medicine.

However a wide application of the replaced surfactant therapy is restrained due to the absence of a simple test for quick diagnostics of SD with well known physical methods such as Wilhelmy plate method, pulsatile bubble's (PB) test, and stable microbubble (SM) test of Pattle. Recently introduced Click-test is already used in timely predicting the development of respiratory distress-syndrome in newborns widely enough [1, 2, 3, 4].

Nevertheless we have not found the data about use of this test in diagnostics of other pulmonary diseases and syndromes accompanied by respiratory insufficiency.

The purpose of this study was to evaluate the effectiveness of the relative laboratory methods for diagnostics of SD and to define their potential for use in the routine clinical practice.

Materials and Methods.

Methods.

Standard methods such as Wilhelmy plate method, PB, SM, and Click-test are subjected for the analysis and their advantages and disadvantages for use in clinical practice are estimated. The comparative estimation of the results received by methods, which are more suitable for routine clinical diagnostics of SD in all aged groups of patients, was made.

Patients and specimens.

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The obtained results have been subjected the correlation analysis with use of Spearman's rank correlation coefficient.

Results.

At the first stage of research the group of the simple biophysical methods, accessible in the all hospitals and potentially suitable for estimation of LS condition in the routine clinical practice, has been picked out. Their relative characteristics are presented in the table 1.

The reasons, that have blocked a wide use of the referred techniques' majority in hospitals, are:
Long test duration.
Necessity of the considerable quantity of a test material.
Necessity of the special measuring device.
Necessity of special equipment and special preparation cycle for device.
Complexity of data interpretation.
Necessity of unification for test sampling technique and specimen preparation.

Table 1. Relative characteristics.

	Advantage	**Disadvantage**
Wilhelmy plate method	1. High sensitivity. 2. More information in comparison with other methods.	1. Necessity of the special measuring device. 2. The considerable quantity of a test material is necessary. 3. Test duration is more than 60 min. 4. Necessity of special skills for the researcher. 5. Difficult math calculations are necessary.
Pulsatile bubble's (PB) test	1. Automatic data analyzer. 2. Graphic data recording. 3. High sensitivity.	1. Necessity of special equipment and special preparation cycle for device.

	4. Short duration of test.	
Stable microbubble (SM) test of Pattle	1. Equipment is an optical microscope. 2. Small quantity of test material.	1. Test duration is 30 min and more. 2. Necessity of special skills for the researcher. 3. Morphologic metric estimation.
Click-test	1. Equipment is an optical microscope. 2. Short test duration (less than 5 min). 3. High data reliability. 4. Small quantity of test material.	1. Necessity of practical skills for the researcher.

The main factors that define a practical value of a procedure usually include a test's accuracy, necessity of special equipment and special skills for the researcher, test's duration, performance complexity, economic suitability, simplicity of result's interpretation, etc. Analysis of these factors has revealed that two methods can be used in routine practice at hospital only: Click-test and SM. However application of a SM becomes complicated due to necessity of performing the morphometric calculations, which are impossible without special and additional special equipment.

Therefore Click-test potentially is the most acceptable test for use in daily clinical practice on account of performance simplicity and short duration.

The following scale was used for results' interpretation of SM and Click-test: 0 - the test is negative, 1 - the test is doubtful, 2 - the test is positive.

The next results of SM were obtained:

7. 24 samples were positive;
8. 3 samples were doubtful.

The Click-test results were the following:

9. 12 samples were positive;
10. 7 samples were doubtful;
11. 8 samples were negative.

Direct communication has been revealed between the results of SM test and Click-test - Spearman’s rank correlation coefficient has made 0,34 ($p<0,05$).

Research of the statistical accuracy for the given number of observations was done and the high reliability has been found out ($p <0,025$). It testifies about a close interrelation of received results.

As a whole the research had shown the comparability of results for SM test and Click-test.

Practical value of the tests is defined by comparison of the received data to the clinical and X-ray findings of patients.

We used the following interpretation of the test results:

1. 0 - the test is negative – SD is present and its correction is required.
2. 1 - the test is doubtful - SD is anticipated and control test in 12-24 hours is necessary.
3. 2 - the test is positive – SD is absent.

Thus the present research has shown that Click-test can be used as the express test for a clinical evaluation of SD for patients of all age groups suffering from various pulmonary diseases and syndromes accompanied by respiratory insufficiency.

Conclusions.

- Click-test is the express test which capable to diagnose a surfactant deficiency without using of special equipment within 5 minutes.
- Click-test and Stable microbubble test gave the similar results with close correlation that were determined by research of superficial activity of endobronchial lavage fluid.
- Click-test can be used in diagnostics of surfactant deficiency for patients of all age groups.

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Nowacki Maciej, Jundziłł Arkadiusz, Bieniek Miłosz, Jundziłł-Bieniek Ewa, Kloskowski Tomasz, Drewa Tomasz. The procedure of a patent application submitting, in the field of medical sciences and biotechnology – on an example, of a preliminary effects and hypothesis, of the hemostatic dressings with oncostatic action = Procedura składania wniosku patentowego w dziedzinie nauk medycznych i biotechnologicznych na podstawie uzyskanych dotychczas wyników i opracowanych hipotez, dotyczących opatrunków hemostatycznych o działaniu onkostatycznym. [in] Czerwińska Pawluk Iwona Ed., Muszkieta Radosław Ed., Napierała Marek Ed., Zukow Walery Ed. Annual Reports of Education, Health and Sport 9781329876002. RSW. Radom. 2013. 151-162. ISBN 9781329876002. 220 p. © The Author(s) 2013. This articles is published with Open Access at Annual Reports of Education, Health and Sport. RSW. Radom. Poland.

Original Text published © The Author (s) 2012. Nowacki Maciej, Jundziłł Arkadiusz, Bieniek Miłosz, Jundziłł-Bieniek Ewa, Kloskowski Tomasz, Drewa Tomasz. The procedure of a patent application submitting, in the field of medical sciences and biotechnology – on an example, of a preliminary effects and hypothesis, of the hemostatic dressings with oncostatic action = Procedura składania wniosku patentowego w dziedzinie nauk medycznych i biotechnologicznych na podstawie uzyskanych dotychczas wyników i opracowanych hipotez, dotyczących opatrunków hemostatycznych o działaniu onkostatycznym. Journal of Health Sciences. 2012;2(1):155-162. ISSN 1429-9623 / 2300-665X. Open Access Open Journal Systems of Radom University in Radom, Poland ISSN 1429-9623 / 2300-665X. 2012.

THE PROCEDURE OF A PATENT APPLICATION SUBMITTING, IN THE FIELD OF MEDICAL SCIENCES AND BIOTECHNOLOGY – ON AN EXAMPLE, OF A PRELIMINARY EFFECTS AND HYPOTHESIS, OF THE HEMOSTATIC DRESSINGS WITH ONCOSTATIC ACTION

Procedura składania wniosku patentowego w dziedzinie nauk medycznych i biotechnologicznych na podstawie uzyskanych dotychczas wyników i opracowanych hipotez, dotyczących opatrunków hemostatycznych o działaniu onkostatycznym

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Number of characters: 17 500 (with abstracts). Number of images: 6 x 1000 characters (lump sum)= 6 000 characters. Total: Number of characters: 23 500 (with abstracts, summaries and graphics)=0,5875 spreadsheets publishing.

Key words: procedure; application submitting; patent; medical sciences; biotechnology; hemostatic dressings; oncostatic action.

Abstract

This paper presents the various stages of development of procedures for applying for a patent and utility model on the example of two technical ideas concerning to hemostatic dressings with oncostatic action. The first described application was related to a patent application and the other to the utility model application. In both cases the preliminary results and developed hypotheses were subjected to proper verification. Due the use of relevant tests and examinations, it was possible to submit properly prepared application, including the necessary data and technical merits.

The procedure for submitting a patent application or utility model in the medical sciences and biotechnology must be based on a detailed categorization of the product or thought technical properly carried out an initial study, demonstrating the usefulness of the material, substance or mixture in the treatment or diagnosis.

Słowa kluczowe: procedura; składanie wniosku; patent; nauki medyczne; biotechnologia; opatrunek hemostatyczny; działanie onkostatyczne.

Streszczenie

W pracy przedstawiono poszczególne etapy opracowywania procedury składania wniosków o uzyskanie patentu i wzoru użytkowego na przykładzie dwóch myśli technicznych, dotyczących opatrunków hemostatycznych o działaniu onkostatycznym. Pierwszy opisywany wniosek dotyczył zgłoszenia wniosku patentowego a drugi wzoru użytkowego. W obydwu przypadkach wykorzystano uzyskane dotychczas wyniki i opracowane hipotezy poddane odpowiedniej weryfikacji. Dzięki wykonanym, odpowiednim testom jak i badaniom możliwe było złożenie odpowiednio opracowanego wniosku, zawierającego niezbędne dane merytoryczne i techniczne.

Procedura składania wniosku patentowego lub wzoru użytkowego w ramach nauk medycznych i biotechnologicznych musi być oparta o szczegółową kategoryzację produktu lub myśli technicznej a także odpowiednio przeprowadzone badania wstępne, pozwalające stwierdzić przydatność danego materiału, substancji lub mieszaniny w leczeniu lub diagnostyce.

Introduction

The procedure of submitting a patent application is generally associated with the provisioning of innovative use of technology in the industry thought. Mainly in relation to purely commercial and oriented exclusively in the production, aspects of the marketing, concern to: the devices, methods, techniques or their modifications or changes in utility. This type of conduct is designed to provide opportunities for commercial production or sale. The conception of innovative mind usually is submitted by commercial implementing entity or group of entities.

This type of situation is completely different in the reporting of a patent applications for solutions in medicine, biotechnology and health sciences, where the restriction of certain solutions

is usually targeted onto the protect of the product from irresponsible or mean changes and often is stringent with clear guidelines and a special administrative and judicial review provisions of the law. It should be distinguish here a wide variety of a many examples of patenting, and reservation of rights or wish to enter the data solutions exclusively. The situation is quite different with the submitting process of products or substances in a drug form, or of a solutions for biotechnology and tissue engineering or other medical thoughts. It should be noted that many solutions are legally excluded from the possibility of patenting them. What seems to be fully justified in terms of for example the patenting impossibility in the field of use modern techniques in surgery and introduced innovative methods of treatment used in “open –closed” systemic medical therapy. This situation is similar when it comes to the Polish legislation guidelines, on the patentability of diagnostic techniques with a specific exemption from the restrictions of this type of substances or mixtures used in medicine. Completely different in this area are data relating to the application and patent procedures for drugs and pharmaceutical substances. Which are temporarily tightened, clearly defined for each country temporary protection, which allows the introduction of a generic drug satisfy in the relevant conditions, including for example the same drug form, bioavailability bioequivalence months, etc. [1, 2, 3, 4, 5].

Cancer diseases are now alongside of a cardiovascular disease, treatment of multiple injuries, and AIDS, one of the most discussed medical problems. This type of situation although it is still providing a large extent in the possibility of effective treatment and prevention in all cases, what is especially noticeable in the present many scientific and research reports on a global scale. This type of situation not only contributes to the increase of the current detailed knowledge of even

type of disease and in the broaden knowledge concern to the biological and physiological processes in man also on the cellular and molecular level, but also has an significant effect of the introduction of innovative technical inventions and thoughts [6, 7].

Aim of the work

The aim of the work was to present the procedure of a patent application submitting, in the field of medical sciences and biotechnology – on an example, of a preliminary work on the hemostatic dressings with oncostatic action - under Polish patent application procedure.

I. Proper categorization of the project

The proper categorization of the innovative project is the main point and first step of the patent application submitting. Not all projects and innovative mind descriptions could be submitted as a patent applications. In our work and the application procedure, we focused on an administrative procedure of the preparation and submission of an application under legislation approved by the Urząd Patentowy Rzeczypospolitej Polskiej headquartered in Warsaw, Poland. From a historical point of view arose many inventions and patents out there that could be not reported nowadays to legal protection, or would be significantly modified to meet the legislative conditions. For example Morton's patent from 1846 for the use of ether in anesthaesia or Dr Samuel Pallin no-stitch cataract surgery in 1990.

