The relationship between physical activity and the prevalence of disabilities caused by back pain in men over 60 years of age

Aktywność fizyczna a występowanie niepełnosprawności spowodowanej bólem kręgosłupa u mężczyzn po 60 roku życia

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A – preparing concepts
B – formulating methods
C – conducting research
D – processing results
E – interpretation and conclusions
F – editing the final version

Abstract

Introduction: Regular physical activity adapted to the current state of health is a priority in successful ageing. Older people want to remain fully independent for as long as possible. In the elderly, revolutionary changes in body structure and posture are taking place. Back pain is a common problem in the elderly and an important factor limiting life activity. Despite the many benefits of physical activity, its effect on the prevention of back pain has not been clearly demonstrated and contradictory information can be found in the literature. The aim of the study was to assess the physical activity of men over 60 years of age and to verify its relation with the occurrence of spinal pain.

Material and methods: The study included 30 men aged 62-86 years, participants of the university of the third age. Somatic parameters (BH, BM, WC, FAT%, BMI, WHR) were evaluated. Physical activity measured by the number of steps per week. The incidence of spinal pain was assessed using the Oswestra questionnaire.

Results: Overweight and obesity were over 80%, while abdominal obesity occurred in 67%. Most men had a sedentary lifestyle or low physical activity. The Oswestra questionnaire showed that 56% of the men surveyed had a mediocre and total disability.

Conclusions: The majority of men were characterized by excess body weight and low physical activity, and the relationship between these variables was clear. The low and

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weak correlation between spinal pain and physical activity and somatic parameters, as shown in the studies, leads to the search for factors with a greater impact.

Key words: **physical activity, back pain, older people**

Streszczenie

Wstęp: Regularna aktywność fizyczna dostosowana do aktualnego stanu zdrowia ma znaczenie priorytetowe w pomyślnym starzeniu. Osoby starsze chcą pozostać w pełni samodzielne jak najdłużej. U osób starszych dochodzi do zmian inwolucyjnych w budowie i postawie ciała. Bóle kręgosłupa są powszechnym problemem u osób starszych i ważnym czynnikiem ograniczającym aktywność życiową. Pomimo wielu korzyści, jakie niesie aktywność fizyczna, nie wykazano jednoznacznie jej wpływu na zapobieganie bólom kręgosłupa a w literaturze tematu znaleźć można sprzeczne informacje. Celem badań była ocena aktywności fizycznej mężczyzn po 60 roku życia oraz weryfikacja jej związku z występowaniem bólów kręgosłupa.

Materiał i metody: Badaniami objęto 30 mężczyzn w wieku 62-86 lat, uczestników uniwersytetu trzeciego wieku. Ocenie poddano parametry somatyczne (BH, BM, WC, FAT%, BMI, WHR). Aktywność fizyczną mierzoną tygodniową liczbą kroków. Występowanie bólów kręgosłupa oceniono kwestionariuszem Oswestry.

Wyniki: Nadwaga i otyłość cechowała ponad 80%, u 67% wystąpiła otyłość brzuszna. Większość mężczyzn cechował siedzący tryb życia bądź niska aktywność fizyczna. Kwestionariusz Oswestry wykazał, iż 56% badanych mężczyzn cechowała niepełnosprawność mierna i całkowita.

Wnioski: Badani mężczyźni cechowali się w większości nadmiarem masy ciała i niską aktywnością fizyczną, a związek między tymi zmiennymi był wyraźny. Wykazany w badaniach nikły i słaby związek bólów kręgosłupa z aktywnością fizyczną i parametrami somatycznymi skłania do poszukiwania czynników o większym wpływie oddziaływania.

