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Male recreational judo training as a factor improving physical wellness based on particular indicators.

Rekreacyjny trening judo mężczyzn jako czynnik poprawy dobrostanu fizycznego na podstawie wybranych mierników

Abstract

In summer months, in 2009 spirometric and anthropometric researches were conducted in 2 groups of men. The first group consisted of people training judo recreationally and the second group consisted of men, who declared lack of physical activity. In both groups, age range was similar. Obtained results showed that among physically inactive men, percentage content of fat is significantly higher than in the group training judo. Simultaneously, chest mobility, volume vital capacity also calculated per unit of mass of a body are significantly higher for physically active males.

In the physically inactive group, increase of percentage content of fat is observed with aging. This effect is not observed in physically active group. For players, eventual increase of BMI is obtained through increase of muscle mass and not percentage content of fat. It has been proved that chest's mobility, apart from spirometric parameters can be an objective indicator of wellness.

Key words: BMI, judo, spirometry, wellness

Streszczenie

W miesiącach letnich 2009 roku wykonano badania antropometryczne oraz spirometryczne w dwóch grupach mężczyzn. Pierwszą grupę stanowiły osoby trenujące rekreacyjnie judo, drugą mężczyźni deklarujący brak aktywności fizycznej. W obu grupach rozpiętość wiekowa badanych była podobna. Uzyskane wyniki pokazały, że wśród nieaktywnych mężczyzn zawartość tkanki tłuszczowej jest istotnie większa niż w grupie trenującej. Jednocześnie wskaźnik ruchomości klatki piersiowej, swobodna życiowa pojemność, także w przeliczeniu na jednostkę masy ciała są istotnie większe u mężczyzn trenujących.
W grupie nie trenującej z wiekiem obserwuje się wzrost zawartości tkanki tłuszczowej. Efektu tego nie widać w grupie trenującej. U zawodników, jeżeli występuje przyrost wskaźnika BMI, to odbywa się on poprzez przyrost masy mięśniowej a nie ilości tłuszczu.
Wykazano, że wskaźnik ruchomości klatki piersiowej obok parametrów spirometrycznych może stanowić obiektywny miernik jakości życia.

Introduction:

In recent years the problem of assessing the wellness, also by means of objective parameters, has been widely discussed.
Among investigated parameters are: body mass index, percentage content of fat, spirometric parameters [1].
They serve as measurements of the influence of various factors such as lifestyle, diet, illnesses, physical activity, etc. on the quality of life [2, 3, 4] and very important physical wellness [5] . In scientific literature normative values of these parameters can be found, often connected with the age of a tested person [6]. Normative values are determined for population, regardless the level of physical activity of investigated people. Few authors analyzed the problem of the influence of sports activity on the values of spirometric parameters [1]. The aim of this study is to answer the question whether the amateur judo training has an effect on the change of the average values of selected spirometric parameters, fat content and chest mobility. The age dependence of measured parameters both for physically active and for inactive men is also analyzed. The influence of amateur judo training on the wellness of men at different age is discussed on the basis of the results.

Materials and methods

Thirty seven players and trainers of judo and 26 randomly chosen holidaymakers (who declared not to practice any physical activity systematically) participated in research, conducted in July/August in the following cities: Janów Lubelski, Żnin, Stare Kaleńsko. Measurements were taken in the morning, in a spacious, ventilated room of temperature about 20^0C Participants declared to have good physical form, no prior respiratory system diseases and undisturbed physiological state.

For all participants the measurements of body mass and height were conducted and BMI index was calculated. Next the percentage content of fat was measured using device BF-300 produced by OMRON. Next the circumferences of chest during inspiration and expiration were measured. Finally the spirometric tests were done. The examined parameters were: vital capacity (VC), forced volume vital capacity (FVC), forced expiratory volume in 1 second (FEV1), peak expiratory flow (PEF). The forced expiratory volume in one second as a percentage of vital capacity (FEV1/VC), called Tiffeneau index, was calculated. In the research the spirometer Microlab ML 3500 was used [7].

Measured spirometric parameters were calculated per unit of body mass. Each of participants of the research had his chest movement index determined. This ratio was defined as [5]:

$$R = \frac{O_{max} - O_{min}}{O_{max}} * 100\% \qquad \text{Eqn.1}$$

where

R – chest movement index

O_{max} – maximal chest circumference during inspiration

O_{min} – minimal chest circumference during expiration

Results :

The anthropometric data are presented into 2 groups: group recreationally training judo and a physically inactive group. It should be emphasized that parameters such as body mass, height, BMI are comparable in both groups. It means that men with similar body-built were selected, with the difference between them being their everyday physical activity.