According to the Polish Patent Office (Urząd Patentowy Rzeczypospolitej Polskiej) guidelines, consisting of application relating to a patent application for invention or utility model

should be well familiar with the definition of each type of application. This type of solution and an accurate description explaining what exactly may be patented to exclude the previously mentioned historical misunderstandings. Of the patent application possibility are excluded methods used in therapy, treatment and diagnostic of human and animals. But this provision does not apply to medical devices, materials, mixtures and substances. This provision allows for fair and honest fully patenting of medical solutions, such as created in our department hemostatic dressings with oncostatic action, without any harm for the patient due to limited access to medical procedures [8].

Strict categorization of the project is necessary to determine the type of innovative mind whether if it is the invention or utility model. In our work, we focused on the description of two of our project - invention and utility model of various hemostatic dressings with oncostatic action. The submitted invention application was titled: „Warstwowy opatrunek o działaniu onkostatycznym, zwłaszcza w obrębie nerki i innych narządów miąższowych" and the submitted utility model application was titled „Opatrunek o charakterze trójwarstwowej matrycy o działaniu onkostatycznym, zwłaszcza w obrębie nerki i innych narządów miąższowych, z górną warstwą związanego granulatu".

II. Tests and studies used to prepare the correct application

In our study we have used the modern methods from the field of tissue engineering, biotechnology, histopathology, diagnostic imaging and radiology, which has allow a full assessment of the work and progress of the use of hemostatic dressings as the oncostatic factors in reducing the risk of tumor recurrence. Using such a wide range of research methods from different fields and

specialization of biomedicine was necessary for a fully correct assessment of the potential use and application of such dressings in manufacturing and medicine. Such studies also allow to closely monitor the quality of the therapeutic agents, structure of dressings and the impact of the various components in vivo. Techniques used in preliminary studies, were also necessary to assess the compatibility of hypothetical assumptions of the properties of dressings in correlation to the effects and results of research work.

III. The assessment of current knowledge and previous reports

The assessment of current knowledge and previous reports is very important to start any patent or innovation application procedure. The process of checking the present state of knowledge and scientific achievements as well as ready-made solutions should be conducted fairly and with a major science and technology tools. In our application procedure we have used for the assessment the main bibliography and bibliometric databases, as well as popular Internet search engines. As a bibliography and bibliometric databases we have used in our analysis the main scientific sources as Pubmed, Medline, Proquest, Google Scholar, Springer, Willey and Sci Central. In analyzed group of Internet search engines resources were Google, Yahoo, Bink, Ask and Aol. The search and exploration was performed according to phrases entries, in different varieties in both languages: Polish and English.

IV. Forms and necessary documentation

When it comes to the Polish submission procedure, the applicant has an access to the appropriate forms, with detailed and exact explanation of the principles of filling them. The main point of the documentation is the section concern to the description of the invention or patent. A patent application may be supported by drawings, but on the application concern to the utility model the drawings are necessary and attaching of them is mandatory.

IV. a) Complex pattern of a patent application, substantiated by a preliminary research results and verification of the assumed hypotheses.

Submitted innovation concern to the construction of hemostatic dressings that have oncostatic effects on tissues and cells, after their use in human or animal, treated with surgical techniques for local cancer tumor. Particularly, if the treatment affect in the kidney tumor and / or another parenchymal organs. The application concerns to hemo-oncostatic dressing measuring 5 cm x 5 cm of the structure and shape, and the uncial porous or layered structure. This hemostatic material consist of well-defined solutions such as gels, fibrin, collagen content, cellulose preparations, gelatin and other materials and biomaterials, which have received approval for use in medicine. The dressing can be freely cut and molded during surgery procedure. The idea of hemostatic dressing with oncostatic action, especially in the kidneys and other parenchymal organs it is to have within its structure and construction structure a layer of a medicinal drug product that prevents the formation of tumor recurrence, after partial, surgical tumor resection (Fig. 1, 2, 3).

Examples of the implementation or use of the invention

Hemostatic dressings with oncostatic action, especially in the kidneys and other parenchymal organs can be created in the chemical and pharmaceutical industries, as well as a dressing typically engaged in the preparation of materials for surgery.

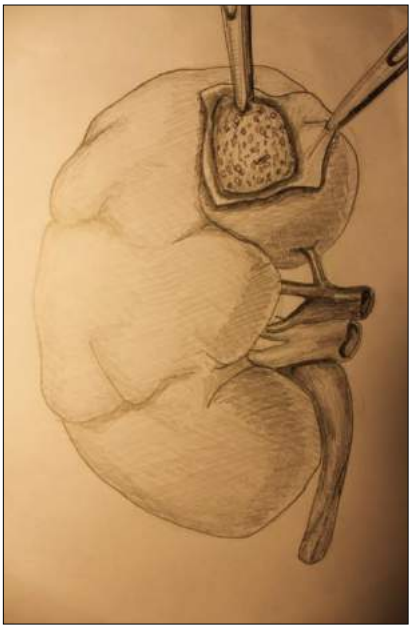

Fig. 1. The photo of drawing illustrating the kidney with applied hemostatic dressing with oncostatic action after partial nephrectomy NSS.

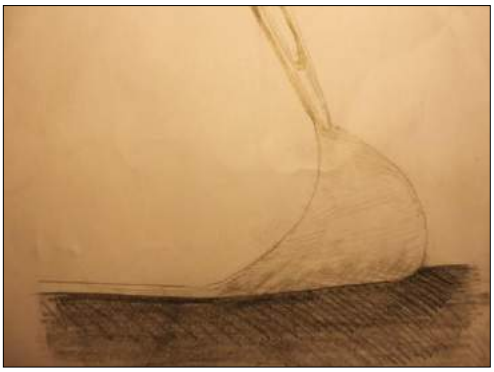

Fig. 2. The photo of drawing illustrating the constituent layers of hemostatic dressing with oncostatic action.

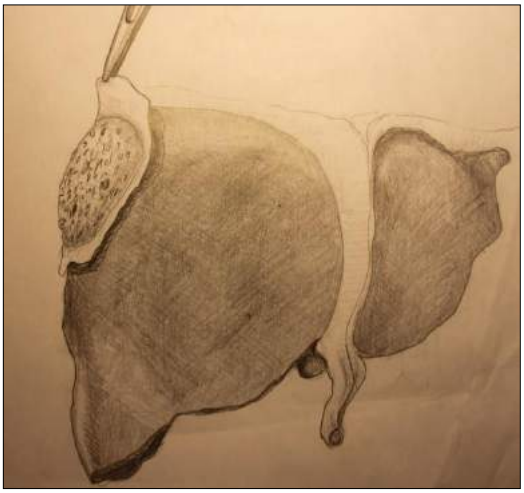

Fig. 3. The photo of drawing illustrating the liver with applied hemostatic dressing with oncostatic action after partial tumor resection.

IV b.) Utility model application.

The application concerns to the hemo-oncostatic dressing as a shaped disc (diameter 3.5 cm) which can be conveniently modeled and cut. The reported current proposal we bring for the application of utility model protection is a a three-layer structure. Our dressing is distinguished by the fact that, its design includes a lower layer with the cross-linked material made of collagen, a layer called the "center" built of fibrin glue, and the top layer of granules combined with cross-linked molecules in a specific oncostatic drug dose (Fig. 4, 5, 6). The dressing are a single solid object, with compact structure. The idea of hemostatic dressing with oncostatic action, especially in the kidneys and other parenchymal organs it is to have within its structure and construction structure a layer of a medicinal drug product that prevents the formation of tumor recurrence, after partial surgical tumor resection.

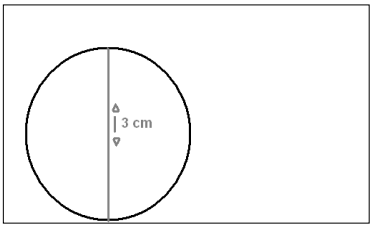

Fig. 4. A layered dressing matrix with the upper bound granular layer in the form of a disc with a diameter of 3.5 cm.

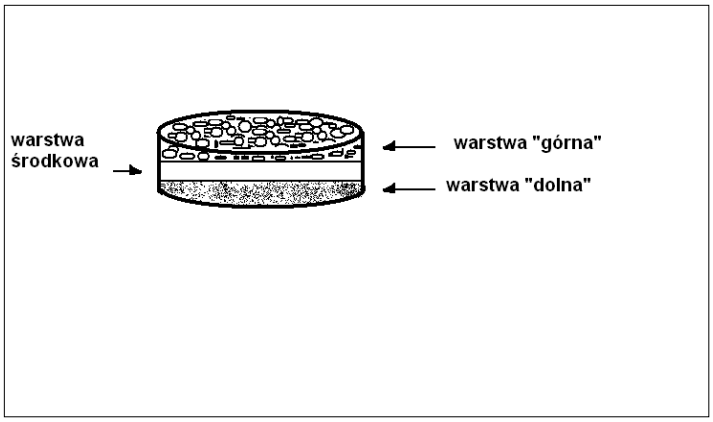

Fig. 5. Three layers of hemostatic dressing matrix.

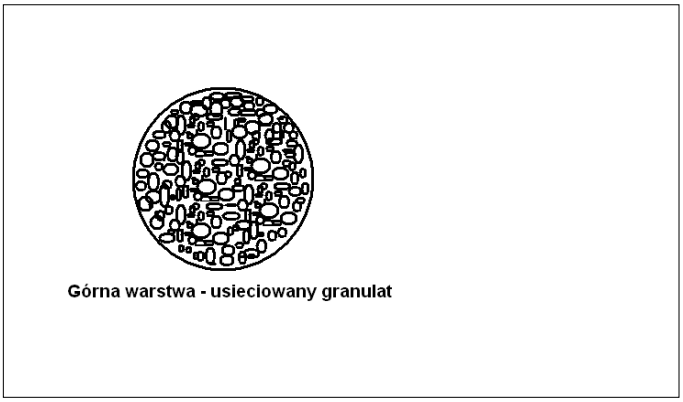

Fig. 6. Hemo-oncostatic dressing matrix, associated with the upper layer of granules.

Conclusions

In our work we have strictly described the procedure of submitting a patent application of invention or utility model in the field of medical sciences and biotechnology. Procedures for submission of proposals within the framework of the Polish Patent Office (Urząd Patentowy Rzeczypospolitej Polskiej) are not very difficult and are very clear for the applicant, but they requires a proper dedication, a proper analysis and gather material.

Every desire of the application, should be well considered and supported by thorough examination procedures, not only concerned to the intended action, influence onto the organism or to be concerned to the clinical effect, but also should be supported by appropriate tests and analysis of consistency, durability and quality of the material, substance or reagent.

There is not possible to submit a patent application for a surgical treatment or diagnostic methods. Current solutions of legislative procedures in an effective manner restrict the erroneous inference or situations that can cause an negative effect, for science or for patients treatment.

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Mikolajewska Emilia, Mikolajewski Dariusz. Consciousness disorders as the possible effect of brainstem activity failure - computational approach = Zaburzenia przytomności jako możliwy wynik upośledzonej aktywności pnia mózgu - podejście obliczeniowe. [in] Czerwińska Pawluk Iwona Ed., Muszkieta Radosław Ed., Napierała Marek Ed., Zukow Walery Ed. Annual Reports of Education, Health and Sport 9781329876002. RSW. Radom. 2013. 163-174. ISBN 9781329876002. 220 p.

Original Text published © The Author (s) 2012. Mikolajewska Emilia, Mikolajewski Dariusz. Consciousness disorders as the possible effect of brainstem activity failure - computational approach = Zaburzenia przytomności jako możliwy wynik upośledzonej aktywności pnia mózgu - podejście obliczeniowe. Journal of Health Sciences. 2012;2(2):7-18. ISSN 1429-9623 / 2300-665X. Open Access Open Journal Systems of Radom University in Radom, Poland ISSN 1429-9623 / 2300-665X. 2012.

