

Original Article

Kinesiophobia Is Associated with Disability, Poor Quality of Life, Psychological Morbidity, and Surgery Dissatisfaction in Patients with Lumbar Microdiscectomy: A Cross-Sectional Controlled Study

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The study aimed to determine the prevalence of kinesiophobia in patients who had undergone lumbar microdiscectomy and to examine its associations with pain intensity, disability, quality of life, depression, anxiety, and satisfaction with surgery. Forty-eight patients with microdiscectomy and 48 healthy controls were enrolled. The Tampa Scale for Kinesiophobia (TSK), Roland-Morris Disability Index (RMDI), Hospital Anxiety and Depression Scale (HADS-A and HADS-D, respectively), and Short Form-36 Health Survey (SF-36) were administered to both groups. The scores of TSK, RMDI, HADS-A, and HADS-D were significantly higher and SF-36 scores were significantly lower in the microdiscectomy than the control group ($p < 0.001$ for all). In the microdiscectomy group, median (min-max) RMDI, HADS-A, and HADS-D scores were 19 (4-34), 10 (0-18), and 9 (0-18), respectively, in kinesiophobic patients, and were significantly higher than 6 (2-20), 3 (0-11), 2.5 (0-11) in non-kinesiophobic patients (all $p < 0.001$). The median (min-max) SF-36 PCS, SF-36 MCS, and VAS scores for surgery satisfaction were 36.5 (8.7-75), 52.1 (11-95), 5, 5 (0-10), respectively, in kinesiophobic patients and were significantly lower than 71 (28-95), 85.5 (9-93), 8.5 (3-10) in non-kinesiophobic patients (all $p < 0.05$). TSK scores were significantly correlated with RMDI, HADS-A, HADS-D, SF-36, and surgery satisfaction scores (all $p < 0.05$). Kinesiophobic patients with lumbar microdiscectomy therefore showed greater disability and psychological morbidity, poorer quality of life, and lower satisfaction with surgery.

Key words: kinesiophobia, microdiscectomy, disability, quality of life, depression

Low back pain (LBP) is a common disorder that affects about 80% of adults at least once in their lifetime [1,2]. One of the most common causes of low back pain is lumbar disc herniation (LDH) [3]. LDH usually results from trauma or degeneration of the disc [4]. Surgical intervention is generally required for LDH when there is a progressive neurological deficit or impaired bladder and bowel function [5].

Physical activity and regular exercises are required for healing and recovery of muscle strength after lumbar

surgery. However, patients who have undergone lumbar surgery may develop kinesiophobia—a debilitating fear of physical movement stemming from a perceived risk of pain or reinjury [6,7]. Such fear often leads to avoidance of physical activity, increasing the risk of functional decline, chronic pain, depression, and anxiety [8].

Although kinesiophobia in patients with low back pain has been investigated in many studies [9-12], to our knowledge only one study has examined the prevalence of kinesiophobia in patients after lumbar discectomy.

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tomy and its association with their physical and psychological status [13]. Therefore, we aimed to evaluate kinesiophobia in patients who had undergone lumbar microdiscectomy and to examine its associations with pain intensity, disability, quality of life, depression, anxiety, and satisfaction with surgery.

Material and Methods

Forty-eight patients aged 18-70 years who had undergone lumbar microdiscectomy between January 2021 and January 2022 at the Diskapi Yildirim Beyazit Training and Research Hospital (Department of Neurosurgery, Ankara) were included in the study; all surgeries had been performed at least 6 months before enrollment. Patients' telephone numbers were retrieved from medical records and used to contact them for eligibility screening. Patients were excluded if they had undergone spinal surgery other than lumbar microdiscectomy or if they had peripheral neuropathy, neurological or orthopedic disorders, cognitive impairment, pregnancy, rest pain, rheumatological joint disease, or peripheral vascular disease. Forty-eight healthy volunteers matched for age and gender were included as a control group.

Written informed consent was obtained from all participants. The study was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the University of Health Sciences Local Institutional Ethics Committee (approval date: March 2, 2020; approval number: 81/02).