Słowa kluczowe: **aktywność fizyczna, ból kręgosłupa, osoby starsze**

Introduction

Regular physical activity adapted to the current state of one's health is a priority for optimal aging. Regular physical activity should be a fundamental component of all preventive and rehabilitation procedures regardless of the health status and physical fitness of elderly individuals [1]. Seniors want to maintain full independence, develop their interests and serve important roles in a society for as long as possible [2]. Health prevention measures, including physical activity, are factors conducive to healthy ageing. Insufficient physical activity may hasten the inevitable alterations in body build (overweight, abdominal obesity) and body posture (exaggerated spinal curves, anterior shift of the center of gravity, disorders of sacroiliac joint area) that lead to imbalances in the musculoskeletal system and may cause spinal dysfunction and related pain [3]. Back pain is a common problem among senior individuals and it constitutes an important factor which limits everyday activity [4]. Despite numerous benefits which physical activity brings, its role in preventing back pain has not been unequivocally proved and contrary findings can be found in the literature of the subject [5-7].

The aim of the study was to assess physical activity among men over 60 years of age and to verify its relationship with disability caused by back pain.

Material and method

The study included 30 professionally inactive men aged 62-86 (average 70 years). They were randomly selected students of the three universities of the third age located in Katowice. They participated in different classes (studying English, occupational therapy, playing instruments) in accordance with their interests. Only two men participated in sports classes (swimming) regularly. The inclusion criteria were as follows: age over 60, consent to participate in the study, positive results of the pedometer test. The following exclusion criteria were applied: medical contraindications, diseases limiting daily physical activity.

A direct observation method and diagnostic poll method were applied.

The following somatic parameters were assessed:

- body height (BH),
- body mass (BM) – Tanita (TBF-300M),
- waist circumference (WC) – measured in the middle of the distance between a bottom edge of the rib cage and an upper edge of the iliac crest [8],
- hip circumference (HC) – measured at the widest part of the gluteal muscle below the wings of ilium [8] ,
- body fat percentage (%FAT) – assessed with the use of bioelectrical impedance (Tanita TBF-300M).

BMI (Body Mass Index) and WHR (waist-to-hip ratio) were calculated. The following norms were applied for the assessed variables:

- waist circumference ≥94 cm [8],
- %FAT 12-25% [9],
- BMI 17-18.49 kg/m^2 – underweight; 24.9-29.9 kg/m^2 – overweight; > 30 obesity [10],
- WHR ≥ 0.90 [8].

Physical activity was assessed with the use of Yamax Inc. Japan pedometers. The study participants were instructed on how to use the pedometers. They were attached at the anterior superior iliac spine of the right lower limb with the use of an integral strap. The participants were asked to complete the table with the data from the pedometer every evening before going to bed. Daily number of steps (NS) was registered for 7 consecutive days. The following norms put forward by Tudor-Locke et al. [11] were applied:

<5000 steps/day – sedentary lifestyle;
5000-7499 – low-intensity physical activity;
>7500-9999 steps/day – active lifestyle.

The Oswestry Disability Index was used to assess the level of disability caused by back pain [12, 13]. The questionnaire includes 10 questions, where a maximal number of points is 50. The disabilities are classified according to the following scale: 0-4 points – no disability, 5-14 points – minimal disability, 15-24 points – moderate disability, 25-34 points – severe disability, > 35 points – total disability [13].

Statistical analysis

_For the quantitative variables, arithmetic means ($\bar{x}$), standard deviations (sd), minimum values (min), maximum values (max), medians and the coefficient of variation V(x) were calculated. It was also verified whether the variables were normally distributed (Kolmogorov-Smirnov test). The results of the measurements of physical activity levels and the results of the Oswestry questionnaire were classified in accordance with the norms. The relationship between physical activity, the Oswestry questionnaire and markers of overweight and obesity (WC, %FAT, BMI, WHR) was examined (Spearman's rank correlation coefficient). The correlation was classified according to J.Guilford. Statistical significance was set at $p \leq 0.05$. Statistical analysis was performed with the use of STATISTICA 12.5 software (StatSoft Poland).

Results

The research revealed that the majority of men had markers of overweight and obesity above the norms (WC-67%, %FAT-70%, BMI-83%, WHR-87%) (Tab. 1).

