

EDUCATION VS. WELLNESS
CHAPTER XXV

‘Akton’ Firm Zielona Góra
Firma „Akton” w Zielonej Górze

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*Description of asymmetry of shoulders in frontal plane on the basis
of the population of both sexes from 4 to 18 years of age
in the Warmińsko-Mazurskie region in the light of projection moire*

**Deskrypcja asymetrii barków w płaszczyźnie czołowej populacji obojga płci
w wieku od 4 do 18 lat regionu warmińsko-mazurskiego,
w świetle mory projekcyjnej**

Body posture is an individual, „private” feature since it expresses the whole range of emotional states (Charriere 1963). When you straighten up, you will notice that not only the position of your body changes, but also your spirits (Gray 1989). The body posture of a human being, as a psychosomatic entity, expresses itself in biological, psychological and social spheres. It is an external expression of the course of posture formation. Its somatic aspect is a relation between the location of particular parts of body towards one another and vertical position, and the work of internal organs, burdening of the passive motor system and the range of movements in the proximal limb joints (Zeyland-Malawka 1992). Hence, there is a phylogenetically shaped silhouette which fosters health and physical efficiency and is characterized by universal standards: straight and symmetric position of head and trunk, shoulders in the prolonged line of neck, well-shaped chest and flat belly, as well as mild physiological curves of the spine.

The human posture is ever variable and conditioned by many factors of further, closer and nearby environment. It is shaped throughout the period from the day of birth to the day of death. During this time some proportion of the population displays, not always prominent, first signs of posture asymmetry in frontal plane. Neglecting them may result in the development of a body posture defect. The basic element of prophylaxis will be screening examinations of the posture, particularly with the emphasis placed on the disorders of asymmetry in frontal plane. Examinations carried out in the period of "growth spurts" will be useful for the selection of children endangered with the development of posture defect or with defect that is already developed.

In frontal plane the spine is situated in the midline of body and it is its main mechanical axis. The burdening of this axis increases gradually from the top to the bottom. The complex anatomic structure allowed the comparison of the spine with the mast of a sailing ship. Based on pelvis, it rises as far as to the head. At the level of scapulas the spar is situated.

he entirety is strengthened by ligaments and muscles (mast rigging); however, the most significant are paraspinal muscles. The full efficiency of the spine joints is basically used only in acrobatic, gymnastic exercises etc. In everyday life using the whole ranges of movements takes place with its limited mobility, which is connected with the spine tasks as a base for the upper limbs' activities as kinematic chains (Zembaty 2002).

The system of column consisting of shafts connected with discs is a stable system in the static conditions and exclusively with axial burdening. The ability to shift the vertical burdening is conditioned, among others, by the symmetry of spine in frontal plane, i.e. when the condition of the exclusively axial burdening is satisfied. In the dynamic conditions an additional active balancing of discs is necessary for equalizing the external forces.

Not corrected asymmetric location of the spine over pelvis and the course of spinous processes in the developmental period of a child can be a reason for height disorders in each of the motor segments of the column.

The conducted research aims at the measurement of the size of asymmetry of shoulders in frontal plane on the basis of the population of both sexes at the age from 4 to 18 in the Warmińsko-Mazurskie region.

SUBJECTS AND METHODOLOGY

The research covered the population of 18503 persons at the age between 4 and 18 from randomly selected nursery and other schools in the Warmińsko - Mazurski region, including 9804 females and 8699 males. The statistical analysis covered only these research results where the doctor did not diagnose considerable posture defects, table 1.

The lack of uniformization of tools, techniques, research methods, definitions and criteria with reference to the assessment results in the fact that authors provide their different value. In the last years non-invasive method diagnosing concurrent dimensional condition of the human body posture has gained in popularity. One of the measurement methods is a computer set which uses a phenomenon called projection moire, further in the paper referred to as Posturometer M. In the assessment of the body posture the phenomenon of diffraction of light rays and the reconstruction of reflected rays are applied. The method, similarly to other methods, arouses many controversies and objections since the achieved results of measurements are often uncomparable with the results of traditional techniques (Bibrowicz 2003). In available scholarly publications the research results achieved from a relatively small population of adults carry only diagnostic meaning (Bibrowicz 1995), (Prętkiewicz - Abacjew E and collaborators 2001), and a moderate number of observations usually covers early school and puberty period, which is the time of such dynamic changes in the postural development of a human.