Demographic data (age, gender, education level, body mass index, occupation) and comorbidities of both groups were recorded. In the microdiscectomy group, time since surgery, surgical level, number of surgeries, satisfaction with surgery, return to work, duration and the duration and intensity of postoperative back and radicular pain were recorded. Outcome measures included the Tampa Scale for Kinesiophobia (TSK), Roland-Morris Disability Index (RMDI), Hospital Anxiety and Depression Scale (HADS), and Short Form-36 Health Survey (SF-36), which were administered to both groups.

A visual analog scale (VAS; 0-100 mm, where 0 indicates no pain and 100 indicates the worst imaginable pain) was used to assess the intensity of low back pain and radicular leg pain intensity during physical activity.

The RMDI was used to assess functional status. It consists of 24 yes/no questions, each scored as 1 for "yes" and 0 for "no." High scores indicate an increased level of disability. The Turkish version of the RMDI has been validated by Kucukdeveci *et al.* [14].

Kinesiophobia was assessed using the TSK; this scale consists of 17 items, each of which is scored on a 4-point Likert-type scale, ranging from "strongly disagree" to "strongly agree." Items 4, 8, 12, and 16 are reversely scored. The total score ranges between 17 and 68. Vlaeyen *et al.* developed a cut-off score of 37 and defined that scores greater than 37 indicated a high degree of kinesiophobia [15]. We used this cut-off score to identify patients with kinesiophobia. The validity and reliability of the Turkish version of the TSK were previously confirmed by Tunca-Yilmaz *et al.* [16].

Anxiety and depression were assessed using the HADS, which consists of 14 items with anxiety and depression subscales. Each item is scored between 0 and 3 and each subscale is scored between 0 and 21. Higher scores indicate greater levels of anxiety and depression. Aydemir *et al.* confirmed the validity and reliability of the Turkish version of the scale [17].

Health-related quality of life was evaluated using the SF-36, a 36-item questionnaire with 8 domains measuring physical and mental health status (physical component summary [PCS] and mental component summary [MCS], respectively). Each item is scored and summed according to a standardized scoring protocol. Each domain is scored between 0 and 100. Higher scores indicate better health status. The validity and reliability of the Turkish version of the SF-36 scale were confirmed by Kocyigit *et al.* [18].

Statistical Analysis. Statistical analysis was performed using PASW software, version 17.0 (SPSS Inc, Chicago, IL, USA). No power analysis was performed to determine the sample size. The Kolmogorov-Smirnov test was used to evaluate the distribution of normality. The unpaired *t*-test for normally distributed data and the Mann-Whitney *U* test for non-normally distributed data were conducted to compare the demographic and clinical characteristics between the groups. Pearson's chi-square test was used to analyze categorical data. Non-normally distributed variables were presented as median (minimum-maximum), and normally distributed variables as mean $\pm$ standard deviation. We used Spearman's rank correlation coefficients to assess the relationship between the TSK scores and age, education

level, number of lumbar microdiscectomies, time from surgery, pain intensity, satisfaction with surgery, disability level, anxiety, depression, and quality of life. Spearman's rank correlation coefficients were interpreted as follows: 0.81-1.0, very strong; 0.61-0.80, strong; 0.41-0.60, moderate; 0.21-0.40, weak; and 0-0.20, very weak [19]. Values of $p < 0.05$ were considered to represent a significant difference for all statistical analyses.

Results

There was no significant difference between the groups in terms of demographic characteristics, comorbidity, or body mass index ($p > 0.05$). Forty-three of the patients (89.6%) with microdiscectomy had low back pain and 38 patients (79.2%) had radicular pain after the surgery. The mean VAS score for surgery satisfaction in microdiscectomy patients was 6.2 ± 2.8 . Eighteen of 48 patients were employed before surgery and 15 (83.3%) returned to their full-time work after the surgery. Only 3 patients (16.7%) returned to part-time work instead of full-time after the surgery. The demographic and clinical characteristics of all study subjects

are shown in Table 1.

The median (min-max) scores of TSK, RMDI, HADS-A, and HADS-D were 45.5 (19-61), 17.5 (2-34), 8 (0-18), 8 (0-18) in the microdiscectomy group, respectively, and were significantly higher than the corresponding scores of 21 (17-50), 0 (0-15), 2.5 (0-8), and 3 (0-10) in the control group ($p < 0.001$). The median (min-max) scores of SF-36 PCS and MCS were 49.4 (8.7-95) and 62.2 (9.6-95.5) in the microdiscectomy group, respectively, and were significantly lower than the scores of 82.8 (67.5-98.7) and 86.8 (72-100) in the control group ($p < 0.001$). The TSK, RMDI, HADS, and SF-36 scores of all study subjects are shown in Table 2.