CONSCIOUSNESS DISORDERS AS THE POSSIBLE EFFECT OF BRAINSTEM ACTIVITY FAILURE - COMPUTATIONAL APPROACH

Zaburzenia przytomności jako możliwy wynik upośledzonej aktywności pnia mózgu – podejście obliczeniowe

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Number of characters: 18 800 (with abstracts). Number of images: 4 x 1000 characters (lump sum)= 4 000 characters.
Total: Number of characters: 22 800 (with abstracts, summaries and graphics)=0,65 spreadsheets publishing.

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Keywords: cognitive neuroscience; neurorehabilitation; consciousness; brainstem; disorders of consciousness; computational models; clinical applications.

Abstract

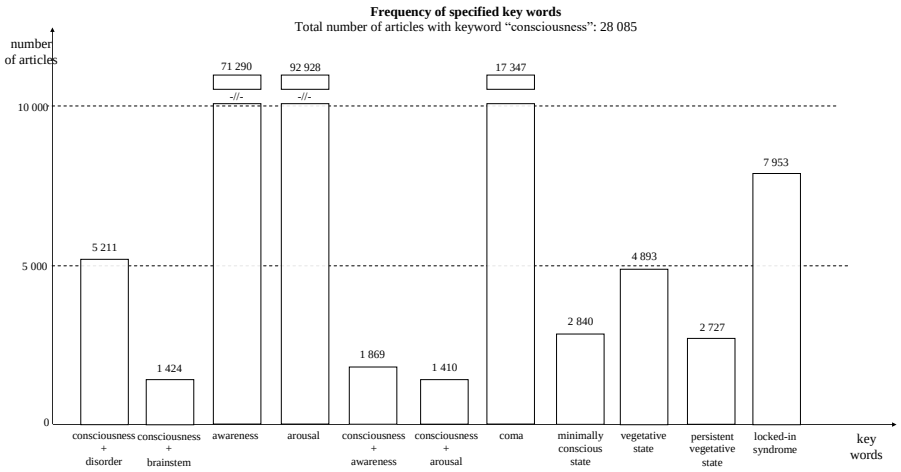
Human consciousness is perceived ability to be aware of himself and environment. Control of human consciousness, as a result of information integration, seems be one of the most complex processes within human nervous system. Disorders of consciousness are perceived one of the most severe disorders, both in acute and long-term therapy and care. Despite a few number of research there is strong belief that computational models in the area of consciousness control can provide better understanding and analysis crucial in contemporary neurology and neurorehabilitation. This paper, based on computational neuroscience approach, aims at familiarizing the newest tool and activate other scientists into providing further research.

Introduction

Human consciousness is perceived ability to be aware of himself and environment. Despite this area is wide discussed particularly in the medical area, scientists don't know exactly, how consciousness is embodied in the human brain. No doubts consciousness is a result of integrative functions of brain, including particular role of brainstem.

There seems be essential to provide full knowledge about the brainstem's role in consciousness control, because clear understanding of it is compromised [1, 2, 3]. Computer simulations can be relatively new, not always popular but helpful approach in medical applications [2, 4, 5].

PubMed (U.S. National Library of Health) [6] database was searched to identify relevant papers. Figure 1 shows the frequency of specified key words combinations. This research was limited to English language articles and encompassed the period from 01.01.1990 to 31.12.2011.



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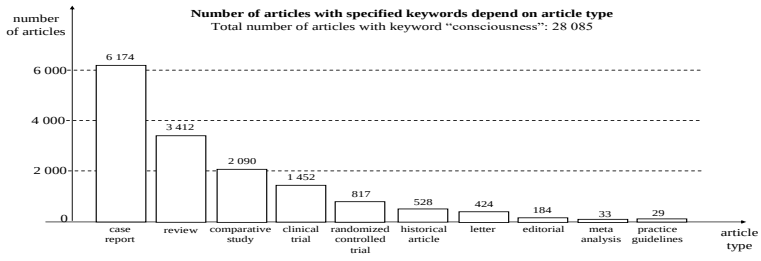

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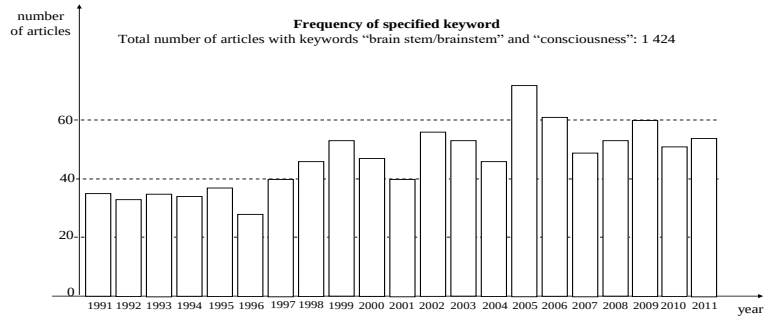

c

Fig. 1. (a; b; c). Results of authors' investigation of the PubMed database (U.S. National Library of Medicine) [6].

Number of articles with keywords "brainstem" and "consciousness" (1 424) constitutes 5% of number of articles with keyword "consciousness". There were observed:

7. significant increase in the articles' number since 1997,
8. a lot of case reports, reviews and comparative studies versus very few meta analyses and practice guidelines,
9. very few articles (34) in the area of rehabilitation and physiotherapy of patients with consciousness disorders because of brainstem damages (after stroke, traumatic brain injuries, etc.), despite these cases are rather severe and need long-term rehabilitation for survivors,
10. lack of articles in the area of simulations and computer models of the brainstem role within consciousness control.

This paper, based on computational neuroscience approach, aims at familiarizing the newest tool and activate other scientists into providing further research.

Current consciousness theories

According to the contemporary research, there is more than one concept of the process of consciousness control. No doubts it requires synchronous co-operation within wide parts of central nervous system (CNS) including Ascending Reticular Arousal System (ARAS) and cerebral hemispheres [7, 8]. From the other side conscious perception of external stimuli requires activation of frontoparietal cortices and low-level specialized cortices, however - frontoparietal activation can also be found during subliminal stimulus processing [8].

Early concepts of Parvizi and Damasio [9, 10] show the brainstem reticular formation as the basic somato-sensing structures critical for emerging core consciousness. Brainstem as the origin of

the ascending reticular activating system plays key role in cerebral cortex activating. This process of activating underlies wakefulness and attention which constitute consciousness [9]. According to this concept consciousness is build based at least on two sets of mechanisms:

- core consciousness (the simplest form of consciousness), representing (mapped within the brain) generally body own state and interactions with "objects" (including subjects, environment and other people) within spatial and temporal context,
- extended consciousness build on the core consciousness, memory, language abilities, etc. [9].

The modern view of ARAS provides evidence, that the activation of the widespread regions of cerebral cortex by the brainstem is mediated through at least several neurotransmitter channels originating from distinct sets of brainstem nuclei [11].

No doubts consciousness needs the results of cortical computations, cognitive binding, synchronization of the neural correlates of consciousness and preserved functions of the most important CUN parts, including thalamus [12] or thalamus and brainstem [13]. Despite wide discussed, these processes seems not fully represent consciousness, but no doubts consciousness cannot exist without them.

From cybernetic point of view consciousness seems need for integrated information processing. The thalamocortical system can play unique role in this process providing both:

- specific connections - involved in representing externally-directed attention [14],
- nonspecific connections – involved in higher-order cognitive processing, self-awareness and introspective mentalizing [14].

In patients in vegetative state were observed significant decrease of functional connectivity within both specific and nonspecific connections [14]. Other research [12] seems provide similar evidence. Some researchers provide evidence in the area of similarity of consciousness disorders and general anesthetics.

Main disorders of consciousness and their consequences

Main disorders of consciousness (DOC) are as follows: coma, vegetative state, minimally conscious state and locked-in syndrome.

Coma is perceived an unarousable state of unresponsiveness, protracted longer than one hour, characterized by lack of purposeful motor behavior, sleep-wake cycles, awareness and eye-opening.

Vegetative state (VS) is characterized as preserved arousal in the absence of any behavioral signs of awareness. There is lack of purposeful motor behavior, awareness, sensory stimulation,

language comprehension or expression, but can be observed sleep-wake cycles and eye-opening [15]. Depends on the source:

12. vegetative state protracted shorter than three months can be assessed as persistent vegetative state,
13. vegetative state because of nontraumatic causes protracted longer than three months, can be assessed as permanent vegetative state,
14. vegetative state because of traumatic causes protracted longer than one year, can be assessed as permanent vegetative state [16, 17, 18].

Persistent vegetative state can be called unresponsive weakfullness syndrome.

Minimally conscious state (MCS) is characterized by nonreflexive and purposeful behaviors with inability to communicate. Despite lack of functional communication or object use, there can be observed partial awareness, language comprehension and expression, inconsistent but reproducible purposeful motor behavior, sleep-wake cycles and eye-opening [19].

Locked-in syndrome is characterized as impairment (complete or partial inability) of production of voluntary motor behavior, despite preserved awareness, eye-coded communication and sleep-wake cycles.

Disorders of consciousness are very huge medical, social and financial problems. Main problems in the DOC therapy are as follows:

- incidence of DOC is not clear, because various consciousness disorders are diagnosed as result (and only one of symptoms) of traumatic brain injuries, stroke, metabolic diseases, etc.,
- there is problem in a precise definition of DOC,
- there is a problem in a proper diagnosis of DOC – providing effective, reliable, valid, accurate and objective tools for patients assessment is one of main directions of contemporary research,
- hard to estimate, but rather high rate of misdiagnosed cases (up to 43 % [20]) can critically influence the therapy effectiveness,
- therapy (including neurorehabilitation) is individual and complicated,
- results of the therapy can be various and sometimes surprising: form death, through transfer to another kind of DOC, to recovery, thus therapist can not be sure effects of their last session.

Table 1. Very general prognostic signs in the area of brainstem damages [21]. Disorders of consciousness, depend on source, are estimated to constitute 15-40% of them.

Damage of brainstem	Prognosis
Bilateral brainstem damage	Very severe cases, mosty death
Disruption of long motor and/or sensory tracts	Very severe cases, mosty death
Unilateral brainstem damage	Approx. 50% survivors
Damage of cranial nerves nuclei	Approx. 50% survivors
Medial syndrome	Mosty hemiplegia
Lateral syndrome	Rather no paralysis

Computational approach to generation of consciousness

Computational research in the area of human consciousness control can be very useful tool as the link between theoretical analysis and experimetal (clinical) research. But both brainstem and ARAS are very complex neurobiological structures, so computational models can assess its selected aspects only (relevant at the level of application). Huge number of nuclei, pathways and other structures makes difficult using simple models without scaling. What more this interdisciplinary research need for close co-operation and integration of research outcomes in medical and technical sciences.

Basic insight into brainstem role in consciousness control can provide general models of action selection within it:

- model of Humphries et al. showing brainstem reticular formation as the cluster model of "small worlds" [22],
- Olmsteds model showing reticular formation as supervised trial-and-error learning scheme with motivation modulation [23],
- Merkers model showing brainstem role as the part of target selection, action selection, and motivation system to optimize integration for action in real time [24].

But no one of them is dedicated to provide:

- research under consciousness control depending on patient's health status (from sleep to various diseases and injuries, etc.),
- frame to provide family of more detailed models.

There is need for a new, more universal approach in the area of neurobiologically realistic human consciousness simulation.

Own observations

Advanced research on the simulation of brainstem impact to consciousness control are conducted in Department of Informatics of Nicolaus Copernicus University. Neurobiologically realistic models of brainstem functions seem be very difficult. Direct simulation (i.e. without scaling) is currently unable because of CNS complexity [3]. What more - shortages in precise knowledge of CNS neuroanatomy (e.g. brainstem reticular formation) makes necessary to assume hypothetic values and connections [3]. Because of it we use development of simulation from general mechanisms to detailed as easier do identify and build [3].

One of the most popular environments, Emergent, is common used for brainstem and whole human nervous system simulation. Neurobiologically realistic models of neurons are based e.g. on Hodgkin-Huxley model with three main channels (excitatory, inhibitory and leak).