Table I .The anthropometric data of the judo-training group.

number	Mass (kg)	Range	Height (m)	Range	BMI (kg/m^2)	Range	Age (years)	Range
n=37	79,9±16,9	43,8-125	1,75±0,10	1,50-1,94	25,7±3,7	18,3-35,4	32,9±14,0	10,5-63,5

Table II. The anthropometric data of inactive group.

number	Mass (kg)	Range	Height (m)	Range	BMI (kg/m^2)	Range	Age (years)	Range
n=26	77,4±17,1	45-118,3	1,72±0,1	1,53-1,86	25,8±3,9	19,2-36,4	30,5±15,7	11,25-61

The wide age range in both group stands out. However, it is similar in training and inactive groups. There were both boys under 18 and men approaching retirement. Such a choice of examined participants allows to find the dependence of measured parameters' on age.

Next tables show results of spirometric measurements. Percentage body fat content, chest movement index (R), vital capacity (V), forced expiratory volume in 1 second (FEV1), peak expiratory flow (PEF) - absolute and calculated per one kilogram of body mass, Tiffeneau index are shown in tables III – V.

Tab III. Body fat content, chest movement index (R), vital capacity (Vc) and vital capacity per kilogram of body mass (VC/kg) in both groups.

Number	Fat content %	Range	R	Range	VC (dm^3)	Range (kg)	VC/mass (cm^3/kg)	Range (cm^3/kg)
n=37	18,0±5,2*	9,4-28,0	9,9±1,4*	6,8-13,9	5,33±1,19*	2,48-7,55	67±10*	48,5-87,9
n=26	23,7±6,4*	11,4-35,3	7,0±1,4*	4,1-9,9	4,27±0,9*	2,58-5,86	57±11*	33,1-81,6

* statistically significant, $p<0,05$.

Tab IV. Values of spirometric parameters - forced expiratory volume in 1 second (FEV_1), forced volume vital capacity (FVC), peak expiratory flow **(**PEF), Tiffeneau index

Number	FEV_1 (dm^3)	Range (dm^3)	FVC (dm^3)	Range (dm^3)	PEF (dm^3/min)	Range (dm^3/min)	Wsk. Tiff. (%)	Range (%)
n=37	4,5±1,07*	2,11-6,9	5,1±1,2*	5,0-2,4	610±160*	229-843	83,8±7,4	72-103,4
n=26	3,4±0,7*	2,1-4,5	4,2±0,95*	2,5-5,8	477±129*	230-669	80,5±5,8	71,9-92,7

* statistically significant, p<0,05.

TabV. Spirometric parameters per a unit of body mass: forced expiratory volume in 1 second (FEV1/mass), forced volume vital capacity (FVC/mass), peak expiratory flow **(**PEF/mass) in examined groups.

Number	FEV_1/mass (cm^3 /kg)	Range (cm^3 /kg)	FVC/mass (cm^3 /kg)	Range (cm^3 /kg)	PEF/mass (dm^3/min/kg)	Range (dm^3/min/kg)
Training judo n=37	56,5±11	37,4-85	64±10*	44,0-87,1	7,7±1,6*	4,3-12,1
inactive n=26	45,6±10	27,3-68,5	55±11*	30,8-81,6	6,2±1,2*	4,3-8,9

Basing on obtained results, a correlation between measured parameters was sought for.
The relation between body fat content and BMI of examined men is worth notice. Relations in both groups are completely different.