The rate of kinesiophobia was significantly higher in patients with microdiscectomy than in the control group: 70.8% vs. 18.7% ($p < 0.001$). Within the microdiscectomy group, there were no significant differences in age, education level, time since surgery, number of surgeries, low back pain VAS, or radicular leg pain VAS between the kinesiophobic and non-kinesiophobic patients. In the microdiscectomy group, median (min-max) scores of RMDI, HADS-A, and HADS-D were 19 (4-34), 10 (0-18), and 9 (0-18) in kinesiophobic

Table 1 Demographic and clinical characteristics of all study subjects [median (min-max), mean $\pm$ SD or n (%)]

	Surgery Group (n = 48)	Control Group (n = 48)	t, Z, χ^2	P-value
Age (year)	48 (29-69)	46 (22-69)	Z = -1.3	0.17
Gender				
Male	14 (29.2%)	15 (31.3%)	$\chi^2 = 0.04$	0.82
Female	34 (70.8%)	33 (68.7%)		
Education duration (year)	5 (5-17)	6.5 (5-15)	Z = -1.2	0.20
Occupation				
Worker	18 (37.5%)	23 (47.9%)	$\chi^2 = 5$	0.07
Housewife	26 (54.2%)	22 (45.9%)		
Retired	4 (8.3%)	3 (6.2%)		
BMI (kg/m ²)	30.1 $\pm$ 3.3	27.4 $\pm$ 4.9	t = 2.8	0.39
Number of comorbidity	0 (0-2)	0 (0-2)	Z = -1.7	0.08
Time from surgery (month)	42 (6-120)			
Number of microdiscectomy	1 (1-3)			
Level of microdiscectomy				
L4-5	29 (60.4%)			
L5-S1	17 (35.4%)			
L4-5, L5-S1	2 (4.2%)			
Low back pain duration (month)	6 (1-120)			
Low back pain VAS (mm)	63 $\pm$ 21			
Radicular pain duration (month)	6 (1-120)			
Radicular pain VAS (mm)	62 $\pm$ 23			

SD, standard deviation; BMI, body mass index

patients, respectively, and were significantly higher than the corresponding scores of 6 (2-20), 3 (0-11), 2.5 (0-11) in non-kinesiophobic patients ($p < 0.001$). The median (min-max) scores of SF-36 PCS, SF-36 MCS, and surgery satisfaction VAS were significantly lower in kinesiophobic patients than in non-kinesiophobic patients: 36.5 (8.7-75), 52.1 (11-95), and 5, 5 (0-10) versus 71 (28-95), 85.5 (9-93), and 8.5 (3-10), respectively ($p < 0.05$). Demographic and clinical characteristics of kinesiophobic and non-kinesiophobic patients with microdiscectomy are shown in Table 3.

Spearman's correlation analysis revealed strong positive correlations between TSK scores and RMDI, HADS-A, HADS-D, and the number of lumbar microdiscectomies ($p < 0.05$). TSK scores showed strong negative correlations with SF-36 PCS/MCS scores and with surgical satisfaction ($p < 0.05$). We did not find any significant correlations between TSK scores and age, education level, low back pain VAS, radicular pain VAS, or time from surgery ($p > 0.05$). Correlations between TSK scores and demographic and clinical characteristics are presented in Table 4 and Fig. 1-3.

Table 2 TSK, RMDI, HADS, and SF-36 scores of study subjects [median (min-max)]

	Surgery Group (n = 48)	Control Group (n = 48)	Z	P-value
TSK	45 (19-61)	21 (17-50)	-6.5	<0.001*
RMDI	17.5 (2-34)	0 (0-15)	-7.5	<0.001*
HADS-A	8 (0-18)	2.5 (0-8)	-4.7	<0.001*
HADS-D	8 (0-18)	3 (0-10)	-4.7	<0.001*
SF-36 PCS	49.4 (8.7-95)	82.8 (67.5-98.7)	-6.7	<0.001*
SF-36 MCS	62.2 (9.6-95.5)	86.8 (72-100)	-5.0	<0.001*

TSK, Tampa Scale for Kinesiophobia; RMDI, Rolland-Morris Disability Index; HADS-A, Hospital Anxiety and Depression Scale-Anxiety; HADS-D, Hospital Anxiety and Depression Scale-Depression; SF-36 PCS, SF-36 Physical Component Summary; SF-36 MCS, SF-36 Mental Component Summary.

