The European Research Journal 2023;9(4):665-673 Original Article

DOI: 10.18621/eurj.1018104 *Sports Medicine*

Musculoskeletal pain, kinesiophobia, and quality of life in obese patients

Sabriye Ercan[1], Furkan Hasan Küçük[1], Aydan Örsçelik[2], Cem Çetin[1]

[1]Department of Sports Medicine, Süleyman Demirel University, Faculty of Medicine, Isparta, Turkey; [2]Department of Sports Medicine, University of Health Sciences, Gülhane Faculty of Medicine, Ankara, Turkey

ABSTRACT

Objectives: This study aims to examine musculoskeletal pain, kinesiophobia, and quality of life in individuals with normal body mass index and in individuals with obesity, and to determine the relationship between the variables.

Methods: In the study; individuals aged between 20-65 years, with a body mass index of 30 kg/m^2 and above (Group $_{obesity}$) with obesity, and individuals with a range of 18.5-24.9 kg/m^2 (Group $_{normal}$) were included. General Practice Physical Activity Questionnaire, Orebro Musculoskeletal Screening Questionnaire, Short Form-12 Health Survey, and Kinesiophopia Causes Scale were applied to the participants for primary care.

Results: When the descriptive characteristics of the individuals in the sample which were divided into two groups as the Group $_{normal}$ (n = 82; 22.6 ± 1.7 kg/m^2) and Group $_{obesity}$ (n = 92; 33.0 ± 2.8 kg/m^2 were analyzed; while a difference was determined in terms of sex, education level and presence of chronic disease ($p < 0.05$), no difference was found in terms of age, marital status and regular drug use for the treatment of chronic disease ($p > 0.05$). Although the activity level rates of Group $_{obesity}$ were lower according to the physical activity questionnaire classification for primary care, no statistically significant difference was found between the groups ($p = 0.090$). More musculoskeletal pain was found in the individuals of the obesity group ($p = 0.003$), the physical sub-dimension score of the general quality of life questionnaire was negatively affected ($p = 0.014$), and a difference in favor of phobia was determined in all domains of the kinesiophobia causes scale ($p < 0.001$). There was a weak positive correlation between body mass index and musculoskeletal pain, while a moderate positive correlation with kinesiophobia.

Conclusions: Although physical activity level is similar to individuals with normal body mass index, musculoskeletal pain and kinesiophobia are higher in individuals with obesity, and their quality of life is negatively affected.

Keywords: Obesity, kinesiophobia, pain, quality of life

Obesity is a public health problem with personal, social, and financial burdens and increasing its importance globally [1]. Individuals affected by obesity face deep functional and physical limitations. These individuals experience musculoskeletal problems such as joint pain, functional impairment, and walking difficulties [2]. The prevalence of joint pain, especially in load-bearing segments such as the waist,

Received: ***November 3, 2021;*** *Accepted:* ***August 31, 2022;*** *Published Online:* ***September 6, 2022***

How to cite this article: *Ercan S, Küçük FH, Örsçelik A, Çetin C. Musculoskeletal pain, kinesiophobia, and quality of life in obese patients. Eur Res J 2023;9(4):665-673. DOI: 10.18621/eurj.1018104*

e-ISSN: 2149-3189

Address for correspondence: *Sabriye Ercan, Associate Professor, Süleyman Demirel University, Faculty of Medicine, Faculty of Sports Medicine, Department of Pediatric Dentistry, 32260 Isparta, Turke. E-mail: sabriyeercan@gmail.com, Phone: +90 246 211 92 48*

increases linearly with high body mass index (BMI) values [3].

