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Barriers of physical activity (kinesiophobia) in patients subjected to cardiac rehabilitation

Authors' Contribution:
A – Study Design
B – Data Collection
C – Statistical Analysis
D – Data Interpretation
E – Manuscript Preparation
F – Literature Search
G – Funds Collection

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Key words: *kinesiophobia, fear of movement, barrier of physical activity, cardiac rehabilitation*

Abstract

Background: *Comprehensive cardiac rehabilitation (CR) is a process designed to restore full physical, psychological and social activity and to reduce cardiovascular risk factors. Fear of movement may contribute to the occurrence and intensification of hypokinesia, and consequently affect the effectiveness of therapy. The aim of the study was to determine the level of barriers of physical activity in patients undergoing cardiac rehabilitation. The relationship between selected determinants (age and health self-assessment) and the kinesiophobia level were also examined.*

Material/Methods: *115 people aged 40-84 years were examined: 50 females (x = 63.46; SD = 11.19) and 65 males (x = 64.65; SD = 10.59) – patients undergoing cardiac rehabilitation at the Upper-Silesian Medical Centre in Katowice. In the present study, the Polish version of questionnaires: Kinesiophobia Causes Scale (KCS) and Short Form Health Survey (SF-36) were used. Questionnaires were supplemented by authors' short survey.*

Results: *The patients presented an elevated level of kinesiophobia, both in general as well as in individual components. In women, the kinesiophobia level was higher than in men. The psychological domain was a greater barrier of physical activity than the biological one. Strong, negative correlations of psychological and biological domains of kinesiophobia to physical functioning (SF-36) were noted in women. In the case of men, correlations were weaker, but also statistically significant.*

Conclusions: *1. Sex differentiates patients in their kinesiophobia level*
2. Poor self-assessment of health is associated with a greater intensification of kinesiophobia
3. A high level of kinesiophobia may negatively affect cardiac rehabilitation process

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Introduction

Progressive, rapid development of civilization – together with an increasing use of modern technology leads to a decrease in daily physical activity levels. According to the World Health Organization (WHO), 60 to 85% of people in the world – from both developed and developing countries – lead sedentary lifestyles, which is a one of the most serious problems of public health [1]. The problem of insufficient physical activity also concerns Poland. Research carried out within the WOBASZ project (*Polish Multi-centre Population Health Survey*) indicates that 50-60% of Polish adults are characterised by low levels of physical activity. This applies particularly to women, residents of large metropolitan areas and people with low socio-economic status [2]. Sedentary lifestyle carries a serious implications for health. Hypokinesia is considered as one of the four leading risk factors of diseases occurrence, premature death and disability in the world [3]. Data from WHO estimate that approximately 3.2 million deaths each year are caused by insufficient physical activity [4], which represents almost 3.5% of all deaths

The purpose of the secondary prevention is to modify or eliminate cardiac diseases risk factors, including insufficient physical activity level. [5]. Epidemiological studies have provided a convincing evidence about the importance of physical activity in the cardiac rehabilitation process. Regular physical exercise not only relieves the symptoms of heart disease, but significantly reduces mortality [6]. Data from literature shows that a well-conducted movement therapy reduces the risk of death by 20-25%, which is comparable to the effects of drugs that are commonly used for heart disease [7, 8]. Comprehensive cardiac rehabilitation also decreases a number of sudden cardiac deaths by about almost 35% during the first year after myocardial infarction [9].

Lifestyle and associated with this physical activity level are consequences of each person's individual preferences. It can be a result of biological conditions associated with health, social factors associated with physical activity of people in a similar age group or psychological factors on physical activity habits during childhood [10]. The fact that physical inactivity is rarely perceived by Poles as a risk factor for cardiovascular disease is also worth noting [11]. Many patients undergoing cardiac rehabilitation have never regularly exercised before, they have no habit or need of activity and get discouraged from it very quickly [12].