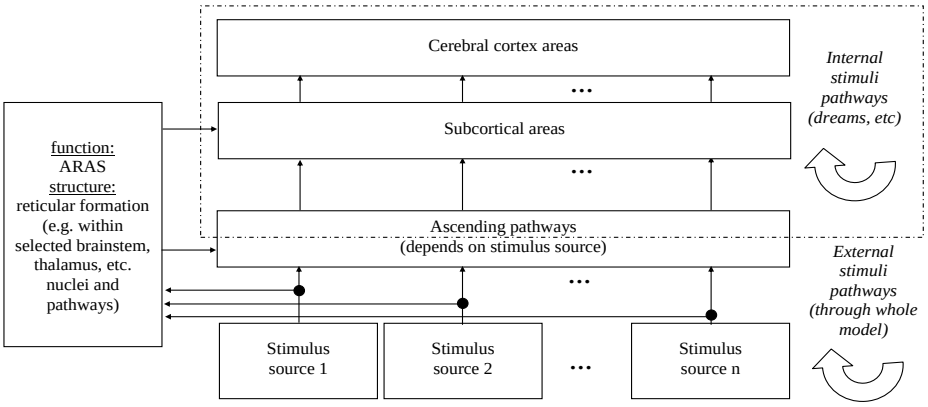

Fig. 2. General brainstem role within human consciousness control, according to concept of Duch [11].

Figure 2, according to the general concept of Prof. Włodzisław Duch [11], shows simple idea of model based on a transmission of stimuli, their integration and processing into representations within cerebral cortex. ARAS provides control under almost all parts of the aforementioned system thanks to parallel stimuli processing describing level of the consciousness. Influence of noise within control system [25] or various lesions can be assessed in the easy way.

Despite simplicity, effectiveness and possibility to develop (e.g. to improve structural similarity to neurobiological patterns) this model has at least two main disadvantages:

- huge number of signals and parameters within the model make hard to discover components carrying meaningful information – deeper analysis can be time consuming,

- increasing complexity (e.g. built-in mechanisms) can make impossible providing similar results using other software environments.

Usefulness of aforementioned approach can be increased using attractors dynamics visualization. Aforementioned transmissional view of consciousness generation is only a part of the whole process. More advanced processes derive from system (figure 2) dynamics. This dynamics can be shaped by individual characteristics (of the patient), changes associated with age, previous experiences, diseases or injuries within CNS, environment, etc. Neuroplasticity of the CNS, both developmental (in children, but in adults too – in selected brain areas) and compensatory (mainly as a result of neurorehabilitation) can provide another important factors. Fuzzy Symbolic Dynamics (FSD) [26, 27] allows for analysis of emerging model dynamics and influence of parameters changes (reflecting e.g. damages of CNS and their influence). FSD can be helpful during verification of hypotheses in the area of the CNS multidimensional dynamical behavior [26, 27, 28].

Aforementioned research help to describe changes within CNS resulting from its:

- damage,
- therapy (drug therapy, neurorehabilitation, etc.).

Main characteristics of the processes are as follows:

time aspect: sudden changes during cerebrovascular accident (CVA) or traumatic brain injury (TBI) versus slow return of functions thanks to the introduced therapy,

range aspect: focused versus diffused changes (lesions, etc.),

critical influence of:

- place and range of the damage and resulting disorders (including disorders of consciousness and disorders of cognitive functions),
- age of the patient (risk of DOC increases with age [29]),
- clinical assessment outcomes (e.g. lack of changes in fMRI or CT imaging reflecting loss of functions),

other relevant factors:

- contraindications,
- secondary changes.

Because of lack of similar research there is hard to compare our results. What more there is very difficult to compare models provided using different simulation environments, e.g. for analysis and development purposes.

Choice of software environment (Emergent based on point neurons) can limit possibilities of research and development. No doubts evolution of connectionism and functionalism approaches provided a lot of various types of software environments, but no one is prevailing. Presented

research, if successful, can be developed into larger project providing family of more detailed models at all levels of processing, based both on point neurons and compartmental neurons. The newest and not fully explored approach in the area of computational simulation of brain processes can provide models based on liquid state machines (LSMs), efficient in mammalians visual system simulations. Diversity of CNS elements (neurons, synapses, etc.) and variety of mechanisms and their characteristics (time constants, recurrent connections, etc.) make LSM good solution to simulate signal processing as distorsions within “liquid” nature of the whole system [30, 31, 32, 33, 34].

Conclusion

Human consciousness and its control seems be one of the less known processes within the human nervous system. Despite acquired knowledge and clinical experience role of the brainstem within consciousness control is still wide discussed. Presented computational approach to consciousness control seems be the good solution for better understanding of the nature of these complex processes. Despite strong belief contemporary evidences seems be insufficient - there is need for further interdisciplinary research in the area of computational consciousness control models.

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Original Text published © The Author (s) 2012. Baqutayan Shadiya Mohamed, Gogilawani Wani, Mahdzir Akbariah Mohd, Sariyah Saidatul. Causes of breast cancer: comparison between the three races in Malaysia. Journal of Health Sciences. 2012;2(2):19-29. ISSN 1429-9623 / 2300-665X. Open Access Open Journal Systems of Radom University in Radom, Poland ISSN 1429-9623 / 2300-665X. 2012.

CAUSES OF BREAST CANCER: COMPARISON BETWEEN THE THREE RACES IN MALAYSIA

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Number of characters: 18 800 (with abstracts). Number of images: 4 x 1000 characters (lump sum)= 4 000 characters.
Total: Number of characters: 22 800 (with abstracts, summaries and graphics)=0,65 spreadsheets publishing.

Abstract

Breast cancer is the most common cancer among women, and it is also the most common cause of cancer death among women in Malaysia. Therefore, new cases of breast cancers are presenting daily to the breast clinics at different hospitals in Malaysia. Moreover, considerations of the three races in Malaysia, there are many differences between them in terms of their causes and effects for breast cancer. As a result, this paper discusses about the causes of breast cancer in relation to the three races in Malaysia. The purpose of this study is twofold: to understand the causes of breast cancer in general, and to discover its relation to different race and culture. Simple research study was conducted to look into different researchers' outcomes and Hospital statistics in Malaysia. The findings of this study indicate that there are significant mean differences between Malay, Chinese and Indian in relation to breast cancer. Eventually, In Malaysia breast cancer is the most common in the Chinese followed by Indians and then, Malays.

Keywords: cancer; causes of cancer; psychology and cancer; Malaysian and cancer.

Introduction

Breast cancer is not a rare issue in the worldwide. It is common to every women and less percentage for men to be diagnosed having breast cancer disease. Looking at the world as a whole, rates of the occurrence of breast cancer slightly increase in every year. In which each and every year people died because of this disease. Experts project that by the year of 2010 about 1.35 million new cases of the disease will be diagnosed per year. The proportion of these people who will die from breast cancer is unknown. However based on present mortality figures, it could be as high as one in four (Nardo, 2002). This is just assumption past few years back on 2002. However, according to

Globocan (2008), the most common cancer occurred among women in Malaysia is breast cancer which is 26.5 percent, it is the highest number of statistics compared to another cancer such as cervix uterine, 12.6 percent, Colorectal 9.9 percent, lung, 5.8 percent and ovary 5.4 percent.

In fact, In Malaysia breast cancer is the most common in the Chinese followed by Indians and then, Malays (National Cancer Registry, 2003). It was supported by study was done by University Malay Medical Center in Kuala Lumpur (HUKL) in the year 2000 has shown that 60% of 952 cancer patients admitted to the UHKL in the years 1993 to 2000 were Chinese patients (Majdi, Nani Adilah, Abd. Rahman & Rahmita, 2004).

Hence, it also reported that, race incidence Malay women: 1 in 28 lifetime risk Chinese women: 1 in 16 lifetime risk Indian women: 1 in 16 lifetime risk (National Cancer Registry, 2003). The direct cause of getting breast cancer disease in Malaysia is still unclear. However, several issues were highlighted as the factors and causes that may contribute to the breast cancer disease. Study done by Nur'saadah, Rusli, Imran, Naing and Winn (2005) found out in their studies that, among well-established risk factors of breast cancer, only null-parity, overweight or obesity, family history of breast cancer and oral contraceptive usage were significantly associated with higher risks of breast cancer.

Therefore, Malaysian should aware and need to be educated well in order for them to learn about the causes of getting breast cancer disease as what we will discuss later in this paper. Later, we will highlighted several causes such as lifestyle, breast feeding, obesity, smoking, and more which may lead to breast cancer disease in which the main interest of this study is focusing in Malaysia country.

Causes of breast cancer

The exact cause or causes of breast cancer remain unknown. Yet scientists have identified a number of risk factors that increase a person's chance of getting this disease. Certain risk factors, such as age and family history, are beyond our control; whereas others like breast feeding, smoking habits, alcohol intake, food intake, and physical exercise can be modified.

1. Breast feeding

There are subtle changes that we can see in Malaysian society from technology, economics and also profession. This rapid development and changes are more or less demands women to be in the workforce. Women nowadays are no longer staying in the house and doing house chores only. They woke up in the morning and prepare to go for working in order to help their partner to raise family. Moreover, women also realized how importance to have education in the highest level as preparation for them to face any problem in the future.

Because of these factors, working women doesn't have much time to do breastfeeding. Therefore, they are preferred to give scheme milk to the baby and totally give full responsibility to the nursery to take care of their babies. The abandon of breastfeeding trend will affect the mother and the baby in the future.

This profile is based on the data from the National Cancer Registry, the breast cancer data from the University Malaya Medical Centre, and from the experience of a wide variety of doctors. The National Cancer Registry showed that Chinese women have the highest risk of breast cancer in Malaysia with a one in fourteen lifetime risk of getting the disease, followed by the Indian women at one in fifteen, and the Malay woman with a one in twenty-four lifetime risk of getting breast cancer. This racial difference may be due to the risk factors that are responsible for the disease, which is different for each racial group. The Malay woman usually gets married earlier, have more children and breast feed their children longer than the Chinese woman. Having your first child early, having more children and breast-feeding for a longer period are well-known protective factors.

Moreover, we can see media and hospital in our country keep on promoting the importance of breast feeding to the mothers and babies. It is because, several studies that were conducted on breast feeding issues shown that, the percentage of women without breast cancer breast- fed their more than those who suffered from breast cancer (Enger, Ross, Henderson & Bernstein, 1997). Hence, the study also showed that, women had breastfed for thirteen months and above, they faced

61.0% lower risk. In addition, the other study showed that breastfeeding is important in which, it was significantly protective against breast cancer comparison with never breast feeding (Akbari, Hadi, Akhavan Tabib, Majd, Razaghi, Esfahani, Akbari, 2010).

However, study done by Tessaro, Beria, Tomasi (2003) whom they found out that there is no relation between breast feeding and breast cancer. The changes in the result of breast feeding effectiveness in preventing breast cancer is might due to how long the mother breast fed the baby. Thus, working women in Malaysia should not neglect the importance of breast feeding which is good for the mother and the baby as well as help to reduce breast cancer risk and way to prevent the breast cancer disease.

2. Smoking

As we can see, in Malaysia, smokers among women are everywhere and recently the trend is increasing dramatically. Recent study shows that, the percentage of Malaysian women smokers has doubled to 480.000 in recent years, according to health Ministry parliamentary secretary Lee Kah Choon. (International smoking facts, n.d). At the moment, the number of younger smokers in Malaysia is keep on increasing especially among female smokers. This is a worrying situation in which it will affect our younger's generation healthy level whom they will be our next future leader, professionals and also care-givers. Therefore, our younger generations especially female youngsters need to be educated in detrimental effects of smoking which not only cause lung cancer but it is important to emphasize about getting breast cancer when they are smoking.

Moreover, the increasing number of female smokers is one of the contributable factors for the increasing number of women getting breast cancer in Malaysia. In relation to that, current evidence confirms that young women who smoke or who have regular long-term exposure to secondhand smokers (SHS) have an increased risk of developing premenopausal breast cancer. (Bottorff, McKeown, Carry, Haines and et. al, 2010). Hence, it is supported by the study done by Katzenstein (1994) which he mentioned that women who smoke over two packs a day have a 75% greater mortality risk from breast cancer than do nonsmokers. In addition, consistent result was

found by Bottorff, McKeown, Carry, Haines and et. al (2010) in which they found the evidence link between smoking and breast cancer. Thus, prevention of smoking should be taken in the highest consideration because smoking is totally not good for health and also one of the risk factor of having breast cancer.

