

The alternative ways of aging of men based on the forced spirometry results in terms of the salutogenesis theory

Alternatywne modele starzenia się mężczyzn w ujęciu teorii salutogenezy na przykładzie pomiarów spirometrii natężonej

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Słowa kluczowe: zagrożenie wykluczeniem społecznym, judo, spirometria

Keywords: risk of social exclusion, judo, spirometry, salutogenesis

Streszczenie

Cel: Celem badań było znalezienie związków pomiędzy różnymi trybami życia człowieka, a jego stanem funkcjonalnym układu oddechowego, który jak cały organizm człowieka ulega procesowi starzenia się.

Metody: W badaniach spirometrii natężonej wzięło udział 125 osób zagrożonych społecznym wykluczeniem, 95 osób prowadzących osiadły tryb życia oraz 95 osób trenujących rekreacyjnie judo.

Wyniki: Badania wskazały na istotne różnice w sprawności układu oddechowego, oraz różne tempo spadku sprawności – starzeniu się układu oddechowego pomiędzy badanymi grupami osób.

Wnioski: Tryb życia w sposób istotny zmienia sprawność układu oddechowego człowieka opóźniając bądź przyspieszając jego naturalny proces starzenia się.

Abstract

Objective: The aim of this study was to find the relationship between the different modes of human life and the functional status of the respiratory system, whilst the human body is aging.

Methods: The study of forced spirometry was attended by 125 people at risk of social exclusion, 95 people leading a sedentary life, and 95 people practicing judo recreationally.

Results: The study showed a significant difference in the efficiency of the respiratory system and the different rate of decline in performance - the aging of the respiratory system between the groups of subjects.

Conclusions: Lifestyle changes significantly the efficiency of the human respiratory system by delaying or accelerating the natural process of aging.

Introduction

The aging of the man and his whole body is a natural process compatible with the nature, evolution and is irreversible. Aging body organs work less effective, become less efficient and cause abnormal operation of them. The pace of this process is largely genetically determined, but also by independent from human climatic conditions (Balicka-Adamik, i in. 2012), environmental conditions (Pyssa, Rokita, 2007; Skiba, Zejda 2000) and human own activity connected with the lifestyle (Marchewka, Dąbrowski, Żołędź 2013). Human respiratory system is responsible, inter alia, for oxygen delivery- the crucial element in biological functioning of the human body. Deficiency in its function will be always manifested by impediment (Pierzchała, Farnik-Brodzińska,1997) and can even disturb a normal functioning in a society.

The respiratory system diseases can be divided into two categories (Limanowski, 2000; Rowińska-Zakrzewska, Kuś, 1997):

1. obstructive – connected with lower airflow in lungs airways
2. restrictive- causing reduction in functional capacity of the lungs

and those changes are the part of a natural process of aging of a human body.

However, the aging of the human body is the process that can be delayed or slow down through health promoting actions and avoiding the anti- health actions. According to the authors, one of the theory that in the most constructive and dynamic way describes the human health condition is the salutogenesis theory by Antonovski, where health is regarded as the dynamic process of balanced living processes and each human action aims into two direction: either HE state- health (fitness) or DE- state of disease and threat of biological existence (Antonovsky 2005). The types of human behaviours are visible in many spheres like: balanced diet (Gabrowska, Spodaryk, 2006), recreational activity (Gębka, Kędziora-Kornatowska 2012; Pyatkov, Biliński, Bilousova, 2011), appropriate living conditions and hygiene (Krzyszowski, 2013; Przybylski Pyskir, Pujszo i in. 2011), avoiding popular stimulants (alcohol, cigarettes, drugs), quality rest time, moderate life pace, few stressful situations, etc. (Bartoszek, i in. 2014).

It is also worth mentioning that women show higher level of physical activity than men, however, the changes disappear in senile age (Knapik, Rottermund i in. 2014). Moreover, health promoting judo recreation training with the emphasis on spirometry was the area of the research (Przybylski, Pujszo i in. 2010; Pujszo, Kuźmińska i in. 2013). Similar researches were conducted on the group of people leading a sedentary way of life (Bania, Szefer i in. 2010; Pujszo, Przybylski i in. 2010).