The methodology of research covered the determination of asymmetry values of shoulders in frontal plane: difference between levels of shoulders: LBW: left shoulder is higher, PBW: right shoulder is higher and asymmetry angle of shoulders: KLB: left shoulder is higher, KLB: right shoulder is higher. For the purpose of the assessment, the attitude towards a computer assessment of posture, with the application of projection moire technique - Posturometer M, was used. The research methodology and technique were in agreement with generally adopted rules (5). The obtained results in the form of dimensional, graphic image allowed describing in numbers the parameters subject to research.

Description of asymmetry of shoulders in frontal plane on the basis of the population of both sexes from 4 to 18 years of age in the Warmińsko-Mazurskie region in the light of projection moire

The obtained research results were prepared statistically, determining the average value, standard deviation, variability coefficient, minimum and maximum value. The distribution of variables was normal.

ACHIEVED RESULTS

The obtained results have been presented in diagrams: 1 – the course of changes in average values of asymmetry of shoulders in the male population, 2 – in the female population, 3 – in both sexes.

Considering diagram 1, the course of changes in average values of asymmetry with reference to the angle and height of shoulders, it may be concluded that in the male population between the age of 4 and 18 the left shoulder was always situated higher than the right one, on average higher by 3.57 mm, and asymmetry angle was 0.87 degrees. The greatest asymmetry occurs in the 14th year of life and is 5.7 mm and 1.27 degrees. Only in the 17th year of life the asymmetry in subjects takes approximate values. In the case of boys whose right shoulder was higher and as regards the rest whose left shoulder was higher, the asymmetry value was nearly the same and was: 2.4 – 2.43 mm, angle 0.58 – 0.69 degrees.

Taking into consideration diagram no. 2, the course of changes in average values of asymmetry pertaining to the angle and height of shoulders, it may be concluded that in the female population this process takes place in a very similar way. The left shoulder was always situated higher than the right one, on average by 3.49 mm, and the asymmetry angle was 0.85 degrees. The greatest asymmetry also occurs in the 14th year of life and is 5.7 mm and 1.27 degrees. Only in the 17th year of life the asymmetry in subjects takes approximate values. In the case of girls whose right shoulder was higher and as regards the rest whose left shoulder was higher, the asymmetry value was nearly the same and was: 1.87 – 1.8 mm, angle 0.51 – 0 degrees.

Considering diagram no. 3, the course of changes in average values of asymmetry with reference to the angle and height of shoulders in the population of both sexes subject to research, it may be concluded that the left shoulder in relation to the right one is at its highest level in the 14th year of life, and in the 17th year of life shoulders are at the same level.

DISCUSSION

The research carried out by Wojcieszek A. and collaborators (2008) with reference to the asymmetry of body posture in frontal and transverse planes with the application of the point method in accord with Kasperczyk and simplified orthopaedic examination in accordance with Kutzner-Kozińska in the population of 9838 girls and boys of schools in Bielsko Biała showed that the asymmetry in frontal plane most frequently occurs in boys at the age of 7-9, whereas in the case of girls at the age of 10-15. The research carried out by Wróbel and Jethon (2008) pertaining to asymmetry of body posture in frontal and transverse planes with the application of Posturemeter S in the population of 444 girls and boys at the age of 6 showed that the asymmetry in frontal plane occurs in the form of scoliosis to 10 degrees in 45.95% of the subjects and over 10 degrees in 9.01%. The asymmetry of body posture

was noted in 4.95% of the subjects. Kuciel-Lewandowska and collaborators (2008), with the application of physical examination pertaining to body posture in frontal plane in the population of 386 girls and boys at the age of 4, 5, and 6, noted asymmetry in the form of scoliosis in 31.3% of the children. Dąbrowska and collaborators with the application of Kasperczyk's point method noted the asymmetry of body posture in frontal plane in the population of 1669 boys and girls at the primary school age in 36.1% of the children (2008).