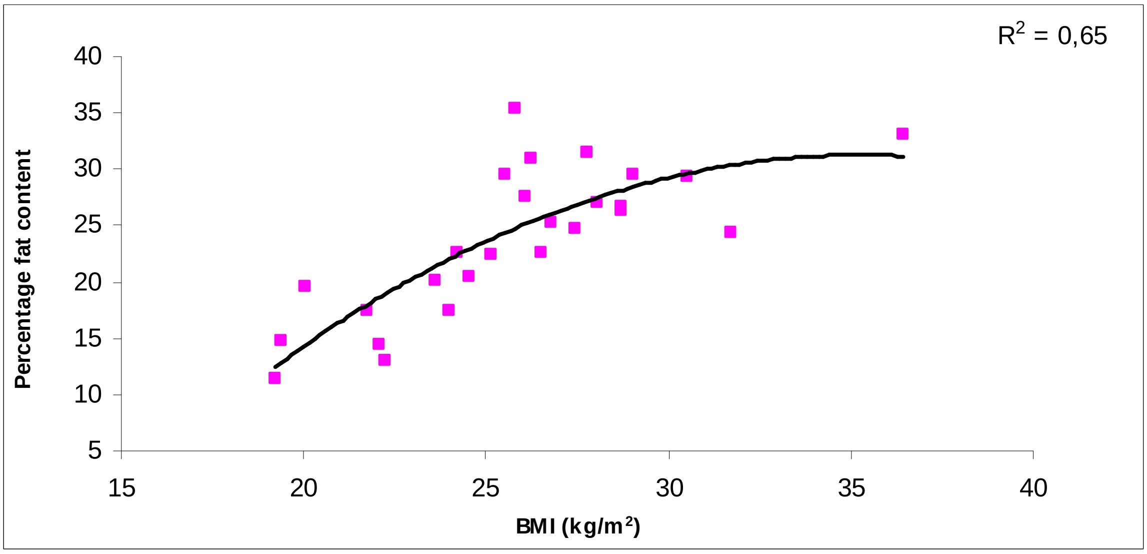


Fig. 1 The dependence of the percentage fat content on the BMI index in the inactive men group

The graph shows high correlation between analyzed variables, R^2 = 0.65. It means that the growth of BMI not training people is happening mainly due to the increase of fat tissue and not the development of muscle tissue.

In the group training judo, the correlation between the content of fat tissue and BMI looks differently. Received results are seen in Figure 2.

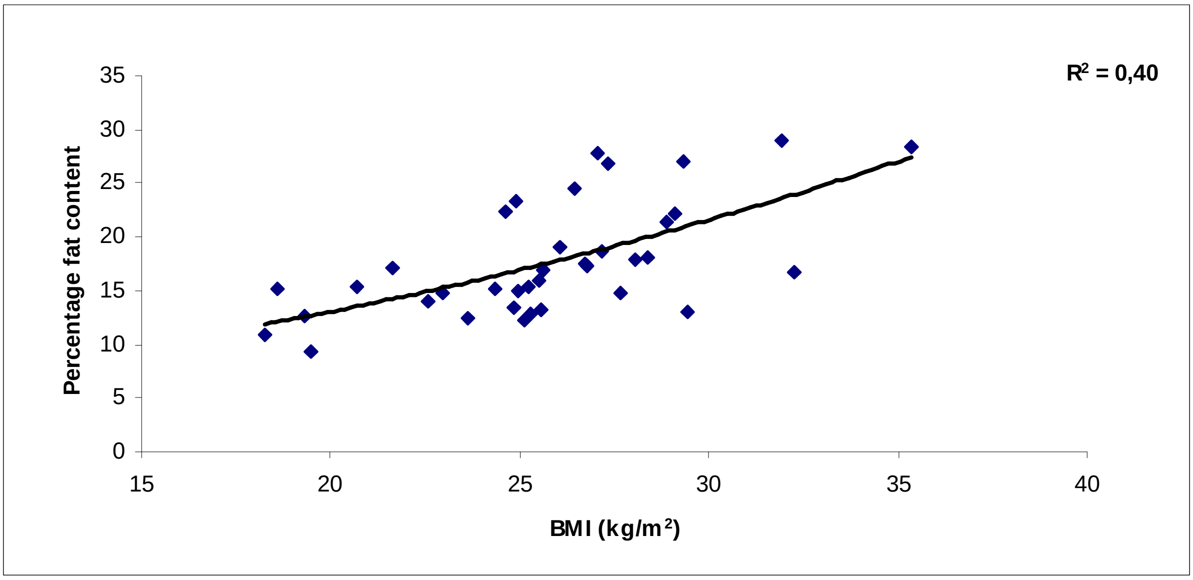


Fig. 2 The dependence of the percentage fat content on the BMI index in the training group

Analysis of the graph shows a slight tendency of increase of fat tissue content with the growth of BMI. However the correlation between analyzed variables is very poor. In the best fit there was obtained an indicator R^2 = 0,4. Results obtained point out that the growth of BMI in the group of men who trained, occurs not only through the increase of adipose tissue but also – and maybe foremost – muscle tissue.