Tab. 1. Somatic parameters of the examined men

Somatic parameters	Mean	SD	Min-max	Median	Coefficient of variability	% of the participants above the norm
Age (years)	70	6	62-86	68.50	8.67	
BH (m)	1.71	0.06	1.59- 1.80	1.70	3.26	
BM (kg)	85.4	15.7	58-122	84.50	18.4	
WC (m)	1.02	0.145	0.78- 1.34	1.00	14.11	67%
FAT (%)	25.3	7.5	9.5- 39.0	25.05	29.6	70%
BMI (kg/m²)	29.3	5.00	20.4- 41.3	28.45	17.05	83%
WHR	0.97	0.08	0.8- 1.15	0.96	7.87	87%

The majority of men demonstrated low levels of physical activity (47%) or a sedentary lifestyle (23%), while the recommended level of physical activity was noted in 30% of the men (Fig.1).

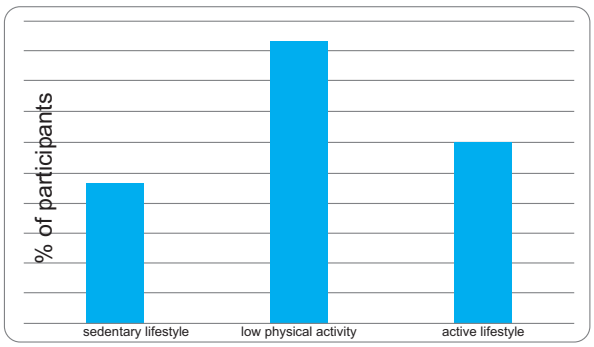

Fig. 1. Physical activity of the examined men

The analysis of the Oswestry questionnaire revealed that 47% of the men had minimal disability, 40% demonstrated moderate disability, while 10% reported severe disability. There were no participants without any disability caused by back pain (Fig. 2).

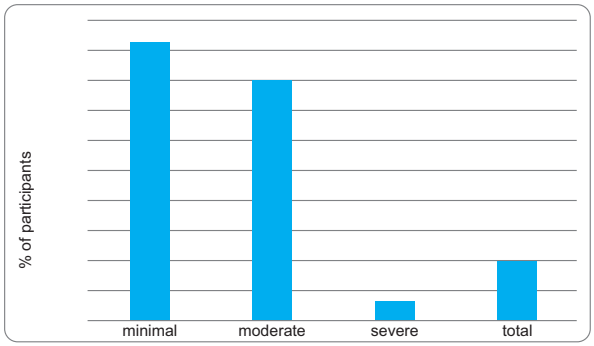

Fig. 2. The degree of disability in the examined men according to the Oswestry questionnaire

No correlation was found between physical activity and the Oswestry questionnaire. In turn, average positive correlations between the results of the Oswestry questionnaire and overweight and obesity markers as well as negative, high and average correlations between physical activity and overweight and obesity markers were found (Tab. 2).

Tab. 2. Correlations between the assessed variables

Variables	WC	% FAT	BMI	WHR	Oswestry Questionnaire
Oswestry Questionnaire	r= 0.47 p= 0.009	r= 0.43 p = 0.018	r= 0.35 p = 0.057	r= 0.42 p = 0.02	
Physical activity	r= -0.62 p= 0.0002	r= -0.43 p = 0.01	r= -0.56 p = 0.001	r= -0.60 p = 0.0003	r= -0.03 p = 0.098

Discussion

Physical activity properly adapted to age and functional ability enables elderly individuals to maintain their physical and mental fitness, which allows for optimal functioning and helps prolongs an active independent life [14]. Physical activity may serve both preventive and rehabilitation functions. Physical exercises may be treated as interventions aimed at maintaining or improving general psychomotor fitness or as a form of treatment of diseases, injuries and/or states of fatigue [15]. Regular physical activity may mediate the process of normal aging, which positively affects well-being and life quality [15, 16]. Elderly men with higher levels of physical activity demonstrated higher physical fitness levels and lower motor disability levels than their less active counterparts [17, 18]. It has also been documented that every additional 15 minutes of daily physical activity reduced all-cause mortality by 4% [19].

