

The Level of Kinesiophobia and Its Relationship with Physical Activity in People with a History of Ankle Sprain

Poziom kinezyfobii i jej związek z aktywnością fizyczną u osób po przebytych skręceniu stawu skokowo-goleniowego

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Key words

fear of physical activity, hypokinesia, ankle injury, Tampa Scale for Kinesiophobia (TSK-17)

Abstract

Introduction: Kinesiophobia is one of the leading clinical factors in recovery from injury. The stressful situation of an ankle joint injury can cause severe withdrawal and fear of the patient to undertake physical activity, resulting in hypokinesia.

Objectives: The aim of the study was to demonstrate the relationship between the level of daily physical activity reported by the respondent after an ankle sprain and severity of the kinesiophobia phenomenon.

Material and methods: The study comprised 78 people (mean age 23.1 years \pm 3.3) with a history of ankle sprain injury. This population was divided into 2 groups, taking the given level of physical activity into account. GR1 consisted of 34 patients with an activity level of 0-3 hours a week of sports activity, GR2 was made up of 44 individuals reporting a level of physical activity > 3 hours a week. In order to obtain the necessary results, the respondents filled in their own personal data sheet; and 3 standardised questionnaires translated into Polish: Foot and Ankle Ability Measure (FAAM); Fear-Avoidance Beliefs Questionnaire (FABQ); Tampa Scale of Kinesiophobia (TSK-17).

Results: A high level of physical activity helps to avoid limitations in ankle and foot functioning. A relationship was found between functional limitations and the intensity of fear regarding movement according to the FABQ questionnaire. The limitations of the foot function translate into higher results for the FABQ questionnaire. No other statistically significant relationships were found.

Conclusions: Kinesiophobia is a protective factor in the acute disease/injury phase. Physiologically, its level should decrease as functional abilities are regained. If the functional limitations remain high, the fear of movement also increases. Regular, high-level physical activity significantly improves the functioning of the ankle and foot, and reduces the level of kinesiophobia.

Słowa kluczowe

strach przed aktywnością fizyczną, hipokinezyja, uraz stawu skokowo-goleniowego, Tampa Scale of Kinesiophobia (TSK-17)

Streszczenie

Wprowadzenie: Kinezyfobia jest jednym z wiodących klinicznie czynników warunkujących powrót do pełnej sprawności po kontuzji. Sytuacja stresowa, jaką stanowi uraz stawu skokowego, może powodować znaczne wycofanie i lęk przed podejmowaniem aktywności fizycznej przez pacjenta, prowadząc tym samym do hipokinezyji.

The individual division of this paper was as follows: A – research work project; B – data collection; C – statistical analysis; D – data interpretation; E – manuscript compilation; F – publication search

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Cele: Celem pracy było wykazanie zależności pomiędzy zgłaszanym przez badanego, po przebytych urazie skrętnym stawu skokowego poziomem codziennej aktywności fizycznej, a nasileniem zjawiska kineziofobii.

Materiały i metody: Do badania zakwalifikowano 78 osób (w wieku \bar{x} 23,1 \pm 3,3lat), po przebytych urazie skrętnym stawu skokowego. Populację tę podzielono na dwie grupy biorąc pod uwagę podany poziom aktywności fizycznej. GR1 stanowiło 34 pacjentów o poziomie aktywności 0-3 godzin aktywności sportowej tygodniowo, GR2 stworzyły 44 osoby, zgłaszające poziom aktywności fizycznej >3 godzin tygodniowo. W celu otrzymania koniecznych wyników ankietowani wypełnili autorską metryczkę; oraz trzy kwestionariusze standaryzowane przetłumaczone na język polski: *Foot and Ankle Ability Measure* (FAAM); *Fear-Avoidance Beliefs Questionnaire* (FABQ); *Tampa Scale of Kinesiophobia* (TSK-17).

Wyniki: Wysoki poziom aktywności fizycznej sprzyja unikaniu występowania ograniczeń funkcji stawu skokowego i stopy. Stwierdzono związek pomiędzy ograniczeniami funkcjonalnymi, a nasileniem strachu przed ruchem wg. kwestionariusza FABQ. Ograniczenia funkcji stopy przekładają się na wyższe wyniki w kwestionariuszu FABQ. Nie zanotowano innych istotnych statystycznie związków.