Since obesity is associated with clinical conditions related to pain, it is also associated with low physical and emotional well-being. As obesity rates increase, the rates of musculoskeletal disorders and related physical effects also increase [4, 5]. Therefore, obese patients with low back and joint pain experience significant functional limitations and injuries [6]. Here; it is faced with a dual problem, including physical activity limitation in daily life due to movement difficulties and pain caused by excess weight [6]. On the other hand, both conditions affect each other. For example, decreased physical activity due to pain may cause an increase in body weight [6]. On the other hand, individuals with obesity often experience shortness of breath, musculoskeletal disorders, and joint pain during physical activity. These situations which are experienced during exercise can negatively change the perception of individuals with obesity towards the benefits of movement and physical activity. As a result of all these, fear of pain and movement may occur [7]. The pain felt evokes avoidance behaviors against the movement, leading to an ever-increasing spiral of inactivity and more avoidance from exercise [7]. Studies have shown that pain-related fear of movement is strongly associated with perceived and detected injury in individuals with low back pain [7]. Therefore, fear of movement in obese individuals with musculoskeletal complaints may be a clinically important condition called 'kinesiophobia'.

Kinesiophobia is an extreme fear of physical movement and activity, which results from the fear of a painful injury or re-injury and creates a sense of vulnerability [8, 9]. Avoidance behaviors that develop due to kinesiophobia cause the continuation of the cycle of avoiding physical activity. Thus, the mobility and functional limitations of individuals may deteriorate. Patients with a diagnosis of obesity and chronic pain may report higher levels of kinesiophobia and may be exposed to more physical activity restrictions than those with lower BMIs [10]. To clarify the relationship between kinesiophobia, obesity, and pain; it can be predicted that it will facilitate the development of individual and targeted treatment approaches and increase the quality of life of individuals affected by obesity [10].

This study hypothesizes that musculoskeletal pain will be higher in individuals with obesity, although physical activity level is similar to individuals with normal body mass index, obese patients will have high kinesiophobia levels and all these differences will have negative effects on the quality of life of obese patients. In this study, it was aimed to determine the relationship between the variables by examining musculoskeletal pain, kinesiophobia, and quality of life in individuals with normal body mass index and individuals with obesity.

METHODS

The study started after the research protocol was approved by the local ethics committee's decision dated 08/01/2021 and numbered 9.

Individuals aged between aged 20-65 years, with a body mass index of 30 kg / m^2 and above, or between 18.5 -24.9 kg / m^2, who were in our hospital as companions were included to the study. Those who have had joint or back surgery in the last 2 years, those who have had a musculoskeletal injury in the last 6 months, those with cognitive and psychiatric disorders, unstable angina or uncontrolled arterial hypertension, severe pulmonary hypertension, recent cardiac arrhythmia, or myocardial infarction, other clinical conditions (malignancy, etc.) which may be worsened by physical exertion, slightly overweight individuals with BMI less than 18.5 kg / m^2 or between 25.1- 29.9 kg / m^2 were excluded from the study.

To all individuals who voluntarily participated in the study; General Practice Physical Activity Questionnaire, Orebro Musculoskeletal Screening Questionnaire, Short Form-12 Health Survey, Kinesiophopia Causes Scale was applied.

Applied Measurement Tools

General Practice Physical Activity Questionnaire

This questionnaire was developed in England to evaluate the level of physical activity in primary health care institutions and adapted into Turkish by Noğay *et al*. [11]. Questionnaire consists of a total of 7 questions under the headings of activity level at work, the activity level in the last 1 week and walking speed. According to the answers given to the questionnaire, activity

levels are divided into 4 groups as inactive, moderately inactive, moderately active, and active. The Turkish version of the Questionnaire has a Cronbach alpha coefficients value of 0.74 [11].

Orebro Musculoskeletal Screening Questionnaire

This questionnaire, which was developed to determine the risk of musculoskeletal pain by screening method, was adapted into Turkish by Öncü *et al*. [12]. Questionnaire consists of a total of 25 questions, 4 of which contain the descriptive information of the participant and 21 of which will be reflected in the scoring. According to the answers given to the questionnaire, a score can be obtained between 0 and 210. An increase in the score indicates that the risk of pain increases. The Turkish version of the Questionnaire has a Cronbach alpha coefficients value of 0.96 [12].