The problem of physical inactivity is complex [13, 14]. Both biological and psychosocial factors are reflected in shaping of hypokinetic attitudes. This raises doubts about to the original definition of kinesiophobia (fear of movement) which unambiguously links it with pain. The identification of causes of physical inactivity and determining the barriers of physical activity may constitute an important element of cardiac rehabilitation process, which improves its effectivity and decreases the risk of cardiac incident in the future. This was the inspiration to undertake the research presented here.

Material and methods

115 people aged 40-84 years were examined: 50 females (mean age = 63.46; SD = 11.19) and 65 males (mean age = 64.65; SD = 10.59). These were patients with ischemic cardiac disease (ICD), after myocardial infarction (MI) and after cardiac surgery interventions (implantation of a pacemaker, coronary angioplasty, coronary artery bypass grafting) – undergoing cardiac rehabilitation at an early stage in the Upper-Silesian Medical Centre in Katowice.

In this study, the Polish version of questionnaires: KCS (Kinesiophobia Causes Scale) [15, 16] and SF-36 (*Short Form Health Survey*) [17] were used. Both questionnaires were supplemented by data about gender, age and type of diseases.

KCS is used to diagnose and identify the causes of motor passivity. The questionnaire consist of 20 closed questions, assessed in a range from 0 to 100 – a higher score indicating a higher fear of movement. Kinesiophobia factors are grouped into two domains. The biological domain (BD) is an average of values of: morphological parameters, an individual need for stimulation, energetic resources, the power of biological drives. The psychological domain (PD) is an average of values of: self-acceptance, self-assessment of motor predispositions, the state of mind and susceptibility to social influence. The total score of kinesiophobia (KCS) is an average value of BD and PD [15, 16].

SF-36 is a widely used tool to measure health self-assessment, or more precisely – health-related quality of life (HRQoL). Self-assessment is recognised in two components: the Physical Component of health (PC) and the Mental Component of health (MC). PC is an average of values of domains: physical functioning, role limitations due to physical problems, bodily pain, and general health. MC is an average of values of domains: vitality, social functioning, role limitations due to emotional problems, and mental health. The questionnaire consists of 36 statements; each is scored from 0 to 100 points, with higher scores reflecting better self-assessment of health [17].

Statistical analysis included: performance of descriptive statistics (means [X] and standard deviations [SD]), calculation of Pearson correlation coefficients to assess the relationship between variables and the calculation of the level of differences – using an analysis of variance ANOVA. The significance level was set at $P < 0.05$. All statistical analyses were conducted with a use of STATISTICA (StatSoft) software, version 10.0.

Results

Descriptive statistics of the kinesiophobia level with a breakdown by gender were described in Table 1. In females correlation analysis revealed a significant relationship of age to the kinesiophobia factor: energy resources $r = 0.434$ ($p = 0.002$), while in the case of males with the factor: self-assessment of motor predispositions: $r = 0.279$ (0.024).

Table 1. KCS: descriptive statistics and gender differences

Factors and domains of kinesiophobia	GENDER		p
	females (x+SD)	males (x+SD)	
Morphological parameters	32.0 ± 27.7	30.5 ± 27.2	0.7836
Individual need for stimulation	47.6 ± 18.9	50.6 ± 15.2	0.3524
Energy resources	47.5 ± 25.3	44.6 ± 21.3	0.5142
Power of biological drives	46.5 ± 20.2	45.1 ± 22.8	0.7496
BIOLOGICAL DOMAIN	43.4 ± 14.7	42.7 ± 13.1	0.8032
Self-acceptance	39.4 ± 24.3	35.4 ± 19.4	0.3270
Self-assessment of motor predispositions	58.5 ± 18.2	49.2 ± 23.1	**0.0218***
State of mind	52.5 ± 24.3	55.0 ± 19.8	0.5455
Susceptibility to social influence	64.0 ± 24.3	62.3 ± 25.0	0.7166
PSYCHOLOGICAL DOMAIN	53.6 ± 15.5	50.4 ± 14.2	0.2644
Total score of KCS	48.5 ± 13.8	46.6 ± 12.0	0.4368

**statistically significant differences*

Next, descriptive statistics of health self-assessment were performed. Gender differences were also calculated (see Table 2). In females, negative correlations of age with physical functioning: $r = -0.370$ ($p=0.008$) and physical component of health: $r = -0.376$ ($p = 0.007$) were observed. For males, a relationship between age and domains of health self-assessment were no found.

