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Poziom sprawności ukierunkowanej na zdrowie mężczyzn populacji Górnego Śląska

Streszczenie

Wstęp. W ostatnim czasie zmienia się pojmowanie sprawności fizycznej. Następuje odejście od ujmowania sprawności jako wyłącznie efektów motorycznych, wiążąc to pojęcie coraz bardziej z takim funkcjonowaniem ustroju, który byłby możliwie bliski dobrostanowi. Współczesna sedenteryjność stylu życia i jej efekt – spadek możliwości adaptacyjnych ustroju – wymagają środków kompensacyjnych w postaci zwiększonej aktywności ruchowej. Coraz powszechniejszy jest pogląd, że najefektywniejszym środkiem w realizacji potrzeb biologicznych ustroju jest aktywność ruchowa o charakterze sportowym.

Cel pracy. Celem pracy było określenie wpływu systematycznej aktywności ruchowej o charakterze sportowym na poziom sprawności, pojmowanej według H-RF, mężczyzn – mieszkańców Górnego Śląska.

Materiał i metody. Zbadano 175 mężczyzn w wieku 30-60 lat. Badania objęły pomiary morfologiczne i testy czynnościowe, których dobór był zgodny z przyjętym podejściem koncepcyjnym do sprawności. Wykonano pomiary: tętna spoczynkowego, masy ciała, procentowej zawartości tkanki tłuszczowej, obwodów talii i bioder. Testy motoryczne dotyczyły oceny poziomu wydolności, gibkości, siły mięśniowej oraz wybranych zdolności koordynacyjnych. Jako zmienną różnicującą badanych przyjęto systematyczną aktywność ruchową w wymiarze minimum raz w tygodniu, przez jedną godzinę.

Wyniki. Odnotowano różnice istotne statystycznie w zakresie większości badanych parametrów na korzyść osób aktywnych ruchowo. Różnice te dotyczyły tętna spoczynkowego, zawartości procentowej tkanki tłuszczowej, wskaźnika WHR, wydolności tlenowej, gibkości, wybranych parametrów siłowych oraz niektórych zdolności koordynacyjnych.

Wnioski. Aktywność ruchowa o charakterze sportowym – jako element stylu życia wydaje się być czynnikiem decydującym o poziomie sprawności ukierunkowanej na zdrowie. Ponieważ pojęcie sprawności dotyczy stanu, aktywności – procesu, z punktu widzenia profilaktyki zdrowotnej pożądane wydaje się być promowanie pojęcia aktywności ukierunkowanej na zdrowie.

Słowa kluczowe: poziom sprawności ukierunkowanej na zdrowie, aktywność fizyczna.

The level of health-related fitness in the male population of Upper Silesia

Summary

Introduction. In recent years the perception of body fitness has been changing. There is a move away from the concept of fitness seen only through its aspects of motor function towards the more and more prevalent view of fitness being related to such a functioning of the body which would be closest to its well-being. The contemporary sedentary life style and its effect, i.e. the decrease in the adaptive ability of the body, require a means of compensation in the form of increased physical activity. There is a more and more common view that the most effective means of meeting the biological needs of the body is the activity of a sporting nature.

The aim. The objective of the present paper was to specify the impact of a systematic physical activity of sporting nature on the level of fitness according to H-RF, men living in Upper Silesia.

Materials and methods. One hundred seventy five (175) men aged 30-60 were examined. The tests included morphological measurements and activity tests the choice of which was in compliance with the assumed conceptual approach towards fitness. The following measurements were taken: the static pulse, the body mass, percentage of fatty tissue, and the size of waist and hips. Motor tests encompassed the assessment of the functioning level, flexibility, muscular strength and selected coordination abilities. A regular physical activity with a minimum of one hour once a week was assumed as the variable differentiating the participants of the tests.

Results. Statistically significant differences were noted in the majority of the tested parameters to the advantage of the physically active persons. These differences regarded the static pulse, the fatty tissue, the WHR factor, the oxygen function, flexibility, the selected parameters of strength and some of the coordination abilities.