SF-12 General Quality of Life Questionnaire

The Turkish adaptation of this 12-question questionnaire, which aims to evaluate the general quality of life of individuals with its physical and mental subdimensions, was carried out by Soylu and Kütük [13]. The physical component score of the questionnaire; general health, physical functionality, physical role, and bodily pain sub-dimensions; the mental component score is calculated according to the answers given to the sub-dimensions of social functionality, emotional role, mental health, and energy. A score between 0-100 can be obtained separately from both component scores of the questionnaire. The higher the score obtained, the better the health status. The Turkish version of the Questionnaire has a Cronbach alpha coefficients value of 0.73 for physical component score of SF-12 (PCS-12) and 0.72 for mental component score of SF-12 (MCS-12) [13].

Kinesiophopia Causes Scale

This 20-question scale, which aims to examine the causes of kinesiophobia with its biological and psychological dimensions, was adapted into Turkish by Çayır *et al*. [14] The scale has two sub-dimensions, biological and psychological. The new version of the scale varies between 0-5 points. An increase in the total score of the scale and its sub-dimensions indicates an increase in kinesiophobia. The intra-class correlation coefficient was computed in order to conduct a reliability investigation on The Turkish version of the scale. The scale's overall ICC value was discovered to be 0.863. [14].

Power analysis

The power of the study was examined by post hoc analysis. The α error level was accepted as 0.05 in the G*Power v.3.1 program [15]. The power (1-β err prob) was 0.88 while the effect size was 0.49 for OMSQ, the power (1-β err prob) was 1.00 while the effect size was 1.29 for KCS, the power (1-β err prob) was 0.68 while the effect size was 0.37 for PCS.

Statistical Analysis

The conformity of the continuous variables to the normal distribution was evaluated with the Shapiro-Wilk test. Descriptive statistics were reported as numbers and percentages for categorical variables; mean and standard deviation for continuous variables. Comparisons of continuous variables between two independent groups; independent samples t-test was compared with normal distribution condition and Mann-Whitney U test when normal distribution condition was not met. The Chi-Square test tested the differences between the ratios of categorical variables between groups. Correlation Analysis was used to investigate relationships between continuous variables when the normality assumption was not met, and the Spearman correlation coefficient was also computed; otherwise, the Pearson correlation coefficient was considered. SPSS (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.) was used for statistical analysis. The type I error rate was accepted as 5%. A weak correlation was accepted if r = 0.20-0.39 and a moderate correlation if r = 0.40-0.69 [16].

RESULTS

In the study, the normal body weight (Group $_{normal}$, n = 82) with the mean body mass index 22.6 ± 1.7 kg / m^2 and the obesity class with 33.0 ± 2.8 kg / m^2 (Group $_{obesity}$, n = 92), a total of 174 people's data were analyzed. The mean age of individuals in the Group normal was 42.5 ± 8.8 years, while those in the Group obesity were calculated as 44.8 ± 8.3 years (p = 0.075) (Table 1).

Table 1. Descriptive characteristics of groups

	All	Group $_{normal}$	Group $_{obesity}$	*p* value
Age (years)	43.7 ± 8.6	42.5 ± 8.8	44.8 ± 8.3	0.075
BMI (kg/m^2)	28.1 ± 5.7	22.6 ± 1.7	33.0 ± 2.8	**< 0.001****
Sex, n (%)				**< 0.001****
Female	128 (73.6)	72 (87.8)[a]	56 (60.9)[b]	
Male	46 (26.4)	10 (12.2)[a]	36 (39.1)[b]	
Education Level, n (%)				**< 0.001****
Secondary school	21 (12.1)	3 (3.7)[a]	18 (19.6)[b]	
High school	40 (23)	11 (13.4)[a]	29 (31.5)[b]	
University	113 (64.9)	68 (82.9)[a]	45 (48.9)[b]	
Marital status, n (%)				0.456
Married	146 (83.9)	67 (81.7)	79 (85.9)	
Single	28 (16.1)	15 (18.3)	13 (14.1)	
Chronic disease (Yes), n (%)	71 (40.8)	26 (31.7)[a]	45 (48.9)[b]	**0.021***
Medication use for chronic disease treatment (Yes), n (%)	61 (35.1)	24 (29.3)	37 (40.2)	0.131

Data are shown as mean±standard deviation or n(%). BMI = Body Mass Index. Intependent Samples t-Test was used for age, Mann-Whitney U was used for body mass index, Chi-square test was used for other descriptive characteristics value, **p*-value is significant at the 0.05 level (2-tailed), ***p*-value is significant at the 0.01 level (2-tailed). a-b = There is a difference between them at Chi-square test.