Above results suggested that the relationship between fat content and age should be analyzed. In the group of physically inactive men there was observed a high correlation between measured values - older individuals have clearly more fat tissue, indicator R^2 for analyzed dependence equals 0,71. Described correlation is pictured in Figure 3. Completely otherwise the situation looks in the group training judo. The graph consists of a set of independent points. Best fit was obtained on the level of R^2 = 0,14, which confirms a complete lack of correlation between analyzed variables. Results obtained point rather to stabilized content of adipose tissue in the group of active men. This is confirmed by a finding, that the change in the value of BMI in the active group is caused mainly by the growth of muscle tissue, and not the content of fat .

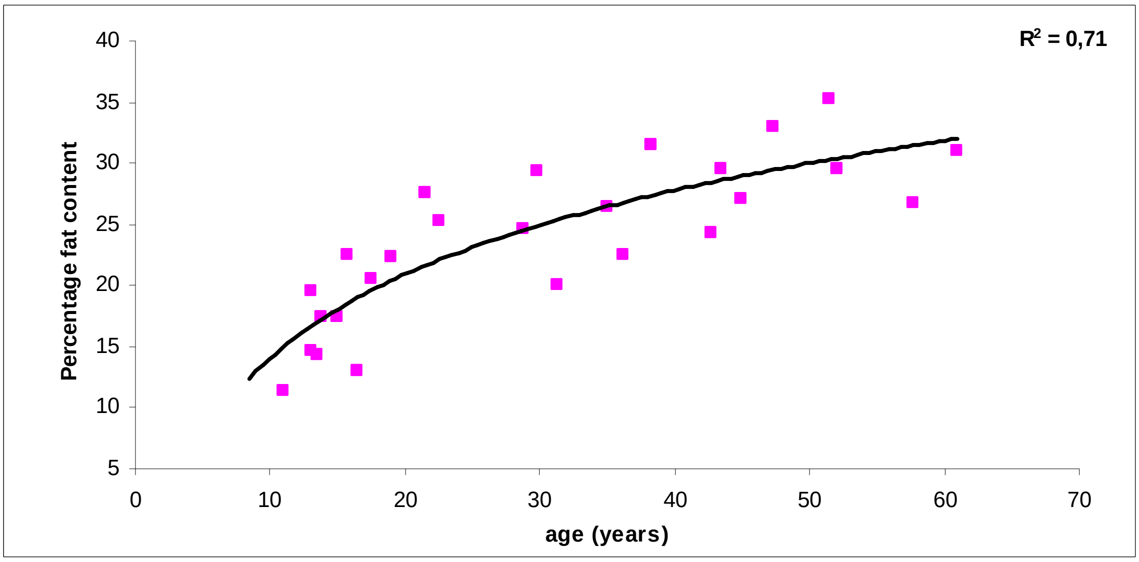


Fig. 3 The dependence of fat content on age in the inactive men group.

