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Examining the Relationship Between Kinesiophobia, Patient Mobility, and Activities of Daily Living in Patients with Chest Tubes After Thoracic Surgery: A Relational Study with Multiple Linear Regression Analyses

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Abstract

Background: Kinesiophobia, or the fear of movement due to anticipated pain or injury, is a significant psychological barrier that interferes with activities of daily living for many patients who have undergone thoracic surgery and had a chest tube placed.

Aim: This study aimed to examine the relationship between kinesiophobia, mobility, and activities of daily living in patients with chest tubes following thoracic surgery.

Methods: This study used a descriptive, correlational design. The research sample consisted of 110 patients with a chest tube following thoracic surgery. A patient identification form, the Katz Activities of Daily Living Scale (Katz ADL), the Tampa Scale of Kinesiophobia (TSK), and the Patient Mobility Scale (PMS) were used for data collection. Percentage distribution, arithmetic mean, multiple linear regression, and correlation analyses were used for data analysis.

Results: The study found that most patients (82.7%) were married, the majority were male (80.9%), and were unemployed (30.9%). In the study, the average total score of the Katz ADL was 13.30±2.33, the TSK score was 60.58±15.19, and the PMS score was 84.32±29.51. The study revealed that PMS and TSK were statistically significant predictors of Katz ADL ($p<0.001$). It was also shown that the total Katz ADL score showed a negative association with both PMS and TSK at a high level of statistical significance ($p<0.01$).

Conclusion: This study showed that patients who had a chest tube inserted after surgery experienced a negative impact on performing activities of daily living due to kinesiophobia and difficulty moving.

Keywords: Activities of daily living, chest tube, kinesiophobia, nursing, thoracic surgery

Introduction

Thoracic surgery is a surgical procedure commonly used to treat diseases of the lower respiratory system, such as the lungs, chest cavity, chest wall, and diaphragm.[1] After surgery, a chest tube is usually inserted and plays a critical role in the postoperative period to ensure adequate breathing and fluid management. A chest tube is used to drain air and fluid that have accumulated in the pleural space and to prevent fluid from flowing back into the pleural space. However, the insertion of a chest tube can cause a number of adverse effects in patients, including fear of movement (kinesiophobia), mobilization difficulties, and limitations in activities of daily living (ADL).[1-6]

Fear of movement is a psychological condition that has a negative impact on a patient's recovery after surgery. People undergoing chest tube placement may develop a reluctance to move due to fear of damaging the tube or increasing pain. This may limit the patient's ability to mobilize, increase the risk of postoperative complications, and prolong the recovery process.[5,7,8]

For patients who have had a chest tube inserted during thoracic surgery, this situation may limit their ability to perform certain movements related to the presence of the chest tube.[2] A study examining patients' experiences with chest tubes found that 72% of patients were unable to move comfortably.[9] Chest tubes that cause discomfort can also negatively affect patients' activities of daily living.[2,5] In reviewing the literature, it has been reported that the presence of chest tubes causes anxiety and discomfort in patients, and pain, especially during movement and coughing, leads to restricted movement.[10]

ADLs are generally considered in two dimensions: basic and instrumental ADLs. Basic ADLs include the care that a person must provide for himself/herself. Inadequacy in basic and instrumental activities of daily living, or dependence on others, are important factors that affect an individual's quality of life. It has been reported that quality of life deteriorates as physical disability increases. As an individual's level of dependency in performing ADLs increases, their emotional status and perception of health/illness may also be negatively affected. Patients who have a chest tube inserted after thoracic surgery may experience fear of movement and limitations in physical mobility due to the chest tube, and may have difficulty performing ADLs. In addition, restricted movement can negatively affect ADLs, causing patients to lose their independence.[5,11-13]

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Given the interrelationship between kinesiophobia, mobilization, and ADLs, a comprehensive nursing approach is required to address these challenges in patients with chest tubes. Nurses should focus on patients' care needs to help them overcome their fears, mobilize, and perform activities. This may include educating patients about the importance of exercise, providing coping strategies, and encouraging gradual exposure to activities that may cause anxiety.[5] A review of the literature found studies investigating levels of kinesiophobia, mobilization, and activities of daily living in patients with chest tubes after thoracic surgery. However, no studies were found that examined the relationship between kinesiophobia, mobilization, and ADLs in patients with chest tubes. There is a need to assess the levels of kinesiophobia, mobilization, and ADLs in patients with chest tubes after thoracic surgery. This study aimed to examine the relationship between kinesiophobia, activities of daily living, and mobility in patients with a chest tube following thoracic surgery.