The aim of the last stage of statistical analysis was to examine correlations between kinesiophobia (KCS) and health self-assessment (SF-36). Statistically significant correlations separately for males and females are presented in Tables 3-4.

Table 2. SF-36: descriptive statistics and gender differences

Components and factors of health	GENDER		p
	females (x+SD)	males (x+SD)	
Physical functioning	56.8 ± 26.6	66.3 ± 21.9	**0.0383***
Role limitations due to physical problems	33.0 ± 34.4	53.0 ± 42.2	**0.0073***
Bodily pain	40.6 ± 25.1	56.0 ± 25.5	**0.0015***
General health	31.8 ± 14.9	41.9 ± 15.8	**0.0007***
PC	40.5 ± 18.0	54.3 ± 19.5	**0.0001***
Role limitations due to emotional problems	56.0 ± 42.2	56.9 ± 41.1	0.9063
Vitality	43.6 ± 17.9	49.8 ± 17.7	0.0668
Emotional well-being	60.8 ± 14.1	61.4 ± 17.2	0.8591
Social functioning	56.1 ± 24.4	59.9 ± 24.8	0.4135
MC	54.1 ± 18.4	57.0 ± 18.4	0.4105

**statistically significant differences*

Table 3. Correlations: KCS-SF-36 for females

KCS scale	SF-36	r	p
Morphological parameters	physical functioning	-0.410	0.002
Individual need for stimulation	physical functioning	-0.635	0.000
	general health	-0.436	0.002
	PC	-0.452	0.001
Power of biological drives	emotional well-being	-0.293	0.039
BD	physical functioning	-0.510	0.000
	PC	-0.282	0.047
Self-assessment of motor predispositions	physical functioning	-0.543	0.000
	PC	-0.376	0.007
Susceptibility to social influence	vitality	-0.402	0.004
PD	physical functioning	-0.462	0.001
	general health	-0.321	0.029
	PC	-0.320	0.024
KCS	physical functioning	-0.531	0.000
	PC	-0.329	0.020

Table 4. Correlations: KCS-SF-36 for males

KCS scale	SF-36	r	p
Morphological parameters	physical functioning	-0.414	0.001
Individual need for stimulation	PC	-0.296	0.017
	vitality	-0.302	0.014
	emotional well-being	-0. 325	0.008
Power of biological drives	emotional well-being	-0.275	0.026
BD	vitality	-0.247	0.047
	emotional well-being	-0.286	0.021
Self-assessment of motor predispositions	social functioning	-0.294	0.017
	PC	-0.245	0.049
Susceptibility to social influence	physical functioning	-0.278	0.025
	bodily pain	-0.278	0.038
	general health	-0.378	0.002
	PC	-0.254	0.041
	vitality	-0.285	0.021
PD	physical functioning	-0.246	0.048
KCS	physical functioning	-0.272	0.028

Discussion

Lack of physical activity increasingly becomes part of daily lifestyle, leading to progression of morbidity with accompanying disability and mortality due to civilization diseases, including cardiovascular disease. The epidemiological data presented in the introduction indicate the scale of the phenomenon of hypokinesia.

Until the 1960s methods used in the treatment of heart diseases relied on immobilization of the patient or a significant reduction in exercises. Currently, moderate intensity training is used not only in the prevention of coronary heart disease, but also as part of the treatment after myocardial infarction, percutaneous coronary angioplasty and after cardiac surgery interventions, such as implantation of a pacemaker or implantation of a cardioverter-defibrillator. For several years, patients with heart failure have participated in cardiac rehabilitation, regardless of its aetiology [9, 18, 19]. Kinesitherapy – treatment by motion – is a very important element of comprehensive cardiac rehabilitation, both at an early stage – implemented as soon as possible after mastering life-threatening condition as well as at a later stage of outpatient rehabilitation, which is a secondary prevention of cardiac incidents.