"We're seeing an upswing in the trend amongst women smokers here in Malaysia, and what is most worrying is that first time smokers are now becoming younger and younger," said Respiratory Medical Institute Head Datin Dr Aziah Ahmad. Meanwhile, she added the statistic reports done by national morbidity survey (NHMS) in 2006. According to that report out of the 2.7 million passive smokers in Malaysia aged 18 and above, female smokers make up some 24%. In addition to that, Dr Aziah highlighted another threat to women that is the exposure to cigarette smoke by other smokers, especially from men. The survey showed that there are over 2.7 million passive smokers in Malaysia, with women making up the large bulk of it at 23.8%. Moreover, the world health organization (WHO) statistic reveals a more somber picture. Across the world, some 600,000 deaths a year are caused by exposure to second-hand smoke with 64% of the deaths being women. With tobacco addiction being the second largest cause of death in the world after high blood pressure, tobacco marketing targeted to women should be taken seriously.

3. Alcohol intake

Malaysia has been named by the World Health Organization (WHO) as the world's 10th largest consumer of alcohol despite its small population and size. (Tan,2011). Though, consumption of alcohol may contribute to the road accidents and causing a lot of health problem as we usually heard, our societies are still lacking in knowing and not much emphasizing the relationship between alcohol and breast cancer disease. There are several researches that found link between alcohol consumption and breast cancer. These findings need to be balanced by the risks associated with alcohol consumption. For example, in women the risk of breast cancer appears to increase proportionally but modestly (10%) with the number of daily alcoholic drinks (as cited in, Anstey and Cheurbin, 2010).

This result was supported by Tamimi, Byrne, Baer, Rosner et.al in (2005) where they found out that Alcohol consumption is a well-established risk factor for breast cancer. In which, in their studies the result was shown that, among women with non-pro-liferative Benign Breast Disease, recent alcohol consumption was positively associated with breast cancer risk: those consuming more or less 15 g of alcohol per day had a non-significant 67% increased risk of breast cancer.

Furthermore, small correlation were found on alcohol and breast cancer in the study conducted by Tseng, Weinberg, Umbach and Longnecker (1999) on attributable risk for alcohol and breast cancer in the United State, in which the researcher believed that it is due to the modest association between alcohol and breast cancer and the generally moderate level of alcohol intake among US women the proportion of breast cancer attributable to alcohol intake is small. Widespread efforts to reduce alcohol consumption would not have a substantial impact on breast cancer rates in this population.

4. Food intake

Soy food and breast cancer

Malaysia and other Asian countries such as Singapore, Korea, Indonesian and etc. are among the soy consumer in the world. Malaysia is one of the largest producers of soy drinks in South East Asia (Hoh 2008).In Malaysia, different ethnic background such as Malay, Chinese or Indian, loves to consume soy. Soy was presented in many ways either as drink or as food such as tofu. To some extent we can say that, Malaysian is overly emphasized by the media that soy can reduce heart disease and the other disease. However, not much emphasizing were done on the effect of soy and breast cancer disease. As for example, a case-control study in Singapore indicated that in premenopausal women, high intakes of polyunsaturated fats, -carotene, and Soya protein were associated with a low risk of breast cancer; high red-meat intake was associated with high risk (Peng, 1996). Contradict with the study done by Fang,Tseng and Daly (n.d), they found out that, the level of soy intake among women at increased risk for breast cancer and highlight potential factors that may influence women's decisions regarding soy food consumption.

The information regarding the correlation between soy food consumption and breast cancer is still limited. The exact amount of consumption of soy food which may lead to breast cancer is unknown. Therefore, as prevention, we need to limit our soy consumption and start healthy lifestyle by eating good food. Thus, impacts of soy products on breast cancer risk require further study in this context.

Fruits and vegetables and breast cancer

With rapid phase of industrialization and urbanization more or less it do contributed to a lot of changes in the lifestyle among Malaysian societies. In addition, statistics available from several Ministries for the last two decades suggest that as the population achieve affluence, their intake of energy, fats and sugars increase, as reflected in the rising and now substantial size of the food importation bills (Ismail, Chee, Nawawi, Yusoff, Lim & James, 2002).

Therefore, Malaysian women need to increase their fruits and vegetables consumption, particularly green, vegetables, are probably associated with reduced breast cancer as reported by the World Cancer Research Fund (WCRF) (Lima, Oliveira Latorre, Carvalho Costa, Fisberg, 2008).

Red meat and breast cancer

In addition, several studies found out that intake of high –protein foods, particularly red meat and fried meat has been associated with increases breast cancer incidence in the last decade (Lima & et. al, 2008). This point is also supported by the other research done by The Cancer Project in Washington in (2005), the consumption of high-fat foods such as meat, dairy products, fried foods, and even vegetable oils causes a woman's body to make more estrogens, which encourage cancer cell growth in the breast and other organs that are sensitive to female sex hormones.

In Malaysia, foods reflect the multicultural aspects of Malaysia it usually derived from multiple ethnic influence. For instance, In Malaysia pork is largely consumed by the non-Muslim community in Malaysia especially Chinese. However, pork is not a healthy food. One of the studies found out that pork is one of the contributable factors in developing breast cancer disease. The study suggested that, among Chinese women, a diet that is high in pork intake and low in vegetable

intake, especially green vegetables predispose to breast cancer development. (Yuan, Wang, Ross, Henderson & Yu, 1995). Consistent with the other study, relatively high levels of heterocyclic aromatic amines (HCAs) have been found in pork dishes in which, HCAs have been shown be associated with the development of various cancers, including breast cancer. (Yuan & et al, 1995). By no mistakes, why Chinese have high risk of getting breast cancer and having breast cancer is due to the consumption of pork.

5. Physical exercise

Moreover, Malaysian citizen nowadays are not aware of the importance of exercising. Because of this unhealthy lifestyle among women in Malaysia, women in Malaysia are prone to the exposure of having breast cancer disease. It is proven by one of the studies that highlighted the very low levels of physical activity in young Malaysian adults, who, even in their twenties, are gaining weight at substantial rates. (Strubbs, Prentice and James, 1997).Inactivity could well be a major contributor as to why women are more prone to obesity problems than men.

The relation of obesity and breast cancer is proven by the fact that women who did not exercise regularly were at risk three-times higher to get breast cancer compared to woman who exercise regularly (Rozanim, Shahrul, & Noor Hidayah,2006). The odds of having breast cancer for women who had BMI of 25 or more were 2.1 times higher (95% CI: 1.1, 3.9) than the odds of women whose BMI of less than 18.5. (Nur'Saadah, Rusli, Imran, Naing and Winn, 2005). Study done by Costa, Rocha, Dias, and Carvalheira (2009) found a significant association between the risk of breast cancer and overweight, as well as underweight women. Moreover, In several studies, obesity has been associated with risk and prognosis for various cancers, and several mechanisms have been proposed to explain the links between obesity and cancer (Gerber, Muller, Reimer,Krause & Friese, 2003).

Conclusion

Thus, several causes that we already mentioned at the above were the causes that may increase the risk factors of having breast cancer disease. Causes such as breastfeeding, smoking, alcohol intake, food intake, physical exercise are among the risk factors of Malaysian women to develop breast cancer.

Hence, Malaysian should aware of their diet and body health by eating food that sources rich in fiber, carotene and vitamin c to protect against breast cancer. Thus, by learning to know what are the contributor factors to the breast cancer and how to prevent it would more or less help societies in Malaysia to prevent the development of breast cancer. In addition, Malaysian should have proper education of breast cancer disease and become more aware and alert about their health condition and not take it as for granted. Regular check up should be taken to make sure in the healthy body condition.

Moreover, as mentioned at the above, Malaysian should change their eating behavior by eating healthy food and decrease their cholesterol intake. Regular exercise should be done as one of the prevention. Therefore, Malaysian should be aware of being healthy especially our younger's generation because there are our future leaders to rule our country. At last, we do hope that further studies should pay more attention regarding the causes of breast cancer by focusing more in Malaysia context.

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Original Text published © The Author (s) 2012. Butska Lidiia, Samosiuk Ivan. Puncture physiotherapy using biofeedback to express the relationship of monitoring and correction of disorders in persons working under conditions of high mental and physical stress. Journal of Health Sciences. 2012;2(2):31-39. ISSN 1429-9623 / 2300-665X. Open Access Open Journal Systems of Radom University in Radom, Poland ISSN 1429-9623 / 2300-665X. 2012.

PUNCTURE PHYSIOTHERAPY USING BIOFEEDBACK TO EXPRESS THE RELATIONSHIP OF MONITORING AND CORRECTION OF DISORDERS IN PERSONS WORKING UNDER CONDITIONS OF HIGH MENTAL AND PHYSICAL STRESS

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Number of characters: 21 700 (with abstracts). Number of images: 0 x 1000 characters (lump sum)= 0 characters.

Total: Number of characters: 21 700 (with abstracts, summaries and graphics)=0,543 spreadsheets publishing.

Key words: puncture physiotherapy; electropuncture diagnostics; functional status; beforenosologic conditions; different stages of the training cycle.

Abstract

Proposed physiotherapy system for the express-monitoring and correction of disorders in persons working under conditions of high level of stress.

The investigation is devoted to problems of a use of methods of physiopunkture for an estimation of the functional state of sportsmen. The criteria of a rating of a functional status and statuses of health of the sportsmen of a different sex, qualification, at different stages of a training year cycle, with different competitive productivity with the help of electro puncture methods of diagnostics (method by AI. Nechushkin and research of pain sensitivity and electricity of auricular points) are offered. The established differences between parameters of function state at the sportsmen of different kinds of sports; different qualification; a different floor and in the different periods of an annual training cycle, with different competitive productivity, proves their high diagnostic ability. Is shown, that electricity of auricular points and the parameters of acupuncture diagnosis to AI. Nechushkin at the sportsmen have the certain laws and depend on a status of the human or system, change under influence of physical loading and measures of

rehabilitation, can be used as a way of an indirect rating of a functional status organism of the sportsmen for early revealing both prevention before and pathological changes caused by the high physical loading.

BACKGROUND OF THE STUDY

The use of physical factors on the principle of biofeedback relationship at high loads increases the efficiency of psychophysical observation and correction of human functional state [1,2,3,4,5,6,8]. Special attention to the development of diagnostic systems worth using local representative areas of the human body that are on the hands, feet, iris, face and auricular shell [11,12,13,14,15,16,17]. These zones can be used to track the immediate changes in the functional state of the person with the following preventive physiotherapeutic correction of feedback [9,10,11,12,13]. From another side the changes in the functional state of people, who work in situation of the high level of stress (sportsmen, pilots) due to its capability to adapt to the maximum physical and mental stress, which require the full mobilization of reserves [4,5,6,8]. Options change the functional state of this contingent can be evaluated by a multi-criteria, physiological systems based on an analysis of their interaction [1,2,3,4,8]. Required informative, economical, easy and quick to use diagnostic method, and criteria for its using in contingents of person, who are have high level of the adaptation to the stress situations [13].

Coach idea - is the immediate registration and assessment of the individual responses of all body systems on the proposed system of training and monitored for prevention pathological of changes in the body in the early stages of development, under conditions of high psychological and physical stress.

The priority is low-intensity exposure, which can run and adjust processes sanogenesis at the level of the whole organism [1,2,3,4,5,6,8,13]. Changes in the functional state of athletes, due to its capability to adapt to the maximum physical and mental stress, which require the full mobilization of reserves, can be use as a model for another contingents of person who are working under the stress [7,8,9].