CONCLUSIONS

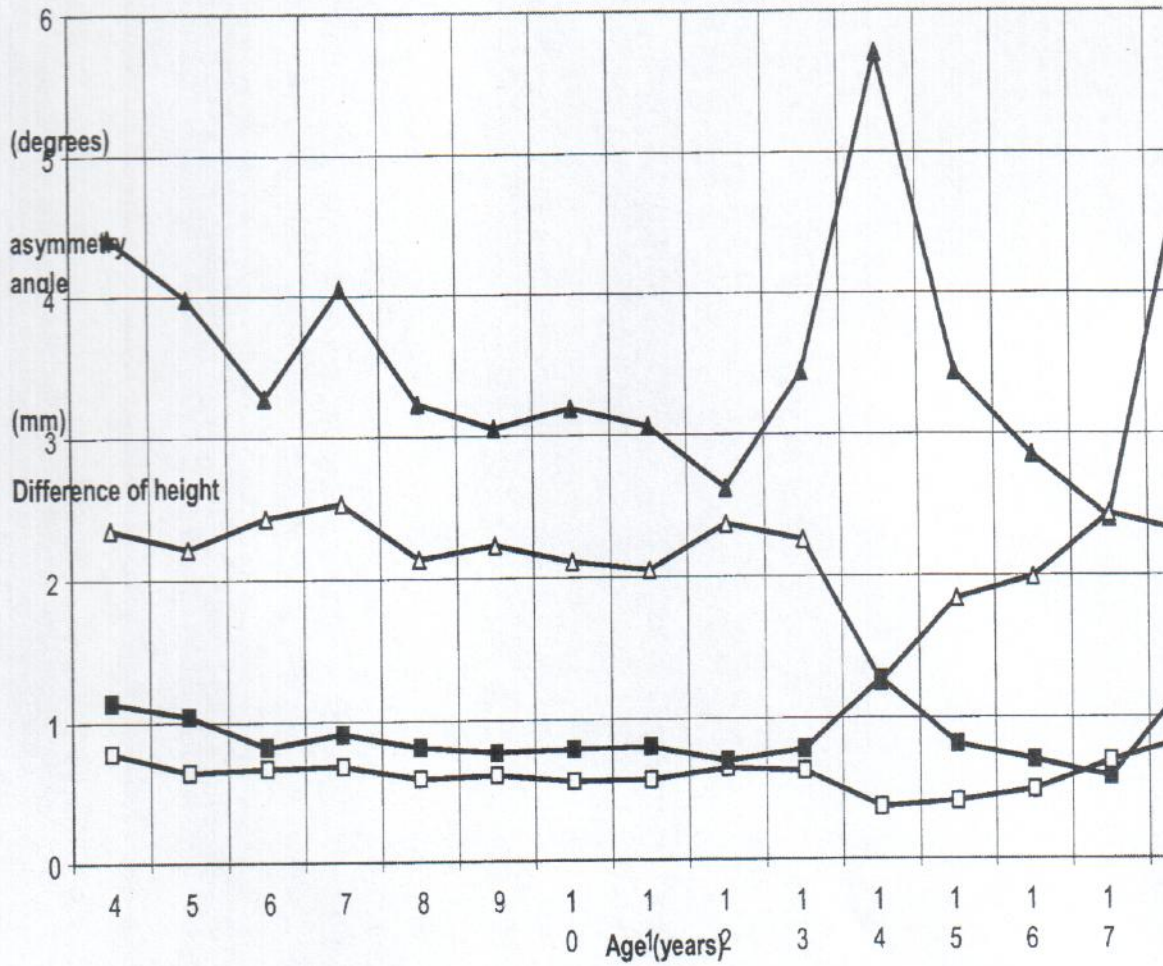
1. The age of 14 in the population of boys and girls is the period when the greatest asymmetry of shoulders occurs. This is the time when people with a raised right shoulder show the state that is the closest to symmetry. Whereas people with a raised left shoulder display the state of the greatest asymmetry.
2. People whose left shoulder is situated higher have a greater value of asymmetry than people whose right shoulder is higher.
3. The asymmetry of shoulders in frontal plane does not exceed 5.7 mm and 1.27 degrees.