Despite the documented significance of physical activity for good aging, the present study revealed that the majority of men (70%) did not lead an active lifestyle. Only 30% of the study participants reported being engaged in recommended levels of physical activity. Our study supported the findings in the literature that men over 60 years of age tend to exhibit low levels of physical activity [20-23].

Moreover, it was revealed that the majority of the men were overweight or obese, which is indicated by the number of the study participants whose overweight and obesity markers were above the norms (WC–67%; FAT%-70; BMI–83%; WHR-87%). Other authors have also pointed to a common occurrence of overweight and obesity among elderly individuals [24-26]. Our research revealed high negative correlations between physical activity and WC, BMI and WHR as well as average negative correlations with %FAT. The results of other studies on this subject are unequivocal. Several

papers confirmed a negative relationship between physical activity and BMI, WC and fat mass [27, 28], while Manini et al. [29] revealed that higher energy expenditure is related to higher total body mass and fat-free body mass but it is not connected with fat mass. Despite the fact that BMI tends to decrease after the age of 75 [30], abdominal obesity increases with age [31] and leads to an increase in metabolic risk regardless of BMI [32]. In our study, the majority of the men had an increased WC and abdominal obesity, which is an alarming issue and should encourage these men to monitor their health state on a regular basis.

The present study revealed a significant correlation between disability caused by back pain and all obesity markers. This finding is similar to the results reported by other researchers who concluded that higher BMI constituted a back-pain risk factor [33-35]. In the strategies of preventing back pain, a significant role is attributed to physical activity and the majority of studies indicate a significant correlation between physical activity and back pain [36-39]. However, our research did not confirm such a relationship. No correlation was found between a higher level of physical activity and a lower degree of disability. It is in line with the findings of the study the research by Bousema et al. [40], who noted that it is not possible to confirm the assumption that individuals with low back pain and with a high level of disability demonstrated a low level of physical activity. Moreover, a review of literature showed that the level of physical activity among persons with chronic back pain was similar to the level of physical activity among healthy individuals [41].

In our research, 87% of the participants had minimal or moderate disability caused by back pain, while 10% of the men had total disability. There were no participants who would have no disability. Spinal pain and dysfunction syndrome are more and more often perceived as a lifestyle disease, since low back pain constitutes one of the most common reasons for visiting a doctor [42]. Rubin [43] concluded that these problems are experienced by 50-80% of the population at some point in their life and the prevalence increases with age [44]. Rehabilitation plays a significant role in treating back pain syndromes and the effectiveness of conservative treatment methods is estimated to be at the level of 70-80% [45]. A properly selected type of movement, i.e. specific or directed movement, is recommended in the case of pain syndrome, while general physical exercises play a preventive role. Such an attitude is encouraged by the European Commission in their Guidelines for the Management of Low Back Pain in Europe (Working Group B13 European Cooperation in the field of Scientific and Technical Research – COST). In our study, physical activity was assessed only with the number of steps, which seems to be insufficient to determine its correlation with disabilities caused by back pain.

Study limitations and recommendations

This was a small study using a sample of convenience. Further research should focus on a broader group including the age category of men over 60. Analysis of muscle mass would enable researchers to see a bigger picture. Moreover, the lack of correlations between physical activity assessed with the number of steps and the results of the Oswestry questionnaire shows that further research should also consider the type of physical activity.

Conclusions

The majority of the examined men had excessive body mass and demonstrated low levels of physical activity, and the correlation between these two variables was clear. Disability resulting from back pain correlated significantly with all the markers of obesity but there was no correlation with physical activity. It seems that assessing physical activity with the number of steps is insufficient in the context of the present study.

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