THE HYPOTHESIS OF THE STUDY

To monitor the functional state of an athlete in an ever increasing volume and intensity of training loads we have selected a diagnostic system that has provided opportunities multifunctional control health with minimum effort and time in the cycle [3]. For this we used electro diagnostic methods (MED), in particular the method of "riodoraku" I. Nakatani [8,9,10,11,17], standard electro diagnostic test for vegetative A. Nechushkin and auricular diagnosis [9,10,12,13]. The basis of these methods is the principle of systematic evaluation of states of the organism through reflexogenic

zone, which allows to use them to study the processes of adaptation, changes in functional state and health of athletes [13,14,15,16].

THE MAIN AIM OF THE STUDY

Increase the effectiveness of prevention risk pre-and pathological conditions in people under the influence of long-term psychophysical stress, by examining the possibility of application non-invasive methods physiopuncture (standard electro diagnostic test for vegetative AI Nechushkin (SVT), auricular diagnosis (ARD), electrical - Millimeter wave and electropuncture) for the diagnosis and correction of functional state of the body, the example of sportsmen of high qualification**.**

THE AIM OF THIS STAGE OF STUDY

Rate prospects of electro diagnostic indicators to track changes in functional status in athletes from different sports qualifications

To see the ability to manage the functional state of a person working under conditions of high mental and physical stress through physical therapy system for monitoring and rapid correction with the use of low-intensity physical therapy.

MATERIALS AND METHODS

Baseline studies were conducted on groups of athletes and civilian pilots. To achieve the objectives have been identified, the three groups surveyed. The first group (n = 25), were highly skilled athletes, and the second (15) - the pilots, the control group (CG) were (25) - practically healthy persons. All subjects performed a standard test of autonomic AI Nechushkin (SVT), conductivity (EP) and the definition of pain sensitivity (PS) auricular biologically active points (ABAT), a detailed medical examination. Indicators of EP determined the device MIT-ET-11. Performed magnetolaser impact (MLT) MLT-MIT device.

RESULTS AND DISCUSSION

Analysis of the data shows that the pilots, as well as in cyclic sports athletes, high-risk systems are the cardiovascular and nervous, which correspond to high points of the electrical conductivity of the heart, brain, and liver, we observed in 90% of the patients, as well as lower high performance SVT-level functional systems of the heart, lung, colon and stomach, and higher rates of high-level WBS functional systems of the liver and kidneys. The average total value of the electrical conductivity ABAT was close in pilots and athletes, and amounted to 10,58 ± 1.76 rel. units. in the control group

EP ABAT was 15,23 ± 1,62 conventional units (c.u.) ($p < 0,05$). The points which correspond somatotopical bodies with chronic pathology in remission or had previously injured in 93% of EP 20 - 55 c.u. warhead and increased in 99% of cases. In acute disease in 95% of the cases - the EP was higher than 50 c.u. and the PS was an increased of 98%. EP ABAT against psychophysical stress increased from 10 to 20 c.u. In athletes with low EP ABAT and the center line of SVT 20 ± 2.25 c.u., the results were better. After a rest or physical treatment, EP of ABAT decreased, mood, stamina and performance improved too, also were improved those figures of SVT, which were to impact beyond the individual corridor standards, such result we have see after MLT - all 60% of figures of SVT are belonged to him. It was found that the average standard autonomic tests was significantly higher in the control group, which was dominated by people with low fitness are not involved in sports exercises. Thus the decrease in electrical conductivity is a sign of improvement of the body or in the course of natural recovery, or as the result correct.

After the analyze of the dates of the auricular diagnostic were done, were significant such groups according to our observations of the data (a) indicate the presence of organic changes in certain organs and systems that meet the clinical diagnosis and occur in 80% of athletes. These groups (b) indicate the beginning of a pathologic process or the presence of chronic changes in the system at a certain stage of remission, the data group (c) evidence of functional stress in the corresponding organs. The points which correspond to organs of corresponding with known chronic disorder in remission or damaged due to trauma are at 93% of EP above 20 but low for 50 c.u. and increased PS in 99% of cases. The points which correspond to organs in a state corresponding to an acute disease, or after the disease or injury in 95% of the cases have the highest EP 50 c.u. and increased PS in 98% of cases. The points that are not felt by patients as pain, had a conductivity, on average, between 1 and 20 c.u. (1c.u. corresponds to the 1 mA)

Summarizing the results, we have identified five stages of the reaction of auricular points (ABAT) on the development of the pathological process:

• 1st degree - electrical conductivity of ABAT (EP) - the highest of 70 mA., Pain sensitivity (PS) - unbearable - responsible lesions diagnosed at the time of other methods of investigation and confirmed complaints, and severe pain or injury is not healed;

• grade 2 - EP - 50-70 mA, BS - very strong - is responsible pathology was diagnosed 2-4 years ago, when there is a pronounced load, confirmed complaints and severe pain syndromes including injuries;

• Grade 3 - EP - 20-50 mA, BS - strong - meets Pathology 5 years ago, that concern no more than 1-2 times a year, sometimes supported by complaints or injuries;

• Grade 4 - EP -10-20 mA., BS - poorly expressed - is responsible organs and systems, strained during the training process, other studies of pathological changes do not register;
• 5 degree - EP to 10 mA., missing warheads, or EP 10-50 mA., BS - no-no complaints, no injuries, functional state - are normal.

The method of recording EP and ear points pain sensibility has a high information content (confirmed by medical examination - 85%) and the rate of (5 - 2 min.). In the 7% found the person whom auricular BAT does not detect changes EP and PS in the presence of these deviations in health status. The results of auricular examinations to confirm and complement the results of CBT test.

Concerning the relationship of indicators SVT and health of athletes, they are related as follows: measurements at the exit of the upper limit of the corridor standards:
• 1-12 units - functional (physiological) arousal, the norm in the preparatory period;
• 12-30 - hyper functions (hyper) organ system or tissue is in a period of rest;
• 30-45-irritation, inflammation or in part, to inflammation, characteristic of the stress in the pre-competition period, and;
• ≥ 45 - excessive irritation, inflammation, stress, often on the meridians of the F, P, C, MC, RP, R, VB in the competitive period or on a background of psycho-physical stress;
measurements at the exit of the lower boundary of the corridor standards:
• 1-9 units – hypo functions, hypo-secretion, hypotension or inhibition in the relevant organs or tissues, slight fatigue, frequent in the run-up;
• 9-15 - slight chronic changes, fatigue and stress before, often on the meridians F, P, C, MC, RP, R, VB in front of the competitive period;
• 15-22 - degenerative processes, chronic irritation of the organ or system, fatigue, and often on the meridians of the IG, GI, V, VB, TR, E, R in front of the competitive period;
• 22 of 45 chronic degenerative processes, marked stress, exhaustion, often to the IG, GI, E in the competition period.

Found a significant variation is beyond the physiological corridor, especially during the holidays, and before the competition in the successful athletes, with the beginning of the new year period of training or under the influence of puncture physiotherapy SVT normal. The most frequent variants are a combination of three methods of EPD:
a) 1 and 2, the degree of PS and EP, MD (meridian diagnostics) - more than 35 c.u. beyond the norm;
b) 3, 4 degree of PS and EP, MD 15-35 c.u.;
c) 1 and 2 the degree of EP and PS, MD - within the normal range or up to 15 c.u.;

d) 3 and 4 degree EP and PS, MD - within the normal range or up to 15 c.u. abroad,

d) 3 and EP 4 degree and PS, MD - within the normal range or up to 15 c.u. abroad;

d) 3 and 4 degree EP and PS, MD - within normal limits,

e) 5, and the degree of EP, PS, MD - within normal limits;

д) 5 degree PS and EP and MD-35 c.u. abroad the normal range.

According to our observations of any of the groups, in confirming the results of clinical examination data EPD (MLC) and data (a, b) without confirmation of clinical investigations indicate the presence of pathological changes in certain organs and systems that meet the clinical diagnosis and occur in 80% of athletes. These groups (c, d) indicate the beginning of a pathologic process or the presence of chronic changes in the system at a certain stage of remission, and the data of (e, f) indicate the functional power in the relevant bodies; auricular study finds tight bodies, and the method of Nakatani - system communication and strained body systems, the combination of three methods of EPD is an effective tool to identify prepathological and pathological processes in the system and organ levels. Designed by EPD-apartment complex SVT revealed in 65.5% of the athletes symptoms characteristic of the disease with a latent course, and in another 73.5% - prepathological state, 12% - a clinically confirmed pathological conditions and diseases, amid much psycho-physical stress, especially in the competition period lead to premature fatigue and a corresponding decrease in athletic performance.

CONCLUSIONS

The results of the EPD in athletes supported by clinical data that reflect the functional state of the organism, organ or system, the effect of exercise and rehabilitation activities, act as a rapid method for assessing the functional state of the organism, for early detection of diseases, including dissimulation, monitoring the adequacy of the functional changes problems in the body of the training process. Evidence of research can be classified as 1A, externally valid to the category of reliability 1a.

Studies show us the EPD performance data obtained from outpatient charts of athletes, the results of the inspection specialists and general medical examination, which proves the validity of EPD to assess the functional status of athletes in order to express prenosological diagnosis during the medical examination, during training, and at all stages of medical of control. EPD-designed apartment complex SVT, allowing to identify athletes with 65.5% the symptoms characteristic of the disease with a latent course, and in another 73.5% - prepathological state, 12% - a clinically confirmed pathological conditions and diseases. Medical rehabilitation and correction of functional state of athletes should be clarified in view of the course of disease with a latent or prepathological state, as well as violations identified in the functional systems of the developed technique of electro-

diagnosis, which is a rapid and objective means to identify and monitor mental and physical status, and allows differentiation of physiotherapy in athletes.

Investigation of the EPD-CBT, psychological, biochemical parameters, showed that the increase in electrical rates and the meridians of the ABAT and of CBT associated with a reduced efficiency of work, the impact of competitive athletes, the development of fatigue or stress, is accompanied by an increase in lactate and uric acid blood results, psycho test deterioration, functional tests, ECG, RVG. Reducing EPD showed an improvement in the function of parasympathetic system, increasing adaptive mechanisms and has a direct connection to a power endurance, tone of vegetative nerves system, with the function of the hard system and the effectiveness of competitive performances. It is proved that the conductivity decreases under the influence on the BAP physiotherapy, psycho, recreation, is a signal of better psychosomatic condition, optimizing recovery processes. Identified and described in athletes integrative indicator EPD (EPEPD), which reflects primarily metabolic and functional changes that occur during exercise and reflects the relative bradycardia at rest, "physiological" hypertrophy of the left ventricle of the heart, changes in autonomic adaptation, increasing the frequency of GM is associated with the experience of work and sportsmanship. High EPEPD respond best competitive results on an electrocardiogram - a high voltage teeth R, T, reduced the interval QT, a high level of physical state (PWC 170), at the ECHO CG - hypertrophy and ventricular dilatation, a larger stroke volume, lower rate of myocardial relaxation and reduced . The level EPEPD correspond to changes of other functional parameters, and significantly increases with increasing skill athletes.

PROSPECTS

Due to mobility, accessibility and efficiency, we proposed a system using biofeedback relationship, which includes monitoring and rapid, and the rapid correction of violations, provides additional capabilities for managing human health, working in extreme conditions. Reliable electrical dynamics of the BAT in response to low-intensity physical therapy action, indicates the possibility of control by the human body at high pressures studied by a combination of methods. Methods proposed to be used to assess the adequacy of functional state of national teams of Ukraine.

The results of investigations can be used as limit of normal deviations electro performance for athletes of different skills, as well as criteria for psychological status and competitive readiness of athletes.

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USE OF WHEELCHAIRS AMONG PATIENTS AFTER ISCHEMIC STROKE

Wykorzystanie wózków dla niepełnosprawnych wśród pacjentów po udarze niedokrwiennym

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Number of characters: 18 650 (with abstracts). Number of images: 0 x 1000 characters (lump sum)= 0 characters.
Total: Number of characters: 18 650 (with abstracts, summaries and graphics)=0,47 spreadsheets publishing.

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Keywords: rehabilitation; ischemic stroke; wheelchair; activities of daily living; quality of life.