Conclusions. A physical activity of sporting nature as an element of one's life style seems to constitute a determining factor about the level of health-oriented fitness. As the concept of fitness pertains to the state of activity – a process, from the view point of health prevention, the promotion of the concept of health-oriented activity, seems desirable.

Key words: health-related fitness (H-RF), physical activity.

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INTRODUCTION

From historical perspective, the overall meaning of various motor skills was constantly changing. Evolution of motor aspects of human behaviour as well as more detailed characteristics of motor skills occurred as a consequence of civilization and technical development. Currently, excellent condition of all elements of the motor system (high-level physical activity) is no longer needed for survival of both the individual and general population. Professional skills and overall self-care activity impose different demands associated with physical activity [1]. These demands may be understood in terms of motor control as well as energy supply. A different fitness profile has been developed under the influence of contemporary existential needs. This situation has also found its reflection in conceptual approaches to physical fitness, where mechanic-biological points of view were criticized [2, 3].

Decreasing importance of high-level daily-living motor potential influences understanding of the fitness. A process of accent replacement is clearly noticeable, in which fitness is described not only by means of its motor effects (although not neglected), but in the first place as biological condition of the whole organism. This builds a foundation for the concept of Health-Related Fitness (H-RF) which individual components constitute functional factors conditioning a state of wellness or, in other words, of health [2, 4].

Irrespective of all associated concepts, the fitness is closely linked to physical activity. A decrease in functional demands of a daily-life facilitates hipokinesia [2, 5], which in turn introduces compensatory demands aiming to fulfil biological needs of the organism.

OBJECTIVE

The aim of the study was to investigate the influence of systematic sport physical activity on the level of fitness, as understood in frames of H-RF concept, in the male population of Upper Silesia.

MATERIAL AND METHODS

In the area of Upper Silesia (several bigger cities of the region) a sample of 175 men was recruited. A purposive sampling strategy was applied. The criteria was stated as follows: age between 30 and 60 years to provide a middle-aged sample and good overall state of health with no contraindications for motor testing and physical loading [6].

Within the concept of H-RF, condition of the circulatory and respiratory system as well as body composition (proportion of fat tissue) are considered to be the major factors influencing health [2]. Therefore our investigation included:

- Subjective examination during which information concerning health state and physical activity was collected.
- Measurement of the rest heart-rate (Polar S-20) after 10 min of lying supine.
- Measurement of body mass and composition (proportion of he fat tissue) using BIA method [7, 8]. A scales equipped with body composition analyser was used. Accuracy of the body mass measurement was 0.1 kg and of proportion of the fat tissue – 0.1% (reliability confirmed by multiple testing of the selected sub-group)
- Calculating Waist-Hip Ratio (WHR) coefficient based on measurements of waist and hip circumferences, which is commonly considered to be a reliable method describing fat tissue distribution [9]. Non-elastic measuring tape was used in this point.

Applied motor tests investigated: level of selected coordination skills, flexibility, muscle strength and physical capacity. All applied after short warm-up, they were:

- Test for static equilibrium – Flaming Test [10, 11]. The task is to maintain balance when standing on one limb on standardized narrow wooden beam (the foot of the opposite extremity is kept in individual's hand behind the buttock). Number of trials needed to complete the total time of 1 min of standing is registered.
- Test for speed of the motor reaction – Ditrich's stick grip [10, 11]. Five trial were allowed, the best and the worst results were neglected, three other were included into further analysis.
- Test for flexibility – the range of lateral bends of the trunk was measured by means of the difference in distances between the middle finger and the ground when standing upright and when fully bent. Three trials were performed and mean result was analysed.
- Test for muscle strength – isometric grip of the hand-held dynamometer (CMS-2) was used in upright position with arm hanging freely parallel to the trunk [10]. The outcome was divided by body mass in order to obtain normalised values. Mean value of the two trials were analysed for both left and right extremity. Accuracy of this measurement was 0.1 kG.
- Indirect test for physical capacity – VO_{2max}) {ml/kg*min} was the parameter subjected to analysis.