*, statistically significant difference

Table 3 Demographic and clinical characteristics of kinesiophobic and non-kinesiophobic patients with microdiscectomy [median(min-max)]

	Kinesiophobics with surgery (n = 34)	Non-kinesiophobics with surgery (n = 14)	Z	P-value
Age (year)	49 (29-68)	47.5 (35-49)	-0.9	0.36
Education duration (year)	5 (5-15)	8 (5-17)	-1.4	0.16
Time from surgery (month)	40 (3-120)	42 (3-120)	-1.1	0.24
Number of surgery	1 (1-3)	1 (1-2)	-1.6	0.09
Surgery satisfaction VAS	5.5 (0-10)	8.5 (3-10)	-2.9	0.003*
Low back pain VAS	7 (2-10)	6 (3-9)	-1.1	0.24
Radicular pain VAS	7 (1-10)	5 (2-9)	-1.1	0.25
RMDI	19 (4-34)	6 (2-20)	-4.3	<0.001*
HADS-A	10 (0-18)	3 (0-11)	-3.7	<0.001*
HADS-D	9 (0-18)	2.5 (0-11)	-3.8	<0.001*
SF-36 PCS	36.5 (8.7-75)	71 (28-95)	-3.9	<0.001*
SF-36 MCS	52.1 (11-95)	85.5 (9-93)	-3.0	0.002*

RMDI, Rolland-Morris Disability Index; HADS-A, Hospital Anxiety and Depression Scale-Anxiety; HADS-D, Hospital Anxiety and Depression Scale-Depression; SF-36 PCS, SF-36 Physical Component Summary; SF-36 MCS, SF-36 Mental Component Summary.

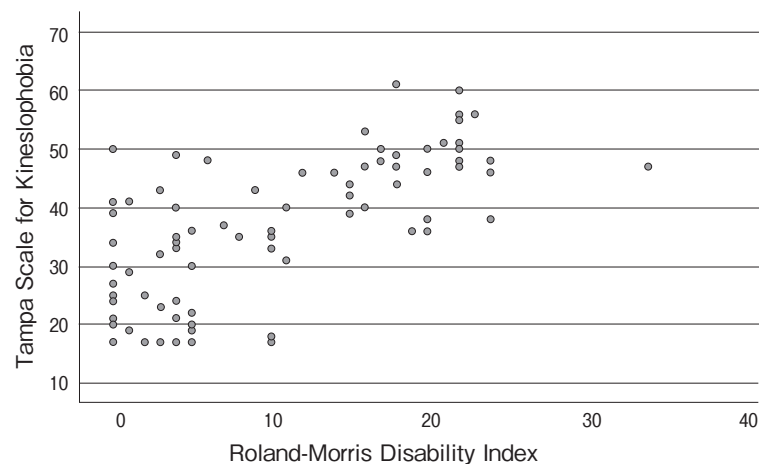
*, statistically significant difference

Table 4 Correlation of TSK scores with demographic and clinical characteristics of the study subjects

	TSK (r)
RMDI	0.69*
HADS-A	0.66*
HADS-D	0.65*
SF-36 PCS	-0.71*
SF-36 MCS	-0.61*
Surgery satisfaction	-0.49*
Number of microdiscectomy	0.42*
Time from surgery	-0.17
Age	0.14
Education duration	-0.07
Low back pain VAS	0.28
Radicular pain VAS	0.19

r, Spearman's correlation coefficient; TSK, Tampa Scale for Kinesiophobia; RMDI, Roland-Morris Disability Index; HADS-A, Hospital Anxiety and Depression Scale-Anxiety; HADS-D, Hospital Anxiety and Depression Scale-Depression; SF-36 PCS, SF-36 Physical Component Summary; SF-36 MCS, SF-36 Mental Component Summary.