Abstract

Aim: Independent walking is one of major determinants of the ability to participate in activities of daily living (ADLs). Aim of this study was to evaluate use of wheelchairs among patients after ischemic stroke.
Material and Methods: Study involved one hundred patients after ischemic stroke. Patients were assessed in the area of wheelchair use **.**
Results: Wheelchair users were:

3. **71% of patients since** 3 weeks to 3 months after cerebrovascular accident (CVA),
4. 42% of patients since 3 months to 6 months after CVA,
5. 20% of patients since 6 months to 3 years after CVA.

Conclusions: This paper seems extend knowledge in the area of wheelchair use among post-stroke patients. Results of the research confirm effectivity of rehabilitation by decreasing (in time) of wheelchair use in post-stroke patients.

Słowa kluczowe: rehabilitacja; udar niedokrwienny; wózek dla niepełnosprawnych; czynności życia codziennego; jakość życia.

Streszczenie

Cel: Samodzielne chodzenie jest jednym z głównych czynników determinujących możliwość uczestnictwa w czynnościach życia codziennego. Celem niniejszego badania była ocena

częstotliwości wykorzystania wózków dla niepełnosprawnych wśród pacjentów po udarze niedokrwiennym mózgu.
Materiał i Metody: Badanie objęło stu pacjentów po udarze niedokrwiennym mózgu. Badaniu poddano używanie przez pacjentów wózka dla osób niepełnosprawnych jako niezbędnego zaopatrzenia rehabilitacyjnego.
Wyniki: Użytkownicy wózków dla osób niepełnosprawnych stanowili:
- **71% pacjentów od** 3 tygodni do 3 miesięcy po udarze,
6. 42% **pacjentów od** 3 miesięcy do 6 miesięcy po udarze,
7. 20% **pacjentów od** 6 miesięcy do 3 lat po udarze.

Wnioski: Artykuł poszerza wiedzę z zakresu użycia wózków dla niepełnosprawnych przez pacjentów po udarze. Wyniki badania potwierdzają efektywność rehabilitacji poprzez zmniejszanie się (w czasie) procentowego udziału pacjentów używających wózka.

1. Introduction

Independent walking seems be one of major determinants of the ability to participate in activities of daily living (ADLs). Inability of walking, resulting in use of wheelchair, is perceived one of the most severe results of neurological diseases and injuries, including traumatic brain injuries (TBI), spine cord injuries (SCI), and stroke. According to current research:

- ischemic stroke is the most common constituting 80-85 % of all stroke cases [1, 2, 3, 4, 5, 6],
- risk of the recurrence of ischemic stroke in 5 years is estimated to 40 % [5, 7, 8].

No doubts ischemic stroke can severely influence quality of life of stroke survivors. Approximately 50% of stroke survivors have limited independence (i. e. need help of other people in activities of daily living) [5, 7, 8]. Despite severity there is a few research in aforementioned area.

Aim of this study was to evaluate use of wheelchairs among patients after ischemic stroke.

2. Material and Methods

Investigated group consisted of one hundred patients after ischemic stroke. Inclusion criteria were as follows: age above 18 years, diagnosis: ischemic stroke, patient during rehabilitation, and time after cerebrovascular accident (CVA) – from 3 weeks to 3 years. Inclusion of patients was each time confirmed by medical records. Size and anatomical involvement of infarct varied depend on the patient.

The patients' profiles are presented in Table 1.

There was important to provide research only for patients after ischemic stroke, because different stroke subtypes may imply different prognosis and different rehabilitation strategies.

Table 1. Patients' overall profile.

	Number and percentage
Age [years]:	
Min	32
Max	82
SD	12,02
Mean	59,33
Median	58
Time after cerebrovascular accident (CVA):	
3 weeks – 3 months	41 (41 %)
> 3 months – 6 months	30 (40 %)
> 6 months – 3 years	29 (29 %)

Assessment were performed in each patient based on the factual (not: reported or proposed) wheelchair use.

The results, where available, are expressed as mean, median, minimal value (min), maximal value (max) and standard deviation (SD). Statistical analysis of data was performed using the Statistica Software. A probability (p) value < 0.05 was considered as statistically significant.

3. Results

Results among 100 patients (100 %) involved in the study are presented in Table 2.

Table 2. Results for whole group of patients.

Number of patients using wheelchair		
3 weeks – 3 months after CVA	> 3 months – 6 months after CVA	> 6 months – 3 years after CVA
71 (71%)	42 (42%)	20 (20%)

4. Discussion

Wheelchairs seem be one of the basic assistive technology (AT) equipment for people with neurological disorders. Because of it knowledge in the area of wheelchairs' use among post-stroke patients should be deep and cover all possible issues of this interdisciplinary (scientific, technical, clinical, and social) problem.

According to general analyses of Kaye et al. [9] and LaPlante et al. [10] 1,6 million citizens of USA (residing outside of institutions) use wheelchairs, constituting 0,55% of USA population, including:

- manual wheelchairs: approx. 1,5 million,
- electric wheelchairs: 155 thousands,
- additionally scooters: 142 thousands [9].

Number of wheelchair users in USA increases with age constituting:

- 0,1% of the population under 18 years,
- 0,4% of the population in working age (aged 18-64),
- 2,9% of the population aged 65 and more [9].

This number grow approx. 5% per year [9, 10]. There is lack of assessments concerning wheelchairs' use among patients with neurological deficits. What more lack of similar research in Poland causes significant problems in analysis and comparison of the results of my research.

There is worldwide shortage of research concerning wheelchair use among ischemic stroke patients. General research among post-stroke patients showed evidences as follows:

- mobility assistive devices, including wheelchairs, are perceived as important element in the neurorehabilitation process,
- there can be significant variation in the provision of wheelchairs to post-stroke patients, influenced by a lot of factors, not only patient characteristics [11], but wheelchair use can be generally predicted by cognition, functional independence, and stroke recovery [12].

Research of Lipson et al. [13] provided significant evidence in the area of differences between recovery and incidence of medical complications in ischemic and hemorrhagic stroke patients admitted for neurorehabilitation. Despite:

- hemorrhagic stroke patients later began neurorehabilitation,
- hemorrhagic stroke patients took longer than ischemic stroke patients to enter into rehabilitation,
- and were more possible to develop medical complications,

there was no significant difference in incidence of seizures or wheelchair ambulation on discharge, length of rehabilitation stay or Functional Independence Measure (FIM) scores on both admission and discharge [13]. Wheelchair ambulation on admission in hemorrhagic and ischemic stroke patients was respectively 53% anf 41% [13].

According to research of Teasell at al. at hospital discharge (despite median of FIM=70) 72% of post-stroke patients remained wheelchair dependent, while only 28% were able to ambulate independently (with or without an assistive device) [14].

Important evidence in the area of allocation of rehabilitation resources, education of patients/carers, and for discharge planning provides review of Preston et al. (table 3 [15]).

Table 3. Very general results in the area of mobility based on review of Preston et al. [15].

Time of rehabilitation	Probability of independent walking among stroke patients	
	Patients initially managed in a nonambulatory rehabilitation unit	Patients initially managed in an acute unit
After 3 months	0.60 (95% CI 0.47-0.74,	0.39 (95% CI 0.27-0.52,

	1373 participants)	634 participants)
After 6 months	0.65 (95% CI 0.53-0.77, 444 participants)	0.69 (95% CI 0.46-0.92, 405 participants)
After 12 months	0.91 (95% CI 0.81-1.00, 24 participants)	0.74 (95% CI 0.59-0.88, 34 participants)

One of basic tools in post-stroke mobility assessment is Rivermead Mobility Index (RMI). It is perceived short, simple, and reliable, and can be used both in hospital and at home [16, 17, 18].

There is need to assess within wheelchair ambulation of the ischemic stroke patients neurorehabilitation:

- Gait re-education effectiveness [19] (including use of rehabilitation robots, e.g. Lokomat [20] or ReoAmbulator) as important factor influencing necessity of long-term or permanent wheelchair use in patients after ischemic stroke.
- Influence of damaged vascular territories of ischemic stroke patients to outcomes of neurorehabilitation and wheelchair ambulation – despite:
- research of Ng et al. showed, that functional status at admission (e.g. FIM) has significantly bigger influence than stroke vascular territory [21],
- review of Paci et al. showed, that stroke subtypes classification according to Oxfordshire Community Stroke Project (OCSP) can be significant factor influencing outcomes of post-stroke rehabilitation [22].
- Sex-related differences on rehabilitation results - research of Paolucci et al. showed mildly unfavorable prognoses for females (in both stair climbing, activities of daily living, and general mobility) [23].
- Influence of onset-admission intervals (OAI): short, moderate and long, and co-occurred wheelchair ambulation on rehabilitation outcomes – despite research of Gagnon et al. showed poor influence of timing transfer from an acute care hospital to interdisciplinary inpatient rehabilitation program following a stroke [24]. What more: mobility status seems be not stabilized at hospital discharge, influence of postdischarge rehabilitation treatment (PDT) seems be very important, and absence of PDT seems be associated with severe mobility relapse [25].
- Possible unfavourable influence of aging to mobility and wheelchair use with long-term post-stroke rehabilitation [26].

What more current classifications of mobility-related assistive technology devices do not fully meet the needs of researchers [27, 28, 29].

Interdisciplinary, integrated approach to wheelchairs development allow for wider use both manual and powered wheelchairs [30, 31, 32], including patients with severe neurological deficits.

My results discussed here provide valuable information about wheelchair use among post-stroke patients in Poland. Limitation of this research is small sample. Nevertheless my outcomes seem be important step towards better understanding of this phenomenon and useful information for planning further research providing better evidence. What more, studies based on real use of wheelchairs are important, but, depends on country, its healthcare policy, etc., there is useful to provide research based on recommended use of wheelchairs, not always applicable.

Presented findings seems extend knowledge in the area of wheelchair use among post-stroke patients. No doubts providing comparative data like this are important in functional prognostication, rehabilitation, and healthcare planning. Despite high significance of described problems literature seems be scarce and isolated, and evidences seem be week. Thus there is need to pay particular attention to increase the number of research and publications in the area of wheelchair use among patients with neurological deficits, including its influence to long-term neurorehabilitation effectivity.

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Original Text published © The Author (s) 2012. Mikołajewska Emilia. Incidence of bedsores in adult patients with neurological disorders = Występowanie odleżyn u dorosłych pacjentów neurologicznych. Journal of Health Sciences. 2012;2(2):51-59. ISSN 1429-9623 / 2300-665X. Open Access Open Journal Systems of Radom University in Radom, Poland ISSN 1429-9623 / 2300-665X. 2012.

INCIDENCE OF BEDSORES IN ADULT PATIENTS WITH NEUROLOGICAL DISORDERS
Występowanie odleżyn u dorosłych pacjentów neurologicznych

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Number of characters: 16 490 (with abstracts). Number of images: 1 x 1000 characters (lump sum)= 1 000 characters.
Total: Number of characters: 17 490 (with abstracts, summaries and graphics)=0,44 spreadsheets publishing.

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Keywords: rehabilitation; ischemic stroke; decubitus ulcers; bedsores; quality of life.

Abstract

Aim: Incidence of decubitus ulcers (pressure ulcers, bedsores), despite huge knowledge and experience, still seems be significant. Aim of this study was to evaluate incidence of bedsores in adult hospitalized patients within first stages of neurorehabilitation.

Material and Methods: Twenty-four adult patients hospitalized because of accident resulting in neurological disorders. Patients, where necessary, were assessed using Norton Pressure Sore Risk-Assessment Scale Scoring System.

Results: Among 24 patients involved in the study decubitus ulcers were observed in 1 case (4,17%).

Discussion: Outcomes of the research provide evidence in the area of low incidence of decubitus ulcers within involved group of patients. It seems be the confirmation of increasing consciousness in the area of decubitus ulcers' prevention among medical staff. Despite aforementioned results there is need for further research concerning incidence of decubitus ulcers in patients with neurological disorders.

Słowa kluczowe: rehabilitacja; udar niedokrwienny; odleżyny; jakość życia.