STATISTICAL ANALYSIS INCLUDED:

1. Calculation of descriptive statistics: mean values and standard deviations.
2. Comparison of the selected parameters and coefficients in groups defined by health state criterions.
3. One-way analysis of variance followed by post hoc Tukey's test. Alternatively, in case of non-normal distribution of the data Kruskal-Wallis Anova was applied.

Statistical significance level was set at 0.05.

The level of sport physical activity was served as independent variable. The individual was considered to be an active person when he was spending at least one hour per week performing any kind sport. This information has been obtained during subjective examination.

RESULTS

After subjective examination 106 men were classified as active, 69 – as non-active. In the group of active men 14 (13.21%) had trainings once per week, 21 (19.81%) – two times per week, 31 (29.25%) – three times per week, and 40 (37.74%) – more than three times per week.

1. Body mass and associated parameters.

In this point body mass, BMI coefficient, WHR coefficient and proportion of the fat tissue were subjected to analysis. Analysis of variance showed significant outcomes: p=0.000. Descriptive statistics are shown in the Table 1.

TABLE 1. Body mass and associated parameters.

Subjects		Body mass (kg)	BMI (kg/m^2)	%FAT	WHR
Active	**x**	**82.13**	**26.22**	**23.97**	**0.90**
	SD	13.40	3.54	5.82	0.05
Non-active					
	x	**81.81**	**26.85**	**26.22**	**0.95**
	SD	14.28	4.30	6.29	0.07

No difference was registered between active and non-active men in the Tukey's test as far as body mass is concerned: p=0.893. This parameter was also compared with Polish standards concerning recommended body mass according to Tatoń [13]. Results are shown in Figure 1.

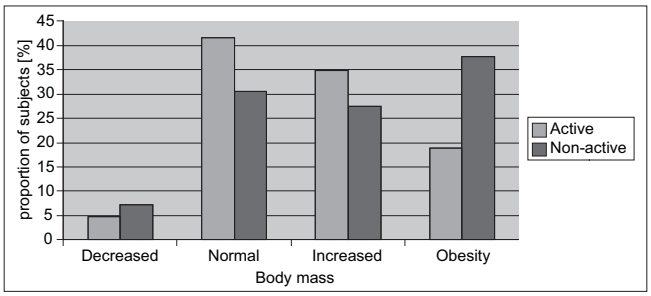

FIGURE 1. Qualitative evaluation of the body mass.

No significant difference was found in case of BMI coefficient as well: p= 0,334. Comparative analysis using criteria of World Health Organization (WHO) [14] is presented in Figure 2.

Proportion of the fat tissue in body composition was different In the two groups: p=0.028. Comparison with WHO standards [14] is shown in Figure 3.

Statistical analysis showed also significant differentiation in values of WHR coefficient: p= 0,000 in Tukey's test. Comparison with WHO standards [14] is presented in Figure 4.

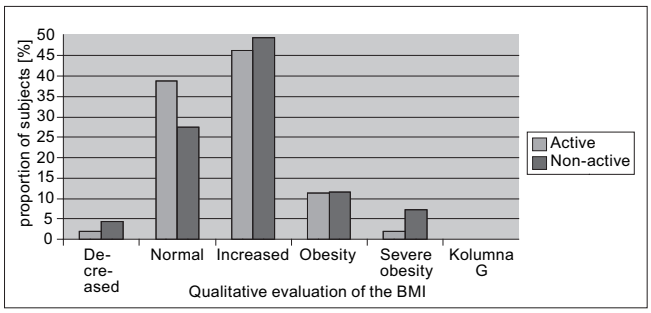

FIGURE 2. Qualitative evaluation of the Body Mass Index.