Wnioski: Kineziofobia jest czynnikiem ochronnym w fazie ostrej choroby/urazu. Fizjologicznie jej poziom powinien spadać wraz z odzyskiwaniem zdolności funkcjonalnych. Jeżeli ograniczenia funkcji utrzymują się na wysokim poziomie, wzrasta również strach przed ruchem. Regularna aktywność fizyczna utrzymywana na wysokim poziomie pozwalała w znaczący sposób poprawić funkcjonowanie stawu skokowego i stopy oraz wpływa na zmniejszenie poziomu kineziofobii.

INTRODUCTION

Ankle sprain is one of the most commonly occurring injuries, regardless of socio-demographic factors. Too late intervention, incomplete diagnosis and neglect in the treatment process may significantly delay or even prevent a return to complete fitness, despite rehabilitation. There are also cases when the pain or the situation in which it had occurred is so traumatic for the body that it leaves not only chronic functional limitations, but also a feeling of uncertainty, avoidance and even fear of physical activity¹.

Kinesiophobia – a term introduced by Kori, Miller and Todd in 1990, is defined as an excessive, irrational and debilitating fear of movement and activity resulting from susceptibility to painful or repeated trauma. It is most often associated with the use of a diseased or damaged body part². Fear is a person's reaction to a specific subject, object or situation, while the fear has no real cause^{3,4,5}. The cause of kinesiophobia is the occurrence of an injury/disease related to the sensation of pain. The patient is convinced of his/her own weakness, which makes him/her vulnerable to injuries⁶⁻¹⁴.

In response to a stressful situation, people gradually reduce daily physical activity, which makes them even more likely to experience the subject of fear again and develop the phenomenon of motor hypokinesia by avoiding physical activity^{4,9,10}.

Fear of movement is recognised as an important clinical aspect. It significantly influences the rehabilitation process and prevents full recovery. Avoidance of exercise causes

withdrawal from everyday activities, work and rest, which may deteriorate social contacts, cause disability or depression. Kinesiophobia is not treated as a disease, but as a personality trait, causing it to be significant internal barrier making it difficult to return to physical activity⁶⁻¹⁴.

OBJECTIVES

The aim of the study was to demonstrate the relationship between the level of daily physical activity reported by the patient after ankle sprain and the severity of the phenomenon of kinesiophobia.

Based on the stated purpose, the following research questions were posed:

1. Does the declared level of physical activity of the patient influence the occurrence of functional limitations after a previous trauma to the ankle joint?
2. Do functional limitations of the ankle joint affect the level of fear and avoidance of physical activity in the study groups?
3. Does the declared level of the patient's physical activity reduce the occurrence of the kinesiophobia phenomenon?

MATERIALS AND METHODS

Study group

The study group comprised 78 participants, aged 18-33 (mean 23.10 \pm 3.30), including 41 (52.56%) women and 37 (47.44%) men. An online population survey was conducted in

the first quarter of 2019. The survey was anonymous and was conducted in accordance with the Declaration of Helsinki. The condition to qualify for the study was being above the age of 18 and a history of ankle sprain, and no other diseases or traumatic injuries. The participants were informed about the aims and conditions of participation in the research project and provided their informed, written consent.

Based on the proprietary record, the respondents subjectively defined the time (in hours) they spent each week on any physical activity. Based on these data, 2 groups were distinguished with regard to reported level of physical activity. The first group (GR1) comprised 34 (43.59%) individuals, including 8 (10.26%) men and 26 (33.3%) women, aged 22.53 \pm 2.84 years, with an average body height of 168.35 \pm 8.21 cm, average body mass totalling 71.21 \pm 17.67 kg, and with an activity level from "very low" (no regular activity) to "medium-high" (2-3 hours of activity per week). The second group (GR2) consisted of 44 (56.41%) people, including: 29 (37.18%) men and 15 (19.23%) women. Their mean age was 24.09 \pm 6.13 years, with an average body height of 175.75 \pm 8.8 cm and an average mass equalling 78.91 \pm 18.55 kg. Among them were people with "high" (3-5 hours a week) and "very high" (>5 hours a week) levels of physical activity (Table 1).

Research tools

All participants in the study were provided with a proprietary record and

Table 1

Physical activity of respondents: GR1 – people declaring physical activity of 0-3 hours a week, GR2 – people declaring physical activity of over 3 hours a week

Level of Physical Activity	Group 1	Group 2
	0-3 hours of physical activity [%]	> 3 hours of physical activity [%]
Very high	–	41.03
High	–	15.38
Moderately high	17.95	–
Moderate	12.82	–
Low	7.69	–
Very low	5.13	–

a questionnaire consisting of 3 standardised questionnaires (FAAM, TSK-17 and FABQ) translated into Polish.