Study Questions

1. What are the levels of kinesiophobia, mobility, and activities of daily living in patients with chest tubes following thoracic surgery?
2. What factors affect kinesiophobia, mobility, and activities of daily living in patients with chest tubes following thoracic surgery?
3. Is there a relationship between postoperative kinesiophobia, mobility, and activities of daily living in patients with chest tubes following thoracic surgery?

Materials and Methods

Sample and Study Design

This descriptive, correlational research was conducted in the thoracic surgery clinic of Dicle University Hospital between October 2024 and February 2025. All individuals who underwent thoracic surgery and chest tube thoracostomy during this period constituted the study population. Sample selection was performed using a haphazard non-probability method. To calculate the sample size, a power analysis using the G*Power 3.1 program (significance level of 0.05, medium effect size of 0.15, and representative power of 0.95) determined a target sample of at least 107 participants. A total of 123 patients were assessed for eligibility; 13 were excluded due to not meeting the inclusion criteria (n=8) or refusal to participate (n=5). A total of 110 patients completed the study. The flow diagram demonstrating participant eligibility and enrollment was created using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist (Fig. 1). At the end of the study, a post hoc power analysis using G*Power calculated the study power to be 1.00, with an effect size of 1.63, p=0.05, and a sample size of 110. These values indicate that the sample size was sufficient.[14]

The study included patients aged over 18 years who were oriented, had no hearing or vision problems, and had no difficulties with reading or writing in Turkish. Participants had undergone thoracic surgery and remained with a chest tube thoracostomy for 25–48 hours. Patients with neurological or psychiatric diagnoses affecting cognitive status and those who refused to participate were excluded.

Data Collection Tools

Data were collected by the researcher through two face-to-face interviews, one conducted 24 hours after surgery and the other after chest tube removal. A patient identification form, the Katz Activities of Daily Living Scale (Katz ADL), the Tampa Scale of Kinesiophobia (TSK), and the Patient Mobility Scale (PMS) were used for data collection.

Patient Identification Form

This form, developed by the researcher based on the literature, consists of 14 questions designed to collect data such as age, sex, education level, marital status, employment status, income level, smoking status, and surgical procedures performed.[2,13,15]

Katz Activities of Daily Living Scale

The scale was developed by Katz et al. to assess dependence and independence in basic ADLs. It consists of six basic ADLs: bathing, dressing, toileting, transferring, continence, and feeding. If ADLs are performed independently, three points are given; if they are performed with partial assistance, two points are given; and if they are not performed at all, one point is given. According to this scale, scores of 0–6 indicate dependence, 7–12 indicate semi-dependence, and 13-18 indicate independence. The Turkish validity and reliability study of the scale was conducted by Özkan Pehlivanoğlu et al.,[16] with a Cronbach's alpha reliability coefficient of 0.83.[2,13,16] In this study, the Cronbach alpha coefficient was 0.87.

Patient Mobility Scale

Developed to measure pain and difficulty after surgery, this scale asks patients to rate pain during four activities (turning in bed, sitting on the edge of the bed, standing at the bedside, and walking in the patient's room) using a visual scale (0–15 cm) and verbal expression. Scores increase in relation to the difficulty and pain experienced during each activity. Each item is scored from 0 to 15, and the total score ranges from 0 to 120. In the Turkish validity and reliability study, Cronbach's alpha coefficient of the PMS was found to be 0.90.[17] In this study, Cronbach's alpha coefficient was 0.95.

The Tampa Scale of Kinesiophobia

The TSK is a 17-item scale used to measure fear of movement/reinjury. It covers parameters related to injury and reinjury, as well as fear-avoidance in work-related activities. The scale uses a 4-point Likert format (1=strongly disagree, 4=strongly agree). Total scores range from 17 to 68 and are calculated by reversing items 4, 8, 12, and 16. Higher scores indicate greater levels of kinesiophobia. The original scale's intraclass correlation coefficient was 0.83, and Cronbach's α was 0.78; for the Turkish version, Cronbach's α was 0.75.[18] In this study, Cronbach's alpha coefficient was 0.91.