Fear of movement is common and the underlying causes are different [20]. Cancer patients are reluctant to perform physical exercise due to the poor physical and mental condition [21]. In patients with lower back pain, refraining from physical activity is associated with fears of recurrent back pain [22]. This approach was an inspiration for authors of the commonly used Tampa Scale for Kinesiophobia (TSK) [23]. This tool, originally intended diagnose kinesiophobia in patients with back pain, was adapted to the study of patients with various conditions, including cardiac disease [24]. A possible negative impact of kinesiophobia on the effectiveness of rehabilitation is an argument. This may be important for behavioural cardiology, connecting together behavioural and psychosocial risk factors of ischemic heart disease [25]. Commonness of the use of TSK in respect of different types of diseases, search for possible cultural differences, connection of kinesiophobia intensity with fatigue or functional parameters incline one to pose questions concerning the original definition of kinesiophobia, unambiguously binding it with pain [26, 27]. The tool used in this study analyses a broad-spectrum of a physical passivity conditions (with necessary reductionism) [15, 16].

Findings presented in this study apply to patients undergoing cardiac rehabilitation. Mean values of kinesiophobia presented in Table 1 indicate moderate intensity of fear of movement in this population. Greater severity of kinesiophobia in the psychological domain – compared to the biological domain leads to the conclusion that cardiac incident is not a major cause of fear of movement, but rather a certain individual predisposition. The highest average value of factor "susceptibility to social influence", both in women and in men, suggest that environmental factors may be an important determinant of physical inactivity. The size of standard deviations of kinesiophobia factors indicates their individual variability. This accentuates the need of use in cardiac rehabilitation of one of the main principles of physiotherapy – an individual approach to each patient in the context of needs, possibilities and progression of rehabilitation.

In other studies, a high level of kinesiophobia was found among 20% of the patients with coronary artery disease (CAD), six months after the cardiac event. However, authors suggest that undergoing cardiac rehabilitation and a high level of physical activity decreased the odds ratio (OR) for a high level of kinesiophobia, by 56% and 80%, respectively. Variables increasing the OR were heart failure as complication at hospital (41%) and anxiety (19%) [28].

In the present study, we reported lower health self-assessment (see Table 2) than in the comparable age materials from other studies [29]. We also pay attention to gender differences in physical component of health. Reduced health self-assessment may affect the psychological aspects of rehabilitation. This problem can be related to issues such as negative attitudes and lack of expectations of the therapy, reduced motivation and commitment as well as lack of faith in one's own abilities. Correlations between factors of physical functioning and the physical component of health with kinesiophobia observed in women should be taken into account by therapists during rehabilitation programming. The relationships between factors of general health (for women) and

physical functioning (for men) with the psychological domain require taking into consideration the psychological sphere in the therapeutic process and emphasize the complexity of rehabilitation.

On the basis of many reports and research, sedentary lifestyle has been recognized as one of the greatest public health problems in the twenty-first century [30]. Many authors emphasize that encouraging people leading a sedentary lifestyle to a greater daily physical activity (walking, walking up stairs) and to perform regular exercise, especially the simple and most accessible ones [31], brings the greatest health benefits. Early identification and diagnosis of the causes of the motor passivity can make a big difference not only in the primary prevention of cardiovascular diseases, but it can also lead to improved efficiency of cardiac rehabilitation in the long term to prevent further hospitalizations. Comprehensive rehabilitation that takes into consideration behavioural aspects of psychotherapy may lead to a reduction in the kinesiophobia level or total elimination of this phenomenon as well as to an improvement in the quality of patients' lives. As a results, this may also lead to an increase in the number of patients returning to work after a period of convalescence.

Conclusions

1. Sex differentiates patients in the kinesiophobia level.
2. Poor self-assessment of health is associated with greater intensification of kinesiophobia.
3. A high level of kinesiophobia may negatively affect the cardiac rehabilitation process.

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