The authors of this article, as an interest of their studies choose to compare the functionality of the respiratory system among two, quite distant, human behaviour models: the group of people practising recreational judo, the group of people from rural areas at risk of social

exclusion and the standard/ controlled group- the group of people who do not do any kind of physical recreation.

The authors chose the Antonovski's salutogenesis as a model for presenting the dynamic state of the respiratory system.

The research material and methods

In the research of the forced spirometry in the academic year 2014/2015 took part 125 men from the Tucholski district, who are at risk of social exclusion, 95 men living a sedentary life, who do not take up any kind of physical activity (controlled group) and 95 men practising recreational judo. The latter group declared that they additionally practice sport two, three times a week for 60-75 minutes.

All participants were adults of different age. The measurements were taken in the morning hours in the spacious and well- ventilated room with the temperature around 20⁰C. The subjects declared to be in good physical state without any previous respiratory system diseases. The height and weight were measured followed by measuring of the adipose tissue using the Omron BF- 300.

The Forced vital capacity – FVC, Forced Expiratory Volume in 1 second - FEV1 and Peak Expiratory Flow- PEF were measured with the use of the spirometer Microlab ML 3500. The BMI index was also calculated. The Statistica version 5.0 was used for statistical calculations. The regression graphing analysis was conducted and the indicator R² for the trend line was estimated. To compare the results gathered in all of the groups the test f- parametric for variations and test t- parametric for discrepancies were used. The level of relevance for the discrepancies was set on p<0.05.

The actual condition of a functionality of the respiratory system was counted with regards to the standard group and is presented on a HE- DE graph according to Antonowski's salutogenesis.

The results are shown in the tables (Tab. I-II) and graphs (Graph. 1-4).

Results

The anthropometric data of the subjects is shown in Table 1., the forced spirometry results and adipose tissue measurement are presented in Table 2.

The graphic interpretation of the results is shown on charts Graph. 1-3. The Antonovski salutogenesis chart is presented on Graph. 4.

Tab. I. The anthropometric data: weight, height, age and BMI index of all subjects

Groups	mass (kg)	Range	High (m)	Range	BMI (kg/m ²)	Range	Age (y)	Range
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Group of people at risk of social exclusion	76,6 ^{a, b}	50,0	1,74 ^{a, b}	1,61	25,3	17,7	39,7	19,0
	±	-	±	-	±	-	±	-
	15,2	141,0	0,07	1,90	4,3	44,1	14,06	66,0
Group of people practising recreational judo.	83,3 ^a	62,0	1,76 ^a	1,64	26,8	20,3	40,1	17,5
	±	-	±	-	±	-	±	-
	11,9	125,0	0,07	1,91	2,8	35,4	13,3	65,25
Group of people living a sedentary life	83,2 ^b	62,5	1,76 ^b	1,64	26,8	21,1	41,2	19,0
	±	-	±	-	±	-	±	-
	12,9	120,0	0,06	1,98	3,2	36,4	13,5	62,5

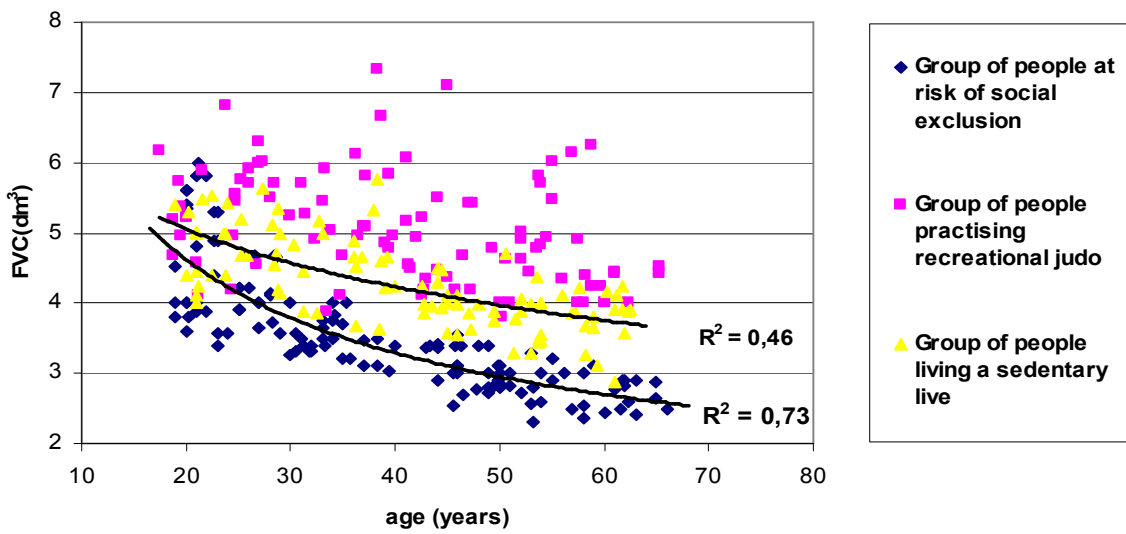
Tab. II. Measured values: body fat content, Forced vital capacity – FVC, Forced Expiratory Volume in 1 second - FEV1 and Peak Expiratory Flow – PEF in all subjects