Data Collection

Study data were collected by the researcher between 09/09/2024 and 27/12/2024. Data were collected on weekdays between 16:00 and 17:00, with an average of two patients per day. The forms were completed in the thoracic surgery patient rooms and took approximately 15 minutes. The patient identification form was completed, and kinesiophobia, mobility, and ADLs were assessed 24 hours after surgery. No measurements were taken the day after chest tube removal; only length of hospital stay and time to chest tube removal were recorded.

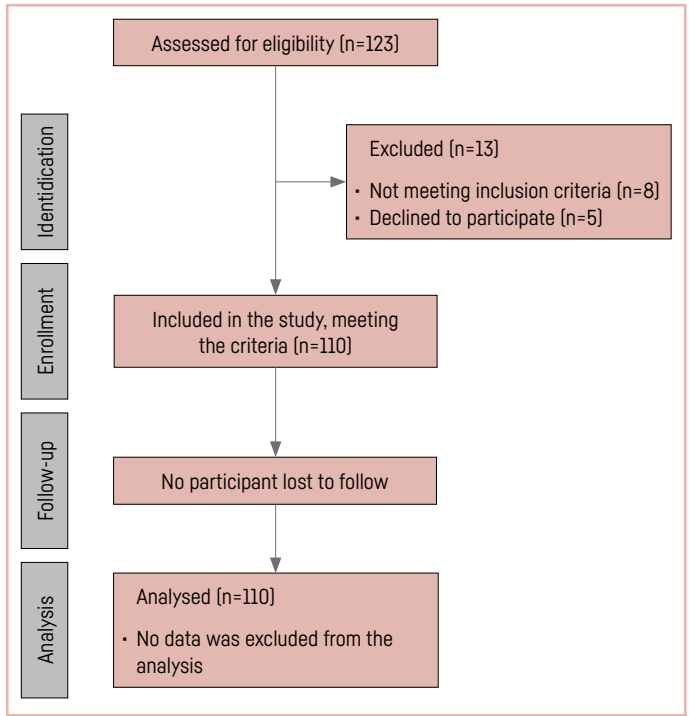

Figure 1. Flow diagram of study participants.

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Table 1. Sociodemographic and clinical characteristics of patients

Features	n=110	
	%	n
Marital status		
Single	17.3	19
Married	82.7	91
Gender		
Male	80.9	89
Female	19.1	21
Occupation		
Pensioner	21.8	24
Official	6.4	7
Farmer	2.7	3
Self-employed	23.6	26
Unemployed	30.9	34
Housewife	14.5	16
Income status		
Less than income	77.3	85
Equal to income	22.7	25
Over income	0	0
Education		
Illiterate	10.9	12
Literate	57.3	63
Elementary school	23.6	26
High school	8.2	9
Smoking status		
Yes	66.4	73
No	33.6	37
Presence of chronic disease		
Yes	37.3	41
No	62.7	69
Type of chronic disease		
Hypertension	11.8	13
Diabetes mellitus	4.5	5
Hypertension+diabetes mellitus	5.5	6
COPD	7.3	8
Heart disease	8.2	9

Features	n=110	
	%	n
Previous surgeries		
Yes	40.9	45
No	59.1	65
Clinic of previous surgery		
General surgery	10.0	11
Orthopedic surgery	6.4	7
Cardiovascular surgery	10.9	10
Eye surgery	5.5	6
Thoracic surgery	4.5	5
Urology surgery	5.5	6
Type of surgery performed		
Lobectomy	15.5	17
Wedge resection	9.1	10
Mass excision	18.2	20
Bullectomy	11.8	13
Pleurodesis	2.7	3
Pneumonectomy	10.9	12
Decortication	5.5	6
Cystidatic-capitonnage	7.3	8
Diaphragm repair	10.9	12
Segmentectomy	8.2	9

	Mean±SD (max-min)
Age	50.30±19.64 (18–76)
Cigarette use (years)	27.01±15.64 (2–50)
Daily mobilization	6.09±2.72 (2–15)
Length of hospital stay (days)	6.33±3.84 (3–16)
Time to chest tube removal (days)	6.17±2.44 (3–14)
Katz ADL score	13.30±2.33 (8–18)
TSK score	60.58±15.19 (17–68)
PMS score	84.32±29.51 (12–120)

Katz ADL: Katz activities of daily living scale, TSK: Tampa scale of kinesiophobia, PMS: Patient mobility scale, COPD: Chronic obstructive pulmonary disease.