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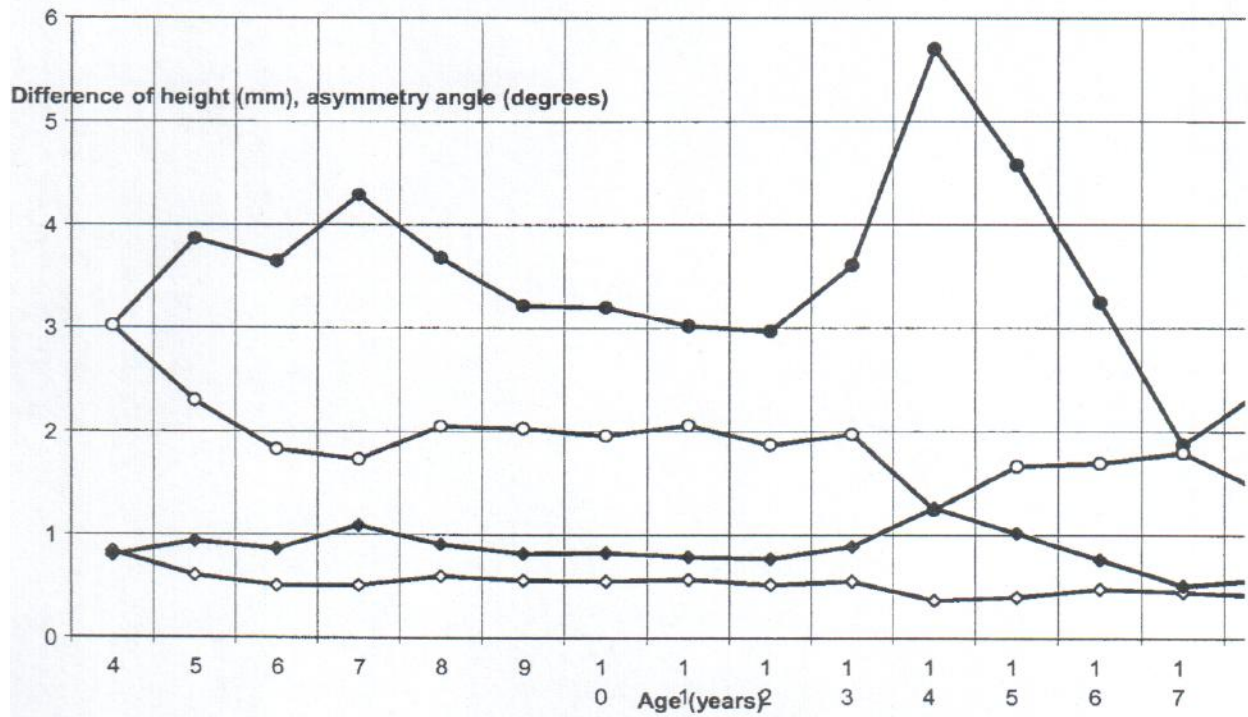
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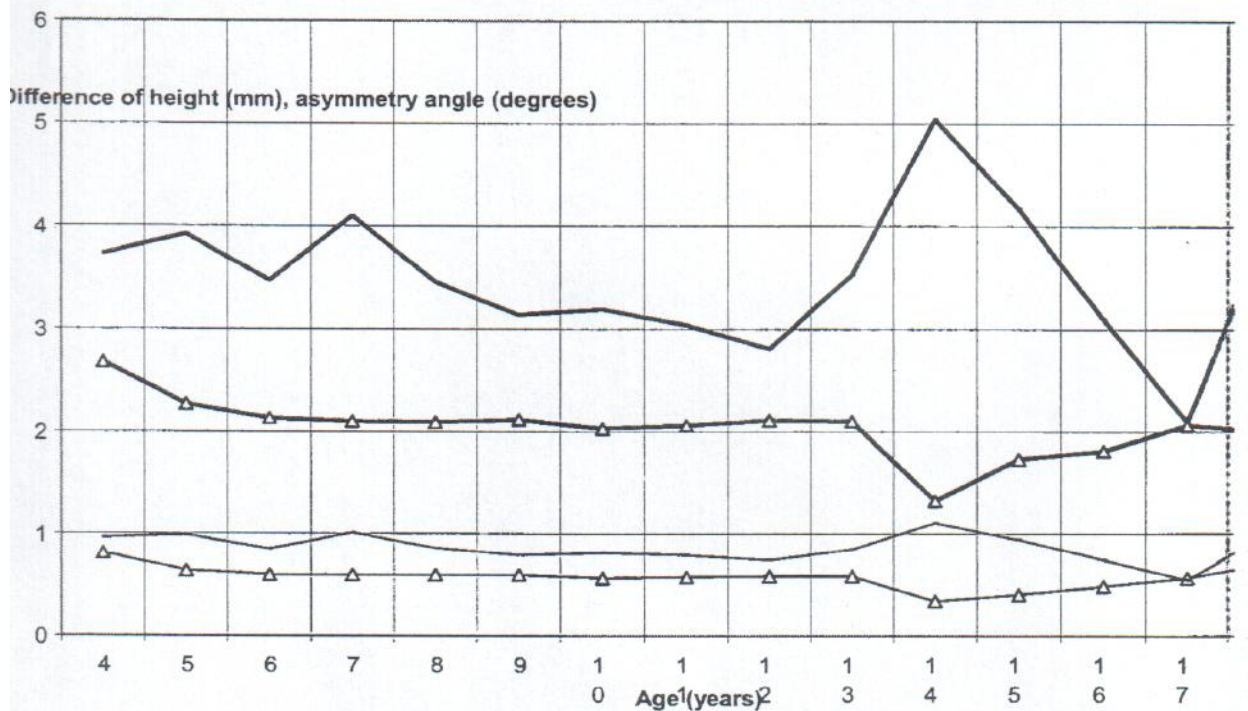
Diag. 1 Course of changes in average values of asymmetry of shoulders in male population at the age from 4 to 18 (n) 8699