Groups	%	Range	FEV1	Range	FVC	Range	PEF	Range
	fat tissue							
Group of people at risk of social exclusion	22,1 ^a	16,6	3,3*	2,48	3,5*	2,31	468,8*	356,0
	±	-	±	-	±	-	±	-
	4,4	36,1	0,6	5,3	0,8	6,00	73,34	671,0
Group of people practising recreational judo.	16,0 ^{a, c}	4,4	4,2*	3,11	5,1*	3,8	625,9*	410,0
	±	-	±	-	±	-	±	-
	5,0	23,6	0,70	6,53	0,78	7,34	91,3	843,0
Group of people living a sedentary life	22,8 ^c	6,5	3,7*	2,43	4,3*	2,88	528,0*	385,0
	±	-	±	-	±	-	±	-
	6,3	35,3	0,5	4,85	0,6	5,76	68,2	687,0

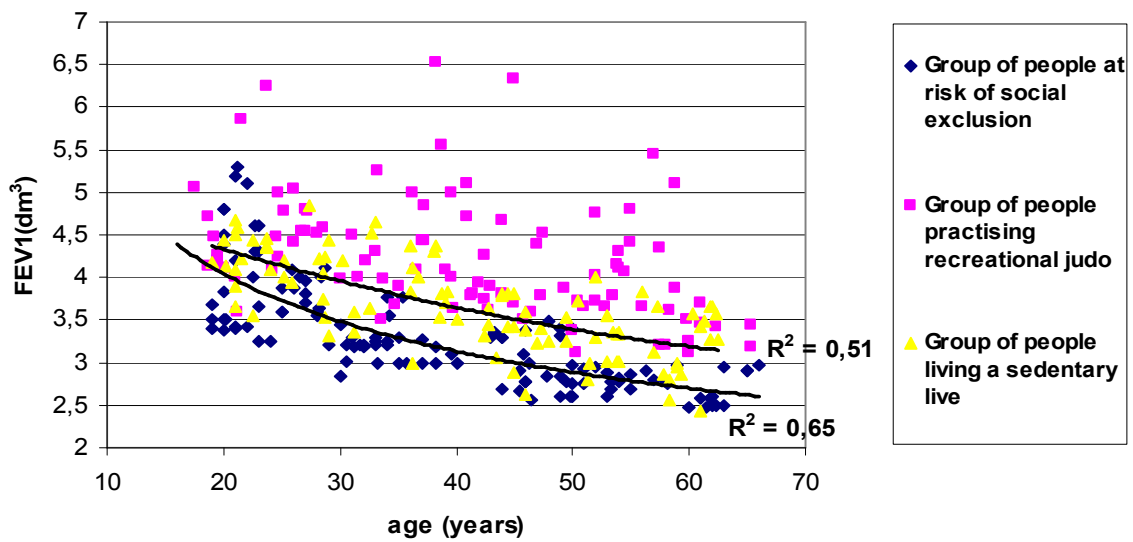
* - all discrepancies statistically important are in the same table column.