Statistical Analysis of Data

The research data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0 (IBM Corp., Armonk, NY, USA). Data distribution was assessed using the Kolmogorov–Smirnov test. Descriptive statistics (means, numbers, percentages, standard deviations) were used. The Student's t-test and one-way analysis of variance (ANOVA) were used to compare independent variables. The Pearson correlation test was used to analyze relationships. Multiple linear regression analyses were used to estimate associations between categorical or continuous variables. Statistical significance was accepted as $p<0.05$.

Ethical Considerations

To conduct the research, ethical approval was obtained from Mardin Artuklu University Non-interventional Clinical Research Ethics Committee (Approval Number: 2024/8-27, Date: 06.08.2024). Permission for the clinical study was also obtained from Dicle University Hospital (decision no. E-22040584-900-769981; 06/09/2024). Participants were informed about the study's purpose, duration, and scope, and written informed consent was obtained, with an explanation that participation was voluntary. The study was conducted in accordance with the Helsinki Declaration.

Results

The study found that most patients (82.7%) were married, male (80.9%), and unemployed (30.9%). Many patients reported an income below their expenses (77.3%), and a substantial proportion were elementary school graduates (66.4%). A large percentage of patients were smokers (66.4%), and over one-third had a chronic disease (37.3%). Many patients had a history of surgery (40.9%), with some having undergone general surgery (10.0%) and others having hypertension in addition to the disease for which they underwent surgery (11.8%). The average age of the patients was 50.30±19.64 years. The mean length of hospital stay was 6.33±3.84 days, the mean number of daily mobilizations was 6.09±2.72, and the mean time to chest tube removal was 6.17±2.44 days. The mean Katz ADL score was 13.30±2.33, the mean TSK score was 60.58±15.19, and the mean Patient Mobility Scale score was 84.32±29.51 (Table 1).

Multiple linear regression analysis was performed using daily mobilization, time to chest tube removal, total kinesiophobia scale score, and total Patient Mobility Scale score as independent variables to evaluate activities of daily living in patients who underwent thoracic surgery. The regression model was found to be statistically sig-

Table 2. Predictors of katz activities of daily living (ADL) in patients

Variables	B	SE	β	t	p
TSK score	-0.08	0.01	-0.55	-5.21	0.00**
PMS score	-0.02	0.00	-0.26	-2.50	0.01*
Daily mobilization	0.05	0.05	0.06	1.15	0.25
Time to chest tube removal (days)	0.03	0.05	0.03	0.57	0.56
	R=0.80	R^2=0.62	F=46.84	p=0.00***	Durbin-Watson=1.42

*: p<0.05, **: p<0.01, ***: p<0.001. Katz ADL: Katz activities of daily living scale, TSK: Tampa scale of kinesiophobia, PMS: Patient mobility scale, B: Regression coefficient, SE: Standard error.

nificant and appropriate for use (F=46.84, p<0.001). In the model, t-test results for the regression coefficients showed that as participants' kinesiophobia levels (t=-5.21, p<0.01) and PMS levels (t=-2.50, p<0.05) decreased, their ADL level increased. The scale scores and variables explained 6.2% of the total variance (Table 2).

Analysis of continuous variables and total scale scores revealed a strong, statistically significant negative relationship between ADL and TSK (r=-0.78, p<0.01), and a strong, statistically significant negative relationship between PMS and ADL (r=-0.73, p<0.01). PMS and TSK also showed a strong, statistically significant positive relationship (r=0.82, p<0.01). Daily mobilization demonstrated a very weak but statistically significant positive relationship (r=0.17, p<0.05) (Table 3).

Table 3. Relationships between kinesiophobia, patient mobility, and activities of daily living in patients (n=110)

Variables	1	2	3	4	5
Katz ADL score					
TSK score	-0.78**				
PMS score	-0.73**	0.82**			
Daily mobilization	0.17*	-0.14	-0.09		
Time to chest tube removal (days)	0.04	0.03	-0.09	0.06	

*: p<0.05, **: p<0.01. Katz ADL: Katz activities of daily living scale, TSK: Tampa scale of kinesiophobia, PMS: Patient mobility scale.