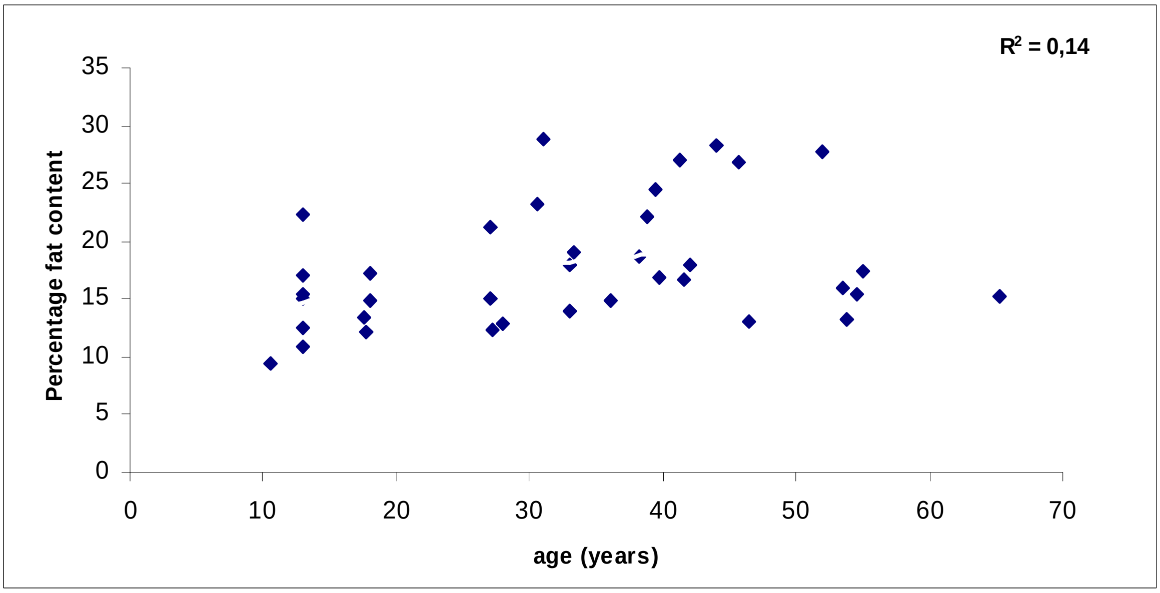


Fig. 4 dependence of fat content on age in the training judo men group.

In the next part of the analysis, correlation was sought between chest mobility and parameters obtained in spirometric tests. However, no dependence was found of the spirometric parameter on the chest movement index in both test groups. Fig. 5 shows a sample graph of vital capacity of the lungs versus the chest mobility of test men. Other parameters look similar in the function R.

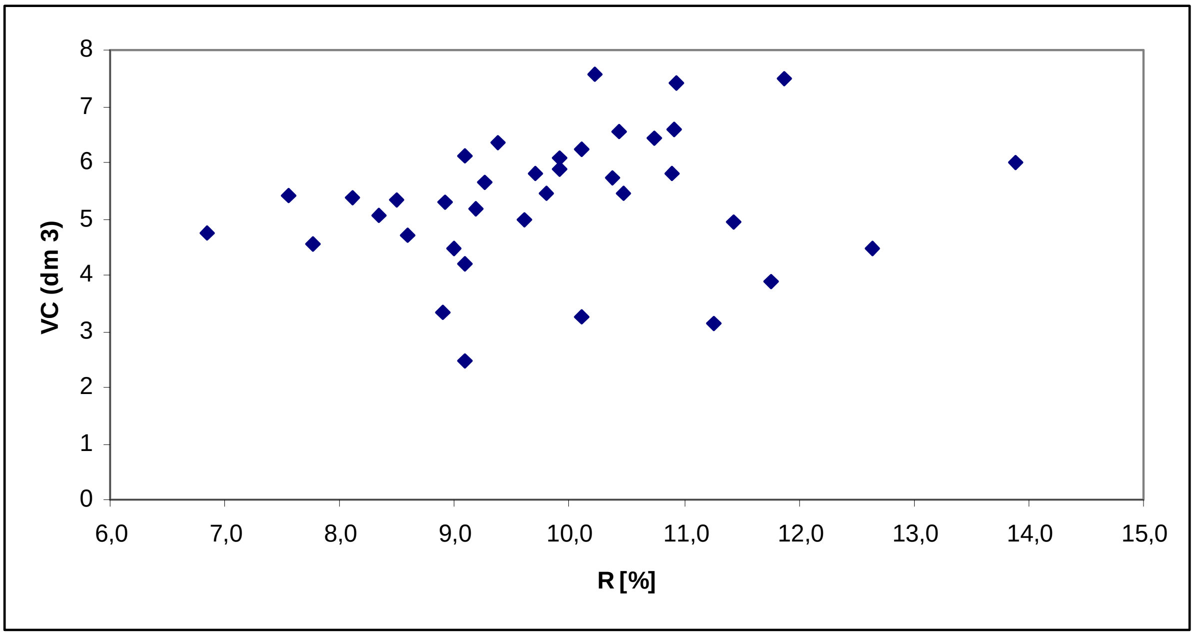
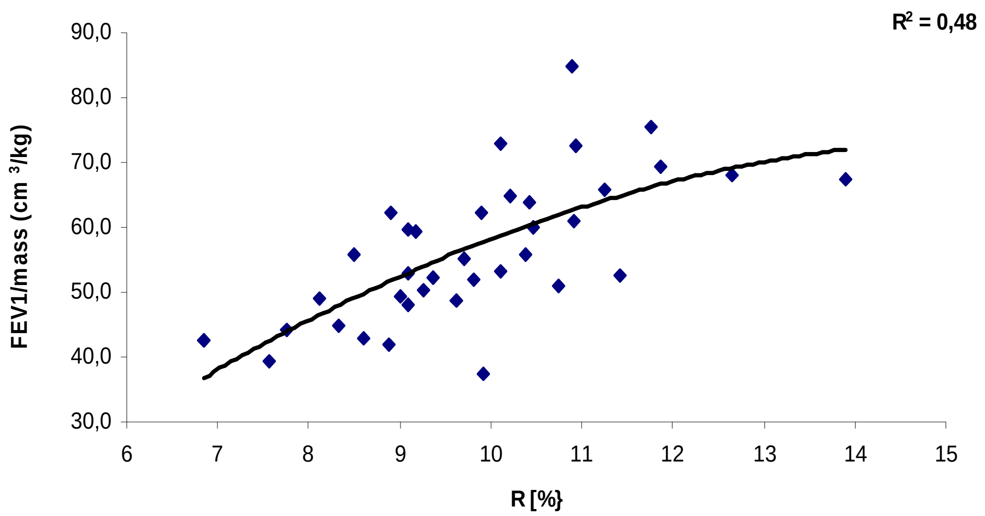
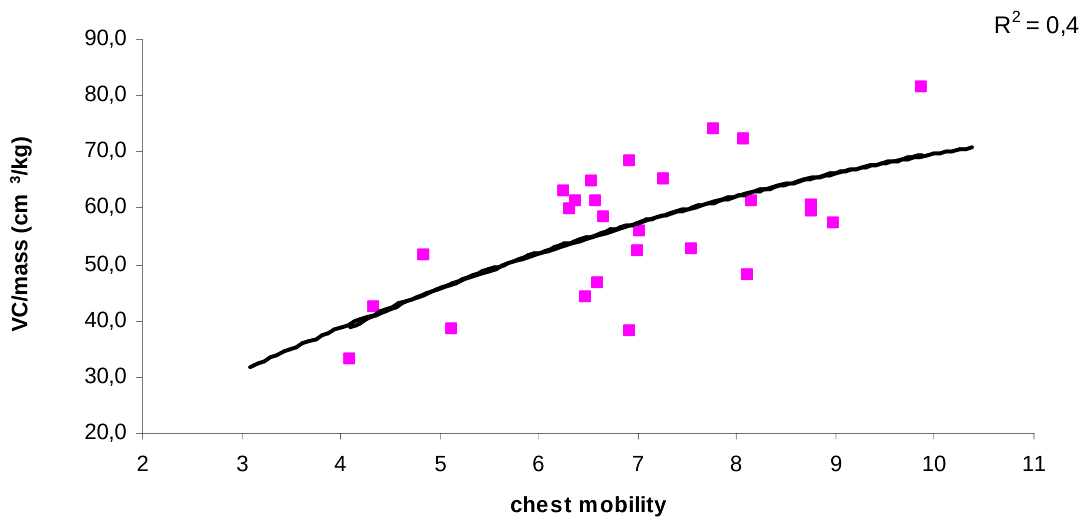