^{a, b, c} – relevant discrepancies statistically important are in the same table column

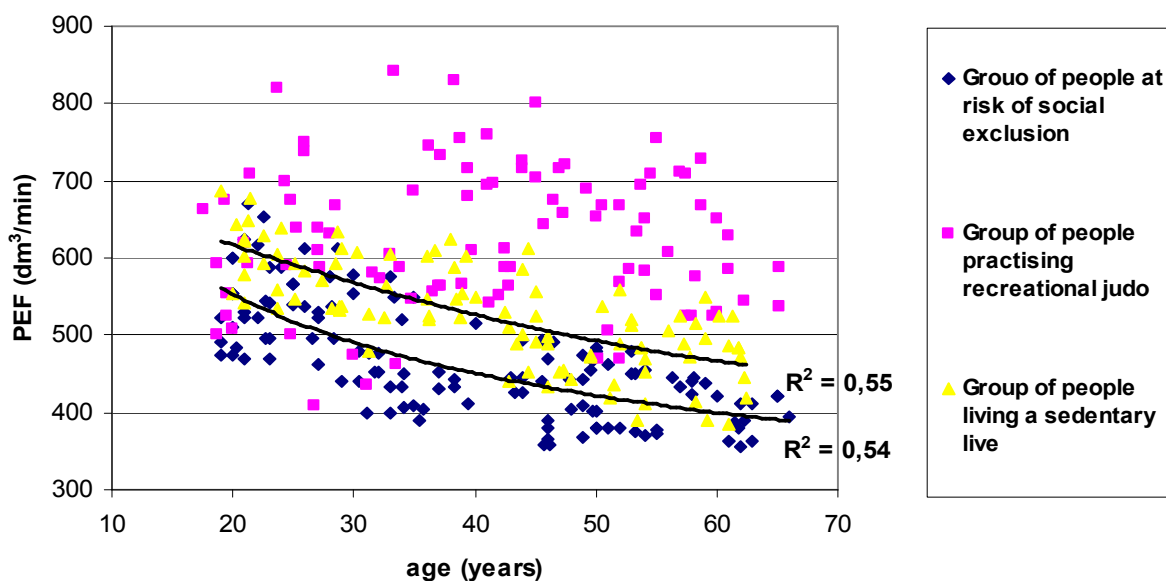
The graphic interpretation of the spirometry results is shown on charts Graph. 1-4.



Graph. 1. Relationship between age and Forced Vital Capacity – FVC in all subjects



Graph.2 Relationship between age and Forced Expiratory Volume in 1 second - FEV1 in all subjects



Graph.3 Relationship between age and Peak Expiratory Flow – PEF in all subjects.

The graphs Graph. 1-3 show the tendency of lowering spirometric values due to aging in social exclusion subject group and subject group living a sedentary life. Regression is confirmed by determination indicators $R^2=0,46$ $R^2=0,73$ $R^2=0,51$ $R^2=0,65$ $R^2=0,55$ i $R^2=0,54$ on a high level. Among the group of people who practise recreational judo there was no relationship observed.

In order to present the relationship between different models of life and the functional condition of the respiratory system- in the view of Antonovski salutogenesis, it was decided to present the ongoing changes in its functionality on the Antonovski axis showing the dynamic model of health changes from health-ease state (HE) to dis-ease continuum (DE).

The standard group (people who led a sedentary way of life, but were healthy) was used as a point of reference for spirometric tests results.

The relative difference between the average value gained by the standard group and the average value gained by the group practising recreational judo and the group at risk of social exclusion of each test was calculated, according to the formula:

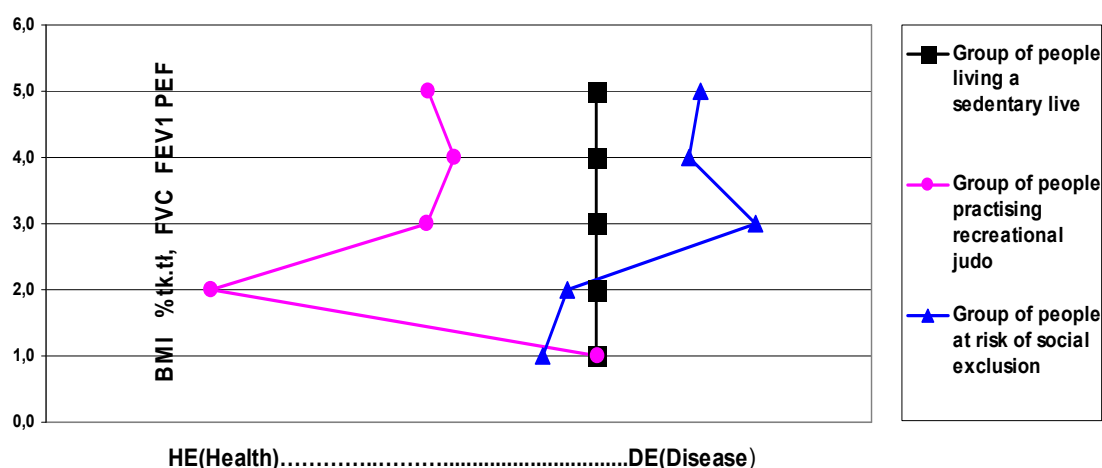
$$R = \left(\frac{O_1 - O_0}{O_1} \right) \quad \text{Equation. 1.}$$