Diag. 2 Course of changes in average values of asymmetry of shoulders in female population at the age from 4 to 18 (n) 9804



Diag. 3 Course of changes in average values of asymmetry of shoulders in population of both sex at the age from 4 to 18 (n) 18503



Description of asymmetry of shoulders in frontal plane on the basis of the population of both sexes from 4 to 18 years of age in the Warmińsko-Mazurskie region in the light of projection moire

Table 1 Human material, quantity, body weight and height

Age	Sex						In total
	Females			Males			
	quantity	B.C.	B.H.	quantity	B.C.	B.H.	
4	95	19,1	111,0	104	19,5	109,5	199
5	196	21,0	113,8	206	20,1	113,0	402
6	269	22,5	117,3	263	21,7	118,4	532
7	610	26,42	121,0	597	23,21	127,93	1207
8	1341	26,42	128,28	1255	28,0	130,23	2596
9	1839	30,14	132,87	1677	31,34	134,47	3516
10	1752	35,11	138,26	1542	35,11	139,84	3294
11	1047	41,95	145,0	901	42,48	145,37	1948
12	670	44,77	151,84	549	43,61	151,7	1219
13	569	46,47	157,2	462	48,45	157,52	1031
14	582	52,56	162,24	436	54,25	165,42	1018
15	424	55,25	165,18	355	59,82	169,81	779
16	108	55,4	162,4	83	58,8	167,7	191
17	134	57,0	164,7	123	64,0	171,0	257
18	168	61,3	166,7	146	70,0	175,4	314
In total	9804			8699			18503