Streszczenie

Cel: Częstotliwość występowania odleżyn, pomimo znacznej wiedzy i doświadczenia, wciąż pozostaje znacząca. Celem niniejszego badania była ocena częstotliwości występowania odleżyn u dorosłych hospitalizowanych pacjentów neurologicznych w ciągu pierwszych miesięcy hospitalizacji na oddziale rehabilitacyjnym.

Materiał i Metody: Dwudziestu czterech dorosłych pacjentów neurologicznych, hospitalizowanych na oddziale rehabilitacyjnym, poddano ocenie z wykorzystaniem Skali Norton.

Wyniki: Wśród 24 pacjentów objętych badaniem odleżyny zaobserwowano w 1 przypadku (4,17%).

Dyskusja: Wyniki badania wskazują na niską częstotliwość występowania odleżyn w grupie pacjentów objętych badaniem. Może to być potwierdzeniem rosnącej świadomości na temat profilaktyki odleżyn wśród personelu medycznego. Pomimo ww. wyników istnieje potrzeba dalszych badań dotyczących występowania odleżyn u pacjentów neurologicznych.

1. Introduction

Prevalence of skin integrity issues seems be widely known, but incidence of decubitus ulcers (bedsores, pressure ulcers) is still significant. Despite develop of:

1. awareness,
2. prevention,
3. co-operation within therapeutic multidisciplinary team,
4. early identification of at-risk patients,
5. accurate and timely assessment,
6. clear clinical guidelines,
7. interventions,

further research in the area of decubitus ulcers seem be priority. There is observed important influence of this skin breakdown to rehabilitation effectivity, especially in long-term rehabilitation in neurological patients (post-stroke, with traumatic brain injury – TBI, with spine cord injury – SCI, etc.). It can severely influence not only results of the whole therapy, but patients' functional outcomes and quality of life too.

Aim of this study was to evaluate incidence of bedsores in hospitalized patients within first stages of neurorehabilitation – up to 6 months after accident.

2. Material and Methods

Investigated group consisted of twenty-four adult patients hospitalized because of accident resulting in neurological disorders. Inclusion criteria were as follows:

age above 18 years,

diagnosis: post-stroke patients, patients with TBI, patients with SCI,

time accident: up to 6 months.

Inclusion of patients was each time confirmed by medical records. The patients' profiles are presented in Table 1. Size and anatomical involvement of infarct varied depend on the patient.

Table 1. Patients' overall profile.

	Number and percentage
Age [years]:	
Min	34
Max	75
SD	13,44
Mean	51,54
Median	48

Basic tools for bedsores assessment are Norton Pressure Sore Risk-Assessment Scale Scoring System, Modified Norton Scale, Pressure Ulcer Card, and Short Form-Mini Nutritional Assessment. The Norton Pressure Sore Risk-Assessment Scale Scoring System was used in the study (table 2).

The results, where available, are expressed as mean, median, minimal value (min), maximal value (max) and standard deviation (SD). Statistical analysis of data was performed using the Statistica Software. A probability (p) value < 0.05 was considered as statistically significant.

Table 2. The Norton Pressure Sore Risk-Assessment Scale Scoring System [1].

Assessment			Score
Physical condition	Good	4	
	Fair	3	
	Poor	2	
	Very bad	1	
Mental condition	Alert	4	
	Apathetic	3	
	Confused	2	
	Stuporous	1	
Activity	Ambulant	4	
	Walks with help	3	
	Chairbound	2	
	Bedfast	1	
Mobility	Full	4	
	Slightly impared	3	
	Very limited	2	
	Immobile	1	
Incontinence	None	4	
	Occasional	3	
	Usually urinary	2	
	Urinary and fecal	1	
		TOTAL SCORE:	
Assessment criteria: Total score lesser than 10: very high risk Total score between 10 and 14: high risk Total score between 14 and 18: medium risk Total score greater than 18: low risk			

3. Results

Results among 24 patients (100 %) involved in the study were as follows:

Table 3. Results for whole group of patients.

	Females	Males
Total	12	12
Patients with diagnosed decubitus ulcers	0	1
Percentage [%]	-	8,36
	4,17	

Characteristics of patient with decubitus ulcers: male (57 y. o.), cervical spine cord injury (SCI), in admission tetrapelgia, currently: paresis (upper limbs) and paralysis (lower limbs), decubitus ulcers in the area of sacrum, The Norton Pressure Sore Risk-Assessment Scale Scoring System score: very high risk.

4. Discussion

In my opinion outcomes of the research provide important evidence in the area of low incidence of decubitus ulcers within involved group of patients. It seems be the confirmation of increasing consciousness in the area of decubitus ulcers' prevention among medical staff (but not quite among patients and their families/caregivers). Despite aforementioned results there is need for further research concerning incidence of decubitus ulcers in patients with neurological disorders.

PubMed (U.S. National Library of Health) [2] database was searched to identify relevant papers. Figure 1 shows the frequency of specified key words combinations.

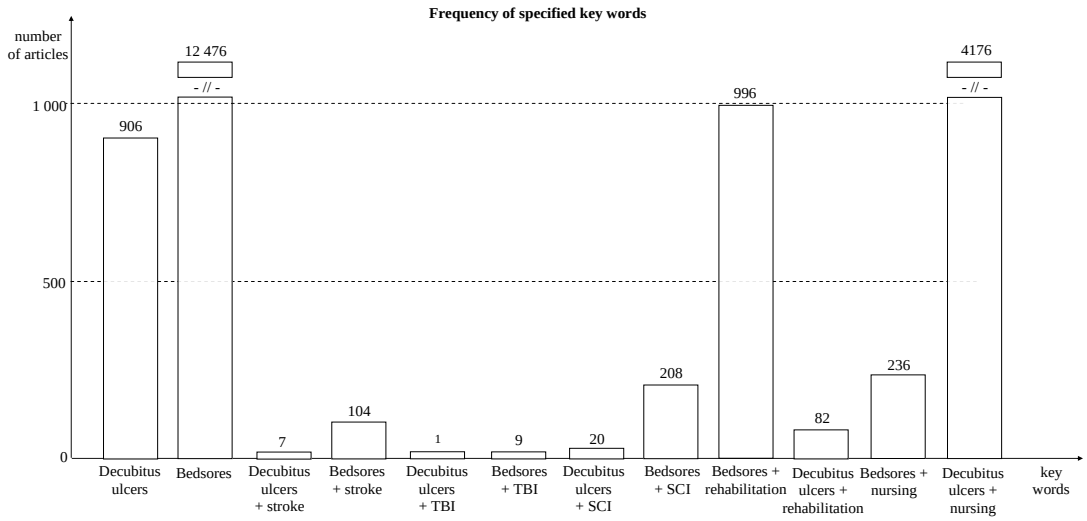

Fig. 1. Results of authors' investigation of the PubMed database (U.S. National Library of Medicine) [2].

There were observed:

- number of articles concerning rehabilitation and physiotherapy in patients with bedsores constitutes 24,4% of number of articles concerning nursing in the same patients – this can reflect wrong opinion, that bedsores are topic for nurses, not for all therapeutic multidisciplinary team [3, 4],
- very few articles (9) in the area of bedsores in patients with TBI, more articles (104) in the area of bedsores in post-stroke patients, and more than two hundred articles in the area of bedsores in patients in SCI – this disproportion implies necessity of further research, paying particular attention to patients with TBI.

Reported in the literature decubitus ulcers incidence varies from 12% to 24% (depend on research), but pressure ulcer incidence in neurological patients within 2 weeks of admission can achieve 47% [5]. Main causes of possible increased risk in neurological patients can be as follows:

- quality of care: incidence of bedsores in institutions or in home care is often assessed higher then incidence of bedsores in hospitalized patients,
- specificity of patients, their diseases and deficits: incidence of bedsores in patients on surgical, neurological or orthopedic, etc. wards is assessed higher then patients treated on other wards [6, 7, 8],
- increased threat: up to 30-40% of bedsores develop during first week of the patient immobility, and up to 70% of bedsores develop during second week of the patient immobility [6, 7, 8].

Proper treatment procedures and bedsores prevention (including early identification of risk factors, even at admission) can lower incidence of bedsores up to 50% [6, 7].

In the patients with SCI research of Saladin and Krause provided evidence, that prevalence rates for pressure ulcers among patients with SCI is associated rather with social support, injury severity, and race-ethnicity (lowest: Hispanics followed by Caucasians), than age, gender, years since injury, and education [9]. Reseach of Wilczewski et al. described these risk factors as: fecal management systems, incontinence, acidosis, support surfaces, steroids, additional equipment, and hypotension [10]. Further evidence was provided by opinion of SCI QUERI Expert Panel on Pressure Ulcer Research Implementation [11]. Aforementioned papers seem provide significant value in identification of barriers to bedsores' prevention and treatment in SCI patients. But according to Gélis et al. [12, 13] there is lack of relevant research, both in acute stage, rehabilitation stage and chronic stage.

In the post-stroke patients bedsores can be associated with poor short-term outcomes. Risk of bedsores significantly increases with age and time after cerebrovasular accident (CVA) – in the case of patient immobility.

Table 4. Percentage of bedsores cases among post-stroke patients

Source	Percentage [%]
Brola et al. (Poland) [8]	3
Ingeman et al. (Danmark) [14] **- Danish National Indicator Project** **- National Registry of Patients**	 1,4 (unknown cases: 8.6) 0,25
Kitisomprayoonkul et al. (Thailand) [15]	1,7
Sackley et al. (Great Britain) [16]	22 (one year after stroke)

According to the research of Brola et al. [8] main risk factors of decubitus ulcers in post-stroke patients are as follows:

- use of wheelchair,
- lack of proper rehabilitation (caregivers can be not conscious of its importance [17]),

- inadequate home care [8].

Proper bedsores prevention and treatment can significantly influence effectivity of post-stroke rehabilitation, functional abilities and quality of life of post-stroke patients [8]. One od possible solutions in home care can be support of post-stroke out-patient clinic.

In patients with TBI research of Safaz et al. reported pressure ulcers in 6,9% of patients with TBI [18].

Physicians, physiotherapists, and nursing interventions may address aforementioned risk factors significantly improving adult patient outcomes. Out of the topic of this paper - evidence in the area of pressure ulcers incidence in children is limited [19].

Education of medical staff, patients and they families/caregivers is important, but critical issue is continuous supervision. No doubts there seems be significant discrepancy between:
what patients and his/her family/caregivers know about pressure ulcer prevention,
and what they are doing to reduce their risk of developing this serious complication.

This situation can influence higher risk factor of secondary changes and return to the hospital. Low admission Norton scale scores are usually associated with high risk of pressure ulcer. Considering the wide spectrum of complications, this study advocates that bedsores can be significant factor influencing effectivity of the therapy. This way role of all health professionals within the multidisciplinary team in pressure ulcers prevention and treatment has to be assessed as very important [20].

My findings provide valuable information about bedsores incidence among post-stroke patients in Poland. Despite limitation of my research is small sample, aforementioned results seem be important step towards planning therapy in clinical and home settings, and can be basis for further research providing better evidence. In my opinion, based on experience, use of wheelchair is not a bedsores risk factor, but important bedsores risk factor can be:

- wrong wheelchair fit (selection of parameters),
- wrong use of the wheelchair.

To sum up decubitus ulcers are perceived important factor influencing both effectivity of the therapy (including rehabilitation) and quality of life of patients with neurological disorders. Despite increased consciousness both among medical staff and caregivers bedsores remain important problem. Incidence of bedsores seems be rather well known, although needs for continuous supervision. There is need for further research in the area of prevention strategies, especially in long-term rehabilitation and home care.

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Instytut Kultury Fizycznej Uniwersytet Kazimierza Wielkiego w Bydgoszczy
85-091 Bydgoszcz ul. Sportowa 2 Tel. +48 523231706 www.ukw.edu.pl

ISBN 9781329876002

Liczba znaków: 520 000 (ze streszczeniami i okładką). Liczba grafik: 70 x 1 000 znaków (ryczałt) = 70 000 znaków.
Razem: Liczba znaków: 590 000 (ze streszczeniami, okładką i grafikami) = 14,75 arkuszy wydawniczych.
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DOI http://dx.doi.org/10.5281/zenodo.45472

ISBN 69781329876002