The author's record contained questions specifying: sex, age, body height, body mass, level of daily activity, the number of ankle sprain injuries in the same limb, the time since the last trauma and its degree.

The Foot and Ankle Ability Measure (FAAM) is a tool for assessing movement restrictions and limitations in undertaking physical activity, depending on the condition of the foot and ankle. It consists of the FAAM-ADL and FAAM-SPORT sub-scales. Each of them is rated on a 5-point scale (0-4). The sum of the points for FAAM-ADL is 0-84 and for FAAM-SPORT, 0-32. The final score is expressed as a percentage (the final sum is divided by the maximum score on the subscale and then multiplied by 100). Results closer to 100% indicate lower functional limitations and a level of fitness that is similar to the state before injury¹⁵.

The Tampa Scale of Kinesiophobia 17 (TSK-17) allows to determine the level regarding fear of movement. It consists of 17 statements, which are assigned answers, scored according to the Likert scale from 1 to 4. The

greater the sum of points – the greater the severity of kinesiophobia. The obtained result ranges from 17 to 68 points^{11,15}.

The Fear-Avoidance Beliefs Questionnaire (FABQ) is a questionnaire used to assess the sense of fear and avoidance of physical activity. It consists of 2 parts. The first is used to self-assess physical activity - 5 questions aimed at indicating which activities cause pain in the subject. The second part relates to the current job. FABQ scores are between 0 and 66 points, and a higher score indicates increased sense of fear and avoidance towards physical activity^{11,15}.

The results of the questionnaires were compiled in a Microsoft Excel spreadsheet, and then, the data was subjected to statistical analysis. Relationships between the variables were examined with the non-parametric χ^2 chi square test in the Statistica program, which enables the comparison of expected and observed values. In all statistical analyses, the significance level was $p = 0.05$. Calculating the correlational relationship between 2 variables, the obtained value was the one of which the absolute value showed the strength of the correlation, in

which the following classification was adopted:

- $0.0 \leq |r| \leq 0.2$ – no correlation;
- $0.2 \leq |r| \leq 0.4$ – weak correlation;
- $0.4 \leq |r| \leq 0.7$ – moderate correlation;
- $0.7 \leq |r| \leq 0.9$ – strong correlation;
- $0.9 \leq |r| \leq 1.0$ – very strong correlation.

RESULTS

The FAAM survey results indicate a high level of recovered function among 29.49% of respondents in GR1 and 43.58% of respondents in GR2. None of the subjects in GR2 reported moderate or low levels of recovered function (Table 2). When assessing the level of kinesiophobia (TSK-17), 20.51% of the participants obtained a medium-high result in both GR1 and GR2, while a moderate result (21.79%) was observed in GR2. A high level of kinesiophobia in GR1 was achieved by 3.85% of respondents, and in GR2 – 8.97%. According to the FABQ questionnaire, the low level of kinesiophobia was 25.64% in GR1 and 34.62% in GR2, while the high level was 5.13% – GR1 and 1.28% – GR2 (Table 3).

Table 2

Level of recovered functional efficiency of ankle joint according to FAAM questionnaires

Level of Recovered Physical Activity	Studied Group FAAM [%]	
	GR 1	GR 2
High	29.49	43.58
Moderately high	5.13	12.82
Moderate	3.85	0
Low	5.13	0

Table 3

The level of kinesiophobia according to the TSK-17 and FABQ questionnaires				
Level of Kinesiophobia	Study group [%]			
	TSK-17		FABQ	
	GR 1	GR 2	GR 1	GR 2
High	3.85	8.97	5.13	1.28
Moderately high	20.51	20.51	1.28	5.13
Moderate	17.95	21.79	11.54	15.38
Low	1.28	5.13	25.64	34.62

Table 4

Correlations between level of respondents' physical activity and functional limitations after ankle sprain										
Level of Physical Activity	FAAM									
	High		Moderately high		Moderate		Low		Total	
	N	%	N	%	N	%	n	%	n	%
Very low	1	25	1	25	1	25	1	25	4	100
Low	2	33.3	2	33.3	0	0	2	33.3	6	100
Moderate	7	70	0	0	2	20	1	10	10	100
Moderately high	13	92.1	1	7.1	0	0	0	0	14	100
High	9	75	3	25	0	0	0	0	12	100
Very high	25	78.1	7	21.9	0	0	0	0	32	100
Total	57	73.08	14	17.95	3	3.85	4	5.13	78	100
							$*r_c = 0.528$		$**p = 0.011$	