Fig. 5 The dependence of vital capacity on the percentage content of fat in the training judo group

With the absence of correlation of measured spirometric parameters and the chest mobility, it was checked if there existed a dependence of spirometric parameters per unit of body mass of the tested men on the chest movement index. However even here the maximum correlation obtained was R^2=0,48. Both between vital capacity per unit of mass and R as well as between FEV_1 per unit of the body mass and chest movement index, there was observed a growing correlation in the training judo group. However R^2 indexes in both cases do not exceed the value of 0,5. This is shown on graph 6a and 6b. In the group of physically inactive men results were not in any kind of correlation.



(a)



(b)

Fig. 6. The dependence of FEV_1 per unit of mass (a) and vital capacity per unit of body mass (b) on chest movement index in the active group of men

Obtained results suggest that chest mobility can be analyzed in the character of an wellness indicator, independent on spirometric parameters. This information is vital especially in the context of the easiness in measurement of chest movement index and ability of gaining data without access to a spirometer.

Introductory analysis of correlation of spirometric parameters, as well as absolute values as converted on a unit of body mass, and age of men, allowed the observation a series of curious correlations between two of the tested groups. However the limited capacity of this paper does not allow for an in-depth analysis of the topic. As an example there was chosen the correlation between the vital capacity per unit of mass and the age of the participants in both groups.