*, statistically significant difference

**Fig. 1** Scatter plot showing positive linear correlation between kinesiophobia and functional disability.

Discussion

This study aimed to evaluate the level of kinesiophobia in patients who underwent lumbar microdiscectomy and to reveal its relationship with pain intensity, disability, quality of life, depression, anxiety, and surgical satisfaction. To the best of our knowledge, only one previous study has examined kinesiophobia prevalence and its association with such physical and psycho-

logical parameters in patients after microdiscectomy [13].

After lumbar microdiscectomy, regular exercise and return to normal physical activity are recommended to improve the disability, poor healing process, and negative outcomes of the surgery [9, 20]. Postsurgical patients sometimes develop kinesiophobia, a fear of pain or reinjury that can lead to avoidance of exercise and physical activity [3, 21-24]. We detected significantly

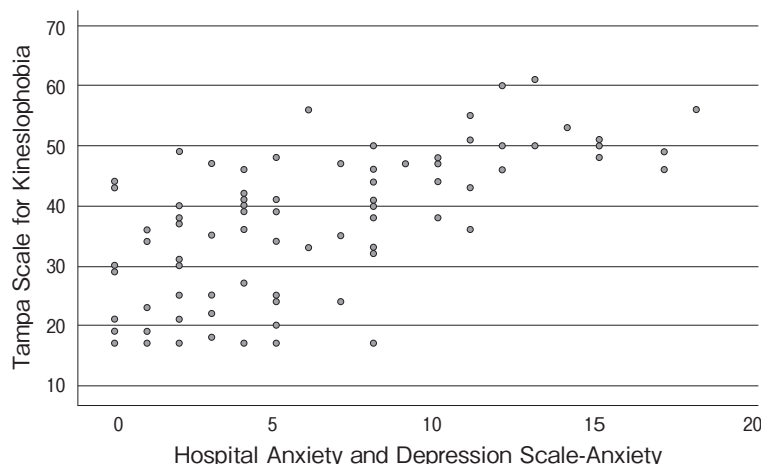


Fig. 2 Scatter plot showing positive linear correlation between kinesiophobia and anxiety.

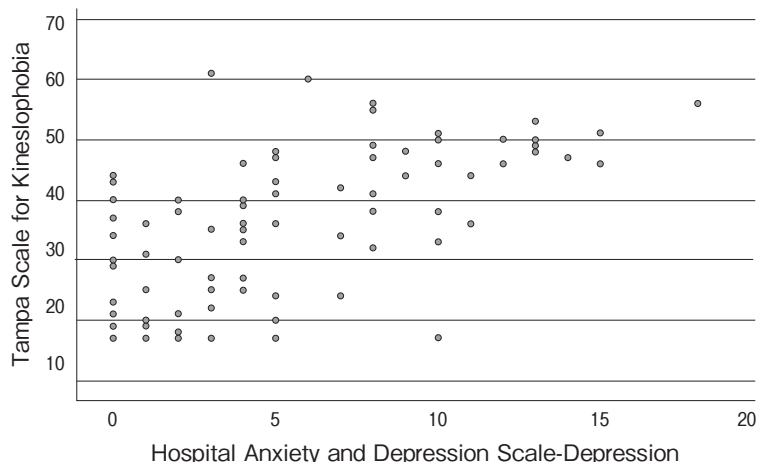


Fig. 3 Scatter plot showing positive linear correlation between kinesiophobia and depression.

higher scores of kinesiophobia in patients with lumbar microdiscectomy than in healthy subjects. Similarly, Silva *et al.* evaluated kinesiophobia in patients with low back pain and reported that these patients had higher scores of kinesiophobia than asymptomatic subjects [8]. Higher scores of kinesiophobia were also detected in elderly patients with spinal surgery [12]. In the present study, we chose a mean of >37 to classify the patients with kinesiophobia and detected that the rate of kinesiophobia was significantly higher in microdiscectomy patients than in normal subjects (70.8% and 18.7%, respectively). In the previous studies, the rate was found to be 45% in patients with open discectomy and 61% in patients with spinal surgery [10, 13]. The discrepancy in the studies can be explained by the different characteristics of the study populations, such as age and

different surgery types.