* r_c – strength of correlation, ** p – level of statistical significance ($p < 0.05$)

Table 5

Correlations between functional limitations of ankle joint and kinesiophobia – TSK-17 questionnaire										
FAAM	TSK-17									
	High		Moderately high		Moderate		Low		Total	
	N	%	N	%	n	%	n	%	n	%
High	5	50	20	62.5	27	87.1	5	100	57	73.1
Moderately high	3	30	9	28.1	2	6.5	0	0	14	17.9
Moderate	0	0	2	6.3	1	3.2	0	0	3	3.8
Low	2	20	1	3.1	1	3.2	0	0	4	5.1
Total	10	100	32	100	31	100	5	100	78	100
							$*p = 0.493$			

* p – level of statistical significance ($p < 0.05$)

A statistically significant relationship was observed between the level of physical activity of the respondents and functional limitations. The strength of the relationship was moderate (Table 4). The relationship between functional limitations in the ankle joint and kinesiophobia according to the TSK-17 questionnaire was not of statistical significance (Table 5), while a statistically significant corre-

lation was observed between functional limitations in the ankle joint and kinesiophobia according to the FABQ questionnaire. The strength of the relationship was defined as moderate (Table 6). The relationship between the physical activity of the subjects and kinesiophobia examined with both the TSK-17 (Table 7) and FABQ (Table 8) was not statistically significant.

DISCUSSION

Most musculoskeletal injuries result in temporary or permanent functional limitations. Taking into account the diversity of people in the population experiencing injuries at least once in their lifetime, the authors of the FAAM scale included statements considering both everyday activities (FAAM-ADL) and those undertaken

Table 6

Correlations between functional limitations of ankle joint and kinesiophobia – FABQ questionnaire

FAAM	FABQ									
	High		Moderately high		Moderate		Low		Total	
	N	%	N	%	N	%	n	%	n	%
High	2	40	3	60	14	66.7	38	80.9	57	73.1
Moderately high	0	0	2	40	4	19	8	17	14	17.9
Moderate	0	0	0	0	2	9.5	1	2.1	3	3.8
Low	3	60	0	0	1	4.8	0	0	4	5.1
Total	5	100	5	100	21	100	47	100	78	100
							<i>*r_c</i> = 0.552		**p = 0.001	

r_c* – strength of correlation; **p** – level of statistical significance (*p* < 0.05)

Table 7

Correlations between level of respondents' physical activity and kinesiophobia – TSK-17 questionnaire

Level of Physical Activity	TSK-17									
	High		Moderately high		Moderate		Low		Together	
	N	%	N	%	n	%	n	%	N	%
Very low	1	25	3	75	0	0	0	0	4	100
Low	1	16.7	3	50	2	33.3	0	0	6	100
Moderate	0	0	5	50	5	50	0	0	10	100
Moderately high	1	7.1	5	35.7	7	50	1	7.1	14	100
High	2	16.7	5	41.7	5	41.7	0	0	12	100
Very high	5	15.6	11	34.4	12	37.5	4	12.5	32	100
Total	10	12.8	32	41	31	39.7	5	6.4	78	100
							<i>*p</i> = 0.984			

**p* – level of statistical significance (*p* < 0.05)

Table 8

Correlations between level of respondents' physical activity and kinesiophobia – FABQ questionnaire

Level of Physical Activity	FABQ									
	High		Moderately high		Moderate		Low		Total	
	N	%	N	%	N	%	n	%	N	%
Very low	2	50	0	0	2	50	0	0	4	100
Low	1	16.7	0	0	1	16.70	6	66.7	6	100
Moderate	1	10	0	0	4	40	5	50	10	100
Moderately high	0	0	1	7.1	2	14.3	11	78.6	14	100
High	0	0	2	16.7	4	33.3	6	50	12	100
Very high	1	3.1	2	6.3	8	25	21	65.5	32	100
Total	5	6.4	5	6.4	21	26.9	47	60.3	78	100
							<i>*p</i> = 0,186			

**p* – level of statistical significance (*p* < 0.05)

during recreation or training (FAAM-Sport). Thanks to this, it is possible to comprehensively assess both these aspects regarding the life of patients after trauma^{1,15,16,17}.

The presented research results showed a relationship between the level of weekly physical activity reported by the respondents and their functional limitations. This relation-

ship suggests that the declared higher level of activity translates into less frequent limitations in the functioning of the ankle joint and foot. People qualified for GR2 regained a high

or medium-high level of functional fitness in as much as 100%, and in the GR1 group – 79.4%. This allows the conclusion that regular physical activity can minimise or even eliminate the occurrence of chronic functional limitations of the joint following injury.