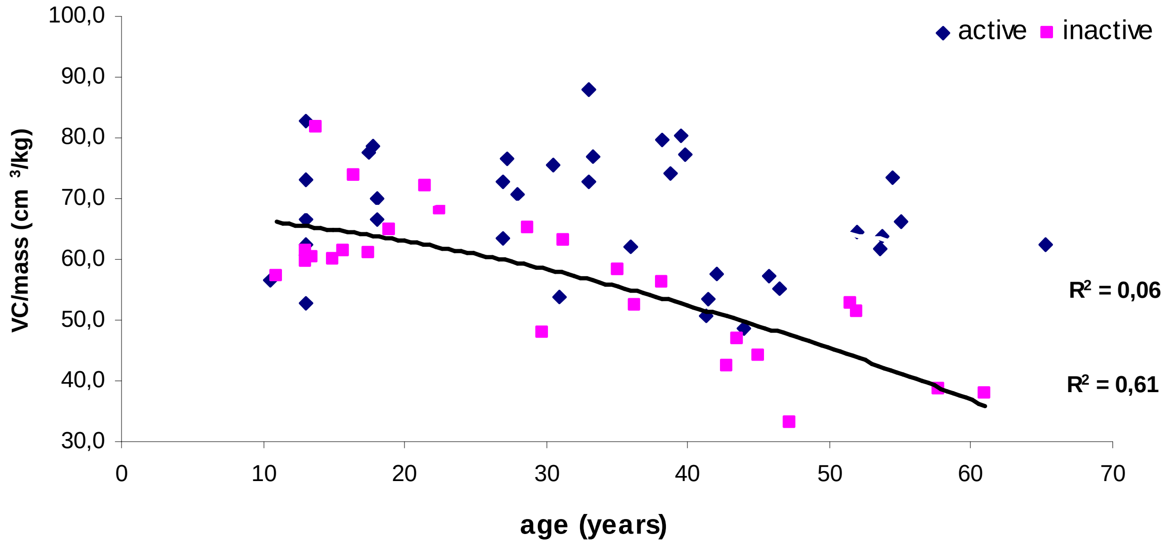


Fig. 7. Vital capacity per unit of mass versus the age of examined men in both groups.

On the above graph it can be seen that the distribution of points for the training judo group is random. R^2=0,06 shows a complete lack of correlation between analyzed parameters. In the inactive group there is a clear falling tendency with a high correlation R^2 = 0,61. It can be assumed that the amount of oxygen distributed in the organism can be noticeably smaller than that in the active group, and can fall with age. This situation can have a decisive impact on the worsening of the quality of life along with age and increase the risk of disease.

Discussion and conclusions:

As anthropometric data shows, both groups of men have been chosen with reference to their mass, height and age. No single person had suffered from diseases of the lungs in the past. Everybody declared good physical form during data collection. It can therefore be said that routine, daily exercise is an important factor that varies the tests. Analysis of obtained data, shows that in the active group BMI index growth is mainly connected with the growth of muscle tissue, because the percentage content of fat is not connected to the BMI. With the inactive group the situation is different - BMI growth is strongly connected with the increase of adipose tissues. It's amount in the tests grows with the age of the participants. It is useful to observe that all directly measured spirometric parameters and the content of fat in the active group differ noticeably from the values obtained from the inactive group. This is a significance that is sometimes at the level of p = 0,005. We can see that amateur judo exercises helps a healthy and proper functionality of the respiratory system and stops fat tissue growth. Lack of physical activity and fat tissue growth can lead to, with age, to a worsening quality of life, and increasing reluctance to an active family and social life.

Analysis of obtained data shows for practically no correlation between the chest mobility and the values of measured spirometric parameters. Because of this it's acknowledged that the chest movement index is a good independent parameter, being able to indicate the quality of life. It is necessary to point out here that similar findings were obtained in tests by female students of Kazimierz Wielki University in December 2009 [5].

Test of chest mobility are very easily conducted and do not require practically any specialized equipment. Therefore it would be of good use to conduct such tests in a large scale population to create normative values, i.e. appropriate to sex or age.

An important observation that came up from the research is occurrence of an increasing difference with age between the judo training group and the non active group. Lack of exercise is good for the growth of adipose tissue, and diminishes the proper functionality of the respiratory system with age, which can be the reason for the occurrence of diseases and a general downgrade of the quality of life. In light of obtained results attention should be payed to the popularization of doing exercises, especially for people above 40 years old. An excellent form of exercise that improves quality of life is amateur judo training.

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