Participants in the Group $_{normal}$ had controlled hypertension (n = 9), diabetes (n = 3), thyroid disease (n = 6), rheumatic disease (n = 6), migraine (n = 2), asthma (n = 2), vitiligo (n = 1). Participants in the Group $_{obesity}$ had controlled hypertension (n = 18), diabetes (n = 13), thyroid disease (n = 4), rheumatic disease (n = 2), osteoporosis (n = 1), migraine (n = 4), asthma (n = 3), angioedema (n = 1), epilepsy (n = 1), polycystic ovary syndrome (n = 1), fibromyalgia (n = 1), psoriasis (n = 1). When the descriptive features of the groups are examined; while a difference was determined in terms of sex, education level, and presence of chronic disease ($p < 0.05$). No difference was found in terms of marital status and regular drug use for the treatment of chronic disease ($p > 0.05$) (Table 1).

When the activity levels of the groups were evaluated with the General Practice Physical Activity Questionnaire, although the activity level rates of Group obesity were lower, no statistically significant difference was found between the groups ($p > 0.05$) (Table 2).

According to the results of the measurement tools

Table 2. Physical activity levels of groups

Activity Level	All n (%)	Group $_{normal}$ n (%)	Group $_{obesity}$ n (%)	*p* value
Inactive	4 (2.3)	0 (0)	4 (4.3)	0.090*
Moderately inactive	33 (19)	13 (15.9)	20 (21.7)	
Moderately active	45 (25.9)	23 (28)	22 (23.9)	
Active	92 (52.9)	46 (56.1)	46 (50)	

*Chi-square test was used.

Table 3. Musculoskeletal pain, kinesiophobia level and quality of life of the groups

	All	Group $_{normal}$	Group $_{obesity}$	*p* value
OMSQ	85.7 ± 29.6	78.5 ± 28.4	92.2 ± 29.2	**0.003 ****
SF-12				
PCS-12	42.7 ± 6.6	44.0 ± 6.4	41.6 ± 6.6	**0.014 ***
MCS-12	42.6 ± 5.4	42.6 ± 5.2	42.5 ± 5.6	0.816
KCS Total Score	2.8 ± 0.8	2.3 ± 0.6	3.2 ± 0.8	**< 0.001****
KCS-Biological Domain	2.8 ± 0.9	2.3 ± 0.6	3.3 ± 0.8	**< 0.001****
KCS-Psychological Domain	2.7 ± 0.9	2.2 ± 0.7	3.1 ± 1.0	**< 0.001****

Data are shown as mean±standard deviation. OMSQ = Orebro Musculoskeletal Screening Questionnaire, SF-12 = Short Form-12 Health Survey, PCS = Physical component score of SF-12, MCS = Mental component score of SF-12, KCS = Kinesiophopia Causes Scale.

Mann-Whitney U was used for OMSQ, Intependent Samples *t*-test was used for other value, **p*-value is significant at the 0.05 level (2-tailed), ***p*-value is significant at the 0.01 level (2-tailed).

Table 4. The relationship of body mass index with pain, kinesiophobia, and quality of life

		All	Group $_{normal}$	Group $_{obesity}$
OMSQ	r_s	**0.222****	0.090	0.036
	***p* value**	**0.003**	0.421	0.736
PCS-12	r	-0.144	0.067	0.064
	***p* value**	0.058	0.547	0.542
MCS-12	r	-0.024	-0.192	0.052
	***p* value**	0.758	0.084	0.625
KCS Total Score	r	**0.534****	0.118	0.186
	***p* value**	**< 0.001**	0.293	0.076
KCS-Biological Domain	r	**0.537****	0.114	0.116
	***p* value**	**< 0.001**	0.310	0.269
KCS-Psychological Domain	r	**0.471****	0.096	**0.223***
	***p* value**	**< 0.001**	0.392	**0.033**

OMSQ = Orebro Musculoskeletal Screening Questionnaire, PCS = Physical component score of SF-12, MCS = Mental component score of SF-12, KCS = Kinesiophopia Causes Scale.