The phenomenon of kinesiophobia is also observed by other authors. Niederer et al.¹⁸ noted an increase in the level of kinesiophobia among patients after both trauma and ACL reconstructive surgery. They showed that this level changes during rehabilitation and is inversely proportional to the functional level of the entire lower limb¹⁹. The higher level of fear towards movement was also associated with the weakening strength of the lower limb muscles, weaker dynamics and asymmetry during jump and landing. These data show the relationship between kinesiophobia and exercise. An individually selected rehabilitation programme and tailored physical activity contributed to the convalescence of the knee joint, thanks to which the patient recovered faster, and was even able to go back to practicing sports^{18,19,20,21}.

Other researchers, including Fukano et al.²², who carried out research among a group of athletes, presented a different position and observed a greater fear of movement or recurrence of injury, which was strongly correlated with instability of the ankle joint, compared to healthy people. Athletes returning to regular training after injury reported a higher level of fear towards movement and re-injury¹⁸. This seems to contradict the results obtained in the present study, in which it is stated that the phenomenon is less frequent in physically active people. Houston et al.²³ explain this relationship by the fact that athletes are a different group that cannot be compared with the rest of the population due to the constant overload of the locomotor system²³. According to Brdak et al.⁴, kinesiophobia is an indispensable phenomenon that occurs regardless of the type of injury, and is a protective factor in the acute phase of the disease⁴. Based on physiological reactions during rehabilitation, it should be expected that its level will

decrease with the recovery of function²⁴. Sometimes, however, this process is disturbed by various external or internal factors⁴.

Based on the obtained data, it can be concluded that a high level of activity, close to or equal to 100% of pre-injury fitness, may significantly affect the patient's fear of movement and/or re-injury. However, the results obtained in this research for both groups (GR1, GR2), based on the results achieved from the TSK-17 and FABQ questionnaires, were not unequivocal. As in the case of other authors, a relationship was found between the increase in the level of kinesiophobia determined by FABQ and the decrease in the percentage of FAAM. Nevertheless, contrary to the vast majority of scientific reports^{11,25,26}, there was no significant group-related relationships between the FAAM and TSK-17 results in the authors' own study. The obtained results prompted a discussion.

In the research by Crombez et al.²⁷, the accuracy of both scales was compared. The components of the FABQ and TSK-17 questionnaires were assessed, where it was found that the TSK-17 scale is used to determine the fear of repeated injury to a greater extent, and the FABQ of the fear of pain caused by physical activity at work. Relating this knowledge to the results of our own work, it can be concluded that the "moderate" strength of the relationship obtained in the presented research may be the result of subjectivisation of the statements contained in the questionnaires, which may translate into moderate credibility of both tests^{11,27,28,29}. Many authors have addressed the topic of kinesiophobia using one or both of the questionnaires.

Fraser et al.²⁴ also dealt with this subject, where they assessed the size of the kinesiophobia phenomenon in a group of individuals who had suffered ankle joint injuries. The results of patients with lateral ankle joint sprain (LAS) and patients with chronic instability of this joint (CAI) were compared with the results of healthy subjects. It was noticed that patients with CAI achieved worse results in each of these aspects compared to the

LAS group^{24,30}. The presented reports allow to conclude that in chronic instability of the ankle joint, the occurrence of hypokinesia is associated with repeated pain and fear of returning to activity^{4,11,10}.

The return to physical activity in patients experiencing kinesiophobia is a complicated process due to the generalised fear and the risk of depression. Only a well thought-out multidisciplinary rehabilitation process can lead to full recovery, and the prevention of kinesiophobia is its component^{31,32,33}.

CONCLUSIONS

1. The declared level of physical activity significantly influences the return of the functioning in the foot and ankle joint to the state before injury. Frequent sports activity limits the occurrence of chronic functional limitations in the respondents.
2. Kinesiophobia is an inevitable phenomenon that occurs after damage to the musculoskeletal system. Frequently reported functional limitations in the foot and ankle joint (FAAM) are related to the increased level of fear and avoidance of physical activity according to the FABQ questionnaire in the studied groups.
3. The relationship between declared level physical activity and the level of kinesiophobia was not statistically significant, however, the relationship between physical activity and functional limitations (FAAM) shows indirect influence of the respondents' motor habits on the level of fear towards movement after ankle sprain in the study groups.

Conflict of Interest

None declared.

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