Source: own research

Legend: B.W. – average value of body weight; B.H. – average value of body height

ABSTRACT

The human posture is ever variable, and at the same time it is conditioned by many factors of further, closer and nearby environment. It is shaped throughout the period from the day of birth to the day of death. During this time some proportion of the population displays, not always conspicuous, first signs of posture asymmetry in frontal plane. The measurement of the size of asymmetry of shoulders in frontal plane on the basis of the population of both sexes from 4 to 18 years of age in the Warmińsko-Mazurskie region. The research covered the population of 18503 children and youth at the age between 4 and 18 from randomly selected nursery and other schools in the Warmińsko - Mazurski region, including 9804 females and 8699 males. Methodology of research included the determination of asymmetry of shoulders in frontal plane: difference between levels of shoulders: LBW: left shoulder is higher, PBW: right shoulder is higher, and angle of asymmetry of shoulders: KLB: left shoulder is higher, KLB: right shoulder is higher. For the purpose of the assessment, the attitude towards a computer assessment of posture, with the application of projection moire technique - Posturometr M, has been used. Considering the course of average values of asymmetry with reference to the angle and height of shoulders, it may be

concluded that in the male population between the age of 4 and 18 the left shoulder is always situated higher than the right one. Taking into consideration the course of average values of asymmetry pertaining to the angle and height of shoulders, it may be concluded that in the female population this process takes place in a very similar way. Considering the course of average values of asymmetry with reference to the angle and height of shoulders in the population of both sexes subject to research, it may be concluded that the left shoulder in comparison to the right one is at its highest level in the 14th year of life. The age of 14 in the population of boys and girls is the period when the greatest asymmetry of shoulders occurs. This is the time when people with a raised right shoulder show the state that is the closest to symmetry. Whereas people with a raised left shoulder display the state of the greatest asymmetry. People whose left shoulder is situated higher have a greater value of asymmetry than people whose right shoulder is higher. The asymmetry of shoulders in frontal plane does not exceed 5.7 mm and 1.27 degree.

STRESZCZENIE

Postawa ciała człowieka jest zmienna, a jednocześnie uwarunkowana wieloma czynnikami środowiska dalszego, bliższego i okolicznego. Jej kształtowanie obejmuje okres od narodzin do zejścia. W tym czasie u części populacji obserwuje się, nie zawsze uchwytnie, pierwsze symptomy asymetrii postawy w płaszczyźnie czołowej. Pomiar wielkości asymetrii barków w płaszczyźnie czołowej populacji obojga płci w wieku od 4 do 18 lat, regionu warmińsko – mazurskiego. Badaniem objęto populację 18503 dzieci i młodzieży w wieku od 4 do 18 lat, z wybranych losowo przedszkoli i szkół regionu warmińsko – mazurskiego, w tym 9804 kobiet i 8699 mężczyzn. Pomiarami objęto kąt i wysokość asymetrii barków w płaszczyźnie czołowej. Metodyka badań obejmowała określenie wartości asymetrii barków w płaszczyźnie czołowej : różnicę poziomu barków: LBW: lewy bark wyżej, PBW: prawy bark wyżej oraz kąt asymetrii barków: KLB: lewy bark wyżej, KLB-: prawy bark wyżej. Do oceny wykorzystano stanowisko do komputerowej oceny postawy ciała, techniką mory projekcyjnej – Posturometr M. Z przebiegu średnich wartości asymetrii kąta i wysokości barków wynika, że w populacji męskiej w od 4 do 18 lat bark lewy zawsze był usytuowany wyżej niż prawy. Przebieg średnich wartości asymetrii kąta i wysokości barków wynika, że w populacji żeńskiej proces ten kształtuje się bardzo podobnie. Przebieg średnich wartości asymetrii kąta i wysokości barków w badanej populacji obojga płci wynika, że lewy bark w stosunku do prawego najbardziej uniesiony jest w 14 r.ż., Wiek 14 lat w populacji chłopców i dziewcząt jest okresem, w którym występuje największa asymetria barków. To wiek w którym u osób o uniesionym prawym barku występuje stan najbardziej zbliżony do symetrii. Natomiast u osób o uniesionym lewym barku występuje stan największej asymetrii. U osobników, u których lewy bark usytuowany jest wyżej, wartość asymetrii jest większa niż u osobników, u których prawy bark jest wyżej. Asymetria barków w płaszczyźnie czołowej nie przekracza 5,7 mm tzn. 1,27 stopnia.