Correlation test was used, "r" was used for indicating Pearson correlation coefficient; and "r_s" was used for the Spearman correlation coefficient, *: *P* - value is significant at the 0.05 level (2-tailed), **: *P* - value is significant at the 0.01 level (2-tailed). A weak correlation was accepted if r = 0.20-0.39 and a moderate correlation if r = 0.40-0.69.

in which musculoskeletal pain, kinesiophobia level, and quality of life were evaluated, more musculoskeletal pain was found in individuals in the Group $_{obesity}$, the physical sub-dimension score of the general quality of life questionnaire was negatively affected, a difference in favor of phobia was determined in all domains of the kinesiophobia causes scale ($p < 0.05$) (Table 3).

In the correlation analysis made considering all the participants, a weak positive relationship was found between body mass index and musculoskeletal pain, and a moderate positive relationship with kinesiophobia. When the analyzes were repeated according to the groups, only in Group $_{obesity}$ was a weak positive correlation was determined between the body mass index and the psychological domain of kinesiophobia ($p < 0.05$) (Table 4).

DISCUSSION

Individuals affected by obesity face physical limitations. These individuals frequently experience musculoskeletal problems such as joint pain, functional impairment, and walking difficulties [10]. Since obesity is associated with clinical conditions related to pain, it is also associated with losses in physical and emotional well-being [1]. Pain that increases with movement can cause individuals with obesity to have difficulties while maintaining physical activity. The perception that will be created by the difficulty felt during physical activity creates fear of movement due to pain and may cause a decrease in the quality of life in individuals with obesity [6]. All these situations are an indication that the fear of movement that develops in obese individuals with musculoskeletal complaints may be clinically important and should be rehabilitated.

In our study, when the descriptive characteristics of the individuals in the sample, which were divided into two groups as normal body mass index and obese patients, were examined; while a difference was determined in terms of sex, education level, and presence of chronic disease, no difference was found in terms of age, marital status and regular drug use for the treatment of chronic disease. Obesity is higher in males and individuals with lower education levels than the university level. In addition, additional chronic diseases of individuals diagnosed with obesity were observed more frequently. In addition, in a study comparing the obese patient and the normal group, the obese patient group was found to be older than the normal group, and the rate of women was found to be higher than men. While more patients were classified as 'working' in the obese patient group, more individuals were identified as 'student' in the normal group. A higher rate of additional chronic disease was found in the obese patient group. Among the normal and obese group, depression (13.8% vs. 12.9%), anxiety (3.1% vs. 2.9%), and arthritis (7.7% vs. 12.9%) prevalence was not found to be different. It has been found that obese patients use more narcotic drugs for pain control compared to the normal group and less of them use nonsteroidal anti-inflammatory drugs for pain control [7]. In a study by Alqahtani *et al*. [17], comparing the obesity patient group with the normal group, most of the participants in both groups were found to be single and their income level was found to be close. Gomes-Neto *et al*. [18], in a study comparing the quality of life of people with knee osteoarthritis (OA) with and without obesity, no statistically significant difference was found between the groups in terms of sociodemographic characteristics and duration of OA.

In our study, although physical activity levels of individuals with obesity were lower according to the General Practice Physical Activity Questionnaire classification, no statistically significant difference was found between the groups ($p > 0.05$). In parallel, in a study conducted with 200 female university students in Saudi Arabia in 2017 using the same questionnaire, although the activity level rates of the obesity group were lower, no statistically significant difference was found between the groups [17]. However, in a study conducted with 4716 adults in Iran, a statistical difference was found in the activity level ratios of the obesity group, reflecting that individuals with obesity were less active [19]. Although there is no statistically significant difference in various studies, results reflecting that individuals with obesity are less active have been determined. This situation, which was also revealed in our study, shows that individuals with obesity are less physically active than individuals with normal body mass index.