It has been reported that patients with lumbar disc surgery may have certain limitations in daily activities due to ongoing low back pain and leg pain [25]. Kinesiophobia, which is related to the avoidance of physical activities, may also contribute to disability after disc surgery. In a recent study, Archer *et al.* evaluated the effects of kinesiophobia in patients with cervical and lumbar spinal surgery for degenerative conditions such as spinal stenosis, spondylosis, or spondylolisthesis, and they revealed a relationship between kinesiophobia and increased disability [6]. Svensson *et al.* reported that kinesiophobic patients who underwent lumbar disc surgery had greater disability than non-kinesiophobic patients [13]. Consistent with these findings, we observed a higher degree of disability

in kinesiophobic patients after surgery. Moreover, a very strong positive correlation was found between kinesiophobia and disability, indicating that higher kinesiophobia scores were associated with greater disability. These results suggest that kinesiophobia may contribute to disability in patients following lumbar microdiscectomy.

Previous studies have shown a negative correlation between kinesiophobia and quality of life in patients with low back pain [23,24,26]. Archer *et al.* demonstrated that there was a relation between kinesiophobia and decreased quality of life in patients with cervical or lumbar spinal surgery for degenerative conditions [6]. Similarly, Svensson *et al.* reported that kinesiophobic patients with lumbar disc surgery had poorer quality of life than non-kinesiophobic patients [13]. In the current study, quality of life was impaired in kinesiophobic patients compared to non-kinesiophobic patients in the microdiscectomy group. We also detected strong negative correlations between kinesiophobia and physical and mental health. Collectively, these results suggest that quality of life is negatively affected by kinesiophobia in patients with lumbar microdiscectomy.

Anxiety and depression may contribute to the development of kinesiophobia in various disorders, including rheumatic and cardiovascular diseases [11,27,28]. Svensson *et al.* reported more symptoms of depression in kinesiophobic patients than in non-kinesiophobic patients after lumbar disc surgery [13]. Similarly, in the present study we found that kinesiophobic patients with surgery had significantly more depression and anxiety symptoms than non-kinesiophobic patients with surgery. We also detected a strong positive correlation between kinesiophobia and depression/anxiety. We can conclude that a high kinesiophobia score may be associated with high levels of depression and anxiety in microdiscectomy patients.

Patient satisfaction is increasingly recognized as an important patient-reported outcome measure for evaluating the efficacy of surgical interventions for spinal pathology [29]. Fair or poor satisfaction has been reported in approximately 33% of patients after recurrent lumbar microdiscectomy [30]. Kinesiophobia may contribute to patient dissatisfaction and the need for repeat surgery. In the present study, surgical satisfaction was significantly lower in kinesiophobic patients than in non-kinesiophobic patients. In addition, kinesiophobia was positively correlated with the number of

lumbar surgeries and negatively correlated with surgery satisfaction. However, no significant relationships were found between kinesiophobia and age, education level, pain intensity, or time since surgery. Similarly, Ishak *et al.* found no significant association between kinesiophobia and pain intensity in patients with low back pain [22], whereas Archer *et al.* reported that kinesiophobia was associated with increased pain in patients who underwent cervical or lumbar spinal surgery [6]. Svensson *et al.* also observed higher pain intensity in kinesiophobic patients following lumbar disc surgery [13]. These discrepancies among studies may reflect differences in sample characteristics, sample size, surgical procedures, or assessment scales.

This study has several limitations. First, the sample size was small, and no power analysis was performed to determine it; a calculate larger cohort would have increased the statistical power. Second, we assessed only the associations between kinesiophobia and patients' demographic and the clinical characteristics. Because of the cross-sectional design, causal relationships cannot be inferred. Future studies should investigate the effects of rehabilitation programs on kinesiophobia in patients who have undergone lumbar microdiscectomy.

In conclusion, patients with kinesiophobia after lumbar microdiscectomy showed greater disability and psychological morbidity, poorer quality of life, and lower satisfaction with surgery in our cohort. Kinesiophobia was significantly associated with impairment in these parameters. Physicians should be aware of fear of movement in patients scheduled for lumbar spine surgery to help prevent postoperative limitation in daily activities and quality of life. Patients should be counseled about kinesiophobia before surgery and encouraged to engage in regular physical activity during recovery. However, further studies with larger samples, structured rehabilitation interventions, and longer follow-up periods are needed to confirm the effects of kinesiophobia in this population.

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