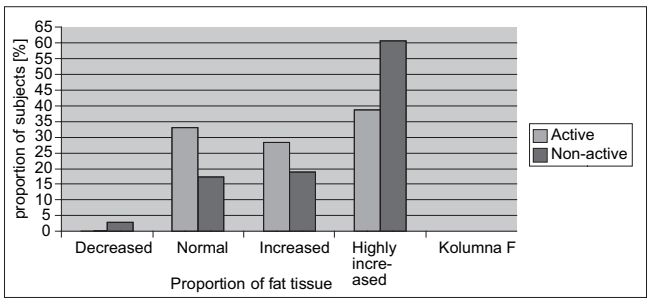

FIGURE 3. Qualitative evaluation of fat tissue proportion.

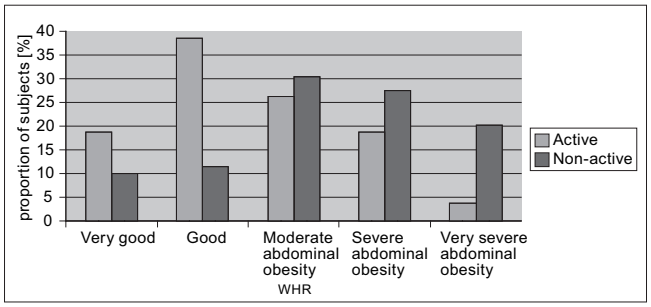

FIGURE 4. Qualitative evaluation of the Waist-Hip Ratio.

2. Functional and motor parameters.

During the next stage of the analysis functional and motor parameters were taken into consideration. Descriptive statistics on the group of active and the group of non-active men are presented in Table 2.

Levels of statistical significance for inter-group differences of all abovementioned parameters are presented in Table 3.

TABLE 2. Functional and motor parameters.

Subjects		Heart-rate at rest (beat/min)	Speed of motor reaction (cm)*	Flexibility (cm)		Static equilibrium (Number/min)	Muscles strength (normalised) (Kg/kg)		VO_{2max} (ml/kg*min)
				Left	Right		Left	Right	
Active	x	66.1	20.72	30.06	30.09	14.14	0.58	0.61	38.9
	SD	11.2	3.27	7.32	7.51	5.56	0.10	0.10	10.03
Non-active	x	73.6	21.91	26.23	26.37	17.45	0.57	0.59	30.4
	SD	10.9	4.47	5.50	5.62	6.09	0.11	0.11	8.18

* due to practical reasons the results are show in cm.

TABLE 3. Levels of statistical significance for inter-group differences.

Parameter	P
Heart-rate at rest	0.000*
Speed of motor reaction	0.045*
Flexibility – left	0.001*
Flexibility – right	0.001*
Static equilibrium	0.001*
Normalised muscle strength – left	0.435
Normalised muscle strength – right	0.496
Physical capacity	0.000*

* statistically significant.

The level of physical capacity measured with use was compared with American Heart Association (AHA) standards [15]. Proportions of subjects in individual categories are presented in Figure 5.

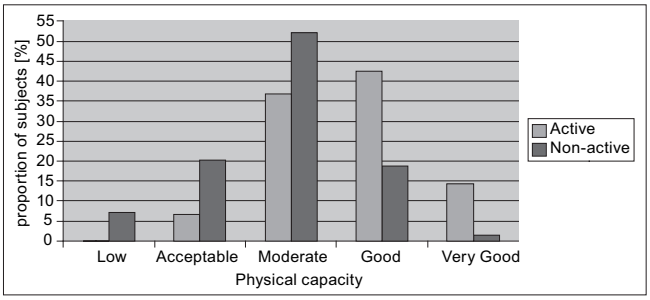

FIGURE 5. Physical capacity according to AHA.

DISCUSSION

Contemporary share of physical activity in fulfilling most urgent existential demands decreases. At the same time, biological system of human organism requires constant motor stimulation. Such contradictory needs constitute a source for problems of preventive and compensatory character. Physical loading of the organism at leisure may however be useful antidote to these problems.

An opinion exists that only efforts of specific level of their intensity repeated several times a week (or even every day) may play a role in prevention [16-19]. Recommended levels of intensity may be however met only by activity of sport character.