In our study, more musculoskeletal complaints were found in individuals with obesity. In the literature, there is a lot of evidence pointing to the coexistence of obesity and pain complaints [20-22]. In the study of Smuck *et al*., less than 3% of people in the normal BMI range reported low back pain in the last 3 months, while 7.7% of obese patients and 11.6% of morbidly obese patients reported low back pain [23]. The results of a population-based study of more than 30000 people over a 10-year period in Norway show that individuals with a diagnosis of obesity, who are not physically active, have a higher risk of developing chronic arm pain [24]. Results of another large population-based study that included prospective follow-up for over ten years showed that people with a diagnosis of obesity developed a higher number of low back pain complaints than those without a diagnosis of obesity [25]. In another study by Maclellan *et al*. [26], multisite musculoskeletal pain was found to be common and severe in obese patients. In another study that studied 6079 Latin American women between the ages of 40-59, it was concluded that obesity is an iden-

tifiable risk factor for musculoskeletal pain in middle-aged women [27]. The results of a survey conducted with more than 1 million people in the United States showed a linear increase in chronic pain cases as BMI increases [28]. Similarly, Hitt *et al*. [29] showed a linearly increasing relationship between obesity and pain. At the end of the study, it was found that the higher the BMI, the more common the complaint of pain, and the probability of suffering from pain in patients with morbid obesity was four times higher than those without a diagnosis of obesity [29].

In the general quality of life questionnaire, we used in our study, the physical sub-dimension scores of the obesity-diagnosed group were negatively affected, while the mental sub-dimension scores were not. It is known that obesity has various negative effects on the functional capacity and quality of life of people. In a study conducted in the USA, a negative correlation was found between BMI and the physical sub-dimension scores of the general quality of life questionnaire, but no significant correlation was found for the mental sub-dimension scores [30]. In another study, it was shown that obesity is associated with low quality of life in patients with low back pain [7]. However, according to the research results reported in the literature, the relationship between mental health and obesity is not consistent. While some studies have shown that obesity is associated with lower mental sub-dimension scores and well-being [31, 32], others have not [33, 34].

In our study, a difference in favor of phobia was determined in all sub-scales of the Kinesiophobia Causes Scale. There are very few studies [1, 6, 7, 10] in the literature examining the relationship between obesity and kinesiophobia. In a study by Varallo *et al*., in patients with chronic low back pain; the relationship between obesity, pain intensity, and kinesiophobia was evaluated. Their findings revealed that kinesiophobia in individuals with low back pain and obesity mediates the relationship between pain intensity and injury [6]. According to the results of another cross-sectional study conducted on 106 participants with obesity and chronic low back pain, kinesiophobia was found to be an important factor in increasing pain-related disability and pain intensity in individuals with chronic low back pain and obesity [1]. Studies supporting this explanation have been previously reported by Vincent *et al*. [7] reported. It was found that adults affected by moderate obesity and chronic low back pain reported higher levels of kinesiophobia compared to those of normal weight, and obese adults with chronic low back pain had a higher fear of movement than adults without a diagnosis of obesity with chronic low back pain [7]. In addition, another study overweight older observed that the degree of kinesiophobia was a significant predictor of low back pain severity and perceived disability in adults with low back pain [10].

Limitations

The first limitation of our study is that it is a cross-sectional study. The second is that the sample consists of individuals from a single center and accompanying individuals in our hospital. On the other hand, it is important that it is a few studied topics in the literature. This study has several strengths, such as the use of validated, reliable measurement tools, the achievement of an adequate sample size, and the fact that it presents data on a population for which there is still little research.

CONCLUSION

Although the physical activity level of an individual with obesity is similar to that of individuals with a normal body mass index, musculoskeletal pain and kinesiophobia are higher, and the quality of life is negatively affected. In the light of the data obtained, it is thought that kinesiophobia should not be ignored when planning an exercise for an individual with obesity, and treatment approaches for kinesiophobia should also be exhibited.