R – relative difference

O_1 – the average value gained by the standard group

O_2 – the average value gained by the group practising recreational judo and the group endanger of social exclusion.

The received result was applied vis-à-vis the standard on the Antonovski HE-DE graph.



Graph.4 The spirometric tests results, body fat content and BMI index were presented graphically according to Antonovski's salutogenesis.

Discussion

The primary data analysis of Tab I shows that people in the group who were endanger of social exclusion are shorter and weight less than the subjects from the other two groups. The differences are statistically relevant. However, the BMI index is at the similar level in all subject groups, and the differences are not statistically relevant.

Comparison of the adipose tissue among the group of people who were endanger of social exclusion and the group of people who led a sedentary lifestyle indicates no relevant differences. So it is possible to assume that in terms of nutrition the group of people that were endanger of social exclusion is not underprivileged at this field. Among the subjects who practise recreational judo the content of adipose tissue is significantly lower, what can be explained by additional physical activity. However, the authors point out that the BMI index can be sometimes misleading in evaluating malnutrition, but in connection with body fat content becomes reliable if malnutrition happens (Wojskowicz, Wojszel, Gułaj i in.2013).

While analysing the data from Tab II, it should be noted that the average values of all spirometric tests for FVC, FEV1 and PEF are the lowest in the subject group endanger of social exclusion and the highest in group of people who practise recreational judo. The differences between all the average values are statistically relevant for all subjects. It can be assumed that the functionality of the respiratory system among the group of people who are at risk of social exclusion is significantly lower. It is also worth mentioning that similar difficulties with the functionality of the respiratory system were already indicated during the research on Gipsies communities who also do not usually live along with the mainstream society (Cianciara, Nowicka, Sitarek, 2012).

There is a probability that lowered spirometric values and as a result lowered functionality of the respiratory system is the characteristic feature of all isolated and excluded members of the society (ethnic, national, penitentiary, captive minorities, sects, etc.) as a result of e.g. migration (Przybylski, Pyskir M., Pyskir J. i in. 2011).

The analysis of the spirometric values shown in charts Graph. 1-3 indicates the systematic decreasing of all spirometric values along with aging in the group of people endanger of social exclusion and the group of people leading sedentary lifestyle. The determination indicators R^2 on all graphs are at the high relevancy level. The regression curve suggests that this process is faster in the group of people endanger of social exclusion.

That means that the functionality of the respiratory system declines along with age in a systematic and relevant manner. Among the people practising recreational judo the relevant decline in functionality of the respiratory system was not observed.

The graphic representation on Graph.4 which uses Antonovski salutogenesis suggests in what way the functionality of the respiratory system is moving due to different paths of life chosen by members of society.

The dynamic state of balance directs the functionality of the respiratory system of people who practise recreational judo into HE (health), whereas the functionality of the respiratory system of people endanger of social exclusion into DE (disease).

It needs to be added that to some point these processes can be reversible (Prączko, Kostka 2005; Szczegieliński, Bogacz 2001), and practising recreational judo can even be successful with people of lowered fitness level to slow down the process (Boguszewski, Kerbaum 2011; Boguszewski, Torzewska 2011; Boguszewski, Zabłocka, Adamczyk, 2012; Michalczak, Gryglewicz 1993).

Conclusion

1. The reduced functionality of the respiratory system is a characteristic feature of people endanger of social exclusion, at the same time this phenomenon can be true for all excluded social groups.
2. Showing the changes in functionality of the respiratory system in term of Antonowski salutogenesis, points out how choosing different paths of life directs people in different states from health/fitness to disease/disability.
3. Recreational judo can be qualified as a healthy therapy to improve the functionality of the respiratory system for all members of the society as well as for people endanger of social exclusion.

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