All statements mentioned above find their reflections in conceptual sphere concerning physical fitness. The modern behavioural-biological concept (*'…a man can and wants to perform a motor task'*) as well as idea of H-RF directly link fitness with health [2]. In H-RF conception the major attention is paid for cardio-pulmonary diseases. This is mainly rooted in statistics showing that circulatory problems are the most common causes of death. Risk factors for such diseases, and many other, include obesity, especially abdominal. Dominating position of body mass and associated parameters in concept of fitness is obvious. Therefore, these parameters should create a foundation for tests evaluating fitness.

Other conceptions emphasize slightly different components of fitness. The behavioural-cultural approach (*'a man is fit, a man is resourceful'*) shows the ability of facing all life challenges (expected and unexpected) as the most respected virtue. This is however hard to imagine with poor health state. To meet such demand it must exceed current functional needs. The contemporary civilisation does not provide challenges of high standard which finally results in relatively low or moderate level of fitness.

The definition of the independent variable used in the presented study described the minimal level of fitness allowing inclusion to the group of active men. In fact, this it was much higher in the active group, similar to recommendations mentioned above.

In the analysis we were able to demonstrate significant inter-group differences in fat tissue distribution and WHR coefficient, again – favouring active men. At the same time, no difference was showed as far as body mass and BMI are concerned. This indicates that isolated evaluation of body mass and BMI are not sufficient for diagnosing health-related demands [9, 20, 21]. It is also worthy emphasizing that the active group contained higher percentage of men showing normal body mass and BMI and lower share of obese and severely obese subjects. Therefore, the role of systematic physical activity in shaping parameters associated with the mass of the body (especially fat tissue concentration and distribution), which are commonly considered to be risk factors for civilisation diseases, cannot be questioned. It should be also mentioned that percentage of subjects showing increased body mass, obesity and abdominal obesity was relatively high in the group of active men (although lower than for non-active). This induces questions concerning associations between physical activity and diet and leads to the conclusion that along with activity the optimal diet should also be considered.

In the light of presented research systematic physical activity is crucial for the level of motor skill. Taking into consideration the conception of H-RF the position of physical activity is exceptional – it positively influences physical capacity and therefore – cardiopulmonary function. This statement finds also its evidence in our results showing significant difference in resting heart-rate favoring active subjects. Treating this finding with due caution (high individual variation), in general population it may well serve as a descriptor of overall physical capacity.

Sport physical activity occurs to be a factor determining flexibility, speed of motor reaction and static equilibrium. No significant difference was demonstrated in case of muscle strength for both upper extremities. The dynamometer testing is commonly being included into batteries of motor tests, however this method may be questioned in the light of our results since the most common forms of physical activity – jogging, cycling, swimming, football, basketball, volleyball – do not influence muscles acting during this test in a considerable degree. Moreover, the relative size of the hand may also be a vital factor [3]. Debate may also be started around the role of these muscles in the structure of physical fitness, as it is understood in frames of H-RF concept.

Together with development of the idea of H-RF, a need for creating useful diagnostic tools has also appeared [2, 4]. Any proposals in this field will surely lead to excessive debates and arguments. Our research may be perceived as a step taken into this direction, although authors are fully aware of possible criticism concerning e.g. the importance

of the speed of motor reaction or ability to maintain global equilibrium for human health. On the other hand, it is hard to claim that high level of such skills stays in opposition to the concepts of health and wellbeing. Satisfaction arising from successfully completed motor task may add to individual's self-confidence and therefore turn into a vital factor determining the feeling of wellness, which is in fact synonyms with good health [22].

CONCLUSIONS

1. Sport physical activity is crucial for physical fitness, as understood by the conception of H-RF.
2. Fitness is a term concerning a state, activity is more a process which influences the level of fitness. In health-related dimension the process – activity as a component of individual's lifestyle – seems to be superior to the state.
3. Isolated physical activity, even if appropriate, is not sufficient for energy balance optimization. It must be always associated with a proper diet.

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