Authors' Contribution

Study Conception: SE; Study Design: SE; Supervision: CÇ; Funding: N/A; Materials: SE, FHK, AÖ; Data Collection and/or Processing: SE, FHK, AÖ; Statistical Analysis and/or Data Interpretation: SE; Literature Review: SE, FHK, AÖ, CÇ; Manuscript Preparation: SE, FHK, AÖ and Critical Review: SE, FHK, AÖ, CÇ.

Conflict of interest

The authors disclosed no conflict of interest during the preparation or publication of this manuscript.

Financing

The authors disclosed that they did not receive any grant during conduction or writing of this study.

Acknowledgements

The abstract of this study was presented as an oral presentation at International Sports Medicine Congress and the 18th Turkish Sports Medicine Congress to be held between December 3-5, 2021 (Online).

REFERENCES

1. Varallo G, Giusti EM, Scarpina F, Cattivelli R, Capodaglio P, Castelnuovo G. The association of kinesiophobia and pain catastrophizing with pain-related disability and pain intensity in obesity and chronic lower-back pain. Brain Sci 2020;11:11.
2. Vincent HK, Ben-David K, Cendan J, Vincent KR, Lamb KM, Stevenson A. Effects of bariatric surgery on joint pain: a review of emerging evidence. Surg Obes Relat Dis 2010;6:451-60.
3. Vincent HK, Vincent KR, Seay AN, Hurley RW. Functional impairment in obesity: a focus on knee and back pain. Pain Manag 2011;1:427-39.
4. Freburger JK, Holmes GM, Agans RP, Jackman AM, Darter JD, Wallace AS, et al. The rising prevalence of chronic low back pain. Arch Intern Med 2009;169:251-8.
5. Janke EA, Collins A, Kozak AT. Overview of the relationship between pain and obesity: What do we know? Where do we go next? J Rehabil Res Dev 2007;44:245-62.
6. Varallo G, Scarpina F, Giusti EM, Cattivelli R, Usubini AG, Capodaglio P, et al. Does kinesiophobia mediate the relationship between pain intensity and disability in individuals with chronic low-back pain and obesity? Brain Sci 2021;11:684.
7. Vincent HK, Omli MR, Day T, Hodges M, Vincent KR, George SZ. Fear of movement, quality of life, and self-reported disability in obese patients with chronic lumbar pain. Pain Med 2011;12:154-64.
8. Knapik A, Saulicz E, Gnat R. Kinesiophobia--introducing a new diagnostic tool. J Hum Kinet 2011;28:25-31.
9. Larsson C, Hansson EE, Sundquist K, Jakobsson U. Kinesiophobia and its relation to pain characteristics and cognitive affective variables in older adults with chronic pain. BMC Geriatr 2016;16:128.
10. Vincent HK, Seay AN, Montero C, Conrad BP, Hurley RW, Vincent KR. Kinesiophobia and fear avoidance beliefs in overweight older adults with chronic low back pain, relationship to walking endurance: part II. Am J Phys Med Rehabil 2013;92:439-45.
11. Noğay AEK, Özen M. [The validity and reliability analysis of Turkish version of General Practice Physical Activity Questionnaire]. Konuralp Med J 2019;11:1-8. [Article in Turkish]
12. Öncü J, Ilişer R, Kuran B. Cross-cultural adaptation of the Orebro Musculoskeletal Pain Questionnaire among Turkish workers with low back pain. J Back Musculoskelet Rehabil 2016;29:135-43.
13. Soylu C, Kütük B. Reliability and validity of the Turkish Version of SF-12 Health Survey. Turk Psikiyatri Derg 2022;33:108-17.
14. Çayır M, Durutürk NA, Tekindal MA. [Reliability and validity of the Turkish version of Kinesiophopia Causes Scale]. J Exerc Ther Rehabil 2020;7:64-73. [Article in Turkish]
15. Faul F, Erdfelder E, Lang A-G, Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods 2007;39:175-91.
16. Alpar R. Spor Sağlık ve Eğitim Bilimlerinden Örneklerle Uygulamalı Istatistik ve Geçerlik Güvenirlik. 6 th ed. Ankara: Detay Yayincilik; 2016.
17. Alqahtani A, Aloraini M, Alsubaie A, Alateq A, Alsagabi B, Benajiba N. Comparison of lifestyle patterns and body weight management practices between normal weight and obese female university students (Riyadh – Saudi Arabia). Nor Afr J Food Nutr Res 2017;1:11-9.
18. Gomes-Neto M, Araujo AD, Junqueira IDA, Oliveira D, Brasileiro A, Arcanjo FL. Comparative study of functional capacity and quality of life among obese and non-obese elderly people with knee osteoarthritis. Rev Bras Reumatol 2016;56:126-30.
19. Akhondi N, Memar Montazerin S, Soltani S, Saneei P, Hassanzadeh Keshteli A, Esmaillzadeh A, et al. General and abdominal obesity in relation to the prevalence of irritable bowel syndrome. Neurogastroenterol Motil 2019;31:e13549.
20. Higgins DM, Kerns RD, Brandt CA, Haskell SG, Bathulapalli H, Gilliam W, et al. Persistent pain and comorbidity among operation enduring freedom/operation Iraqi freedom/operation new dawn veterans. Pain Med 2014;15:782-90.
21. Deere KC, Clinch J, Holliday K, McBeth J, Crawley EM, Sayers A, et al. Obesity is a risk factor for musculoskeletal pain in adolescents: findings from a population-based cohort. Pain. 2012;153:1932-8.
22. Smith SM, Sumar B, Dixon KA. Musculoskeletal pain in overweight and obese children. Int J Obes 2014;38:11-5.
23. Smuck M, Kao M-CJ, Brar N, Martinez-Ith A, Choi J, Tomkins-Lane CC. Does physical activity influence the relationship between low back pain and obesity? Spine J 2014;14:209-16.
24. Mork PJ, Holtermann A, Nilsen TIL. Physical exercise, body mass index and risk of chronic arm pain: Longitudinal data on an adult population in Norway. Eur J Pain 2013;17:1252-8.
25. Heuch I, Heuch I, Hagen K, Zwart J-A. Body mass index as a risk factor for developing chronic low back pain: a follow-up in the Nord-Trøndelag Health Study. Spine (Phila Pa 1976) 2013;38:133-9.
26. MacLellan GA, Dunlevy C, O'Malley E, Blake C, Breen C, Gaynor K, et al. Musculoskeletal pain profile of obese individuals attending a multidisciplinary weight management service. Pain 2017;158:1342-53.
27. Blümel JE, Arteaga E, Mezones-Holguín E, Zúñiga MC, Witis S, Vallejo MS, et al. Obesity is associated with a higher prevalence of musculoskeletal pain in middle-aged women. Gynecol Endocrinol 2017;33:378-82.
28. Stone AA, Broderick JE. Obesity and pain are associated in

the United States. Obesity 2012;20:1491-5.
29. Hitt HC, McMillen RC, Thornton-Neaves T, Koch K, Cosby AG. Comorbidity of obesity and pain in a general population: results from the Southern Pain Prevalence Study. J Pain 2007;8:430-6.
30. Wee CC, Davis RB, Hamel MB. Comparing the SF-12 and SF-36 health status questionnaires in patients with and without obesity. Health Qual Life Outcomes 2008;6:11.
31. Doll HA, Petersen SEK, Stewart-Brown SL. Obesity and physical and emotional well-being: associations between body mass index, chronic illness, and the physical and mental components of the SF-36 questionnaire. Obes Res 2000;8:160-70.
32. Ford ES, Moriarty DG, Zack MM, Mokdad AH, Chapman DP. Self-reported body mass index and health-related quality of life: findings from the Behavioral Risk Factor Surveillance System. Obes Res 2001;9:21-31.
33. Yan LL, Daviglus ML, Liu K, Pirzada A, Garside DB, Schiffer L, et al. BMI and health-related quality of life in adults 65 years and older. Obes Res 2004;12:69-76.
34. Katz DA, McHorney CA, Atkinson RL. Impact of obesity on health-related quality of life in patients with chronic illness. J Gen Intern Med 2000;15:789-96.