Discussion

Kinesiophobia, or fear of movement due to anticipated pain or injury, is a significant psychological barrier that interferes with activities of daily living for many patients who have undergone thoracic surgery and had a chest tube placed. These patients typically experience substantial physical discomfort and may be afraid to move for fear that movement will worsen their condition or cause pain. This fear can lead to reduced mobility, which is crucial for recovery.[5,7,8] Previous studies have reported that the presence of chest tubes causes anxiety and discomfort in patients, and that pain, especially during movement and coughing, leads to restricted movement.[10]

In this study kinesiophobia, patient mobility, activities of daily living, and influencing factors were examined in patients undergoing chest tube thoracotomy. The average TSK total score was 60.58±15.19, with scores above 37 indicating high levels of kinesiophobia.[18] Accordingly, our findings indicate that patients with chest tubes experience high levels of kinesiophobia. In the study by Tunca Yılmaz et al.[19] examining the test-retest reliability of the Turkish version of the TSK, the mean score was 41.54±6.96. Possible reasons for the high levels of kinesiophobia include the belief that pain will worsen with movement. In addition, anxiety and discomfort caused by chest tubes, as well as fear of damaging or re-injuring the surgical site, may cause patients to avoid movements that require muscle strength.

In the present study, patients demonstrated a relatively high level of mobility according to the mobility scale. Similarly, another study reported a mean postoperative Patient Mobility Scale score of 59.18.[20] Despite mobility levels being above average in both studies, it was concluded that patients experienced increased pain and difficulty with movement. Several studies in the literature have shown that patients experience varying levels of difficulty with movement in the early postoperative period.[17,21,22] In a study by Yolcu et al.[21] involving 80 individuals, the mean Patient Mobility Scale score was found to be 27.64±7.34. It is possible that this difference is due to the fact that the participants in the study belonged to multiple groups, including orthopedic, cardiovascular, and general surgery patients, as opposed to a single group of patients with chest tubes in this study. A study examining the effect of mobilization training on postoperative mobilization in patients undergoing lumbar disc surgery found median mobilization levels of 41 and 50 in the experimental and control groups, respectively.[17] Sivrikaya et al.[22] separately assessed patients undergoing open-heart surgery in terms of turning from side to side in bed, sitting at the edge of the bed, standing at the bedside, and walking in the patient room, and found that patients experienced moderate difficulty. Although these two studies did not examine total scale scores, their findings support the results of the present study.

In this study, patients were assessed as independent in terms of activities of daily living based on the total ADL score. Although no studies specifically examining thoracic surgery patients were found in the literature, one study reported that a large proportion of patients who underwent surgery experienced difficulties in performing activities of daily living in the postoperative period.[12] Yaman Çelik and Durmaz Edeer concluded that 100% of patients undergoing thoracostomy after thoracic surgery were able to perform continence-related ADLs independently, 89.2% feeding, 64.6% toileting, 48.5% transferring, and 49.2% bathing.[2] Their study evaluated patient independence based on the ADL scale. However, it did not report a mean score. Despite its percentage-based, proportional approach, the high level of independence in activities of daily living is similar to the findings of this study.

In a study of patients who had undergone total hip and total knee arthroplasty, the mean ADL score was 12.60±3.21, indicating that these patients were partially dependent on their activities.[23] In a study conducted by Koç et al.[24] in 2012, which investigated the level of independence of orthopedic patients, it was found that patients had a high level of dependence. Based on these results, it was observed that the mobilization status was impaired or insufficient in major surgeries that may affect activities of daily living.

Our findings indicate that the PMS was a significant predictor for ADLs in patients with chest tubes. A strong negative correlation was observed between total ADL scores and PMS scores, indicating a negative association between ADL and PMS. This finding suggests that pain and difficulty experienced during movement increase as patients reach a higher level of independence in ADLs. A review of the literature did not identify studies that assessed both mobility and activities of daily living in patients after thoracic surgery. However, studies involving chest tubes in thoracic surgery have shown that early postoperative mobilization, particularly within the Enhanced Recovery After Surgery (ERAS) protocol, and increased physical activity have significant positive effects on respiratory function and recovery speed. The findings of this study therefore support the importance of mobility in performing activities of daily living.[25,26] According to the ERAS protocol, thoracic surgery patients who receive effective pain management and begin mobilization within 24 hours experience fewer postoperative complications and recover more quickly.[8,27] Consequently, it is thought that the return to activities of daily living is faster because patients experience less pain after surgery and begin mobilizing earlier.

In addition, the findings revealed that in patients with chest tubes, kinesiophobia was the primary predictor of ADLs. A strong negative correlation was observed between total ADL scores and TSK, indicating a negative association between ADL and kinesiophobia. This study shows that increased kinesiophobia associated with the presence of chest tubes makes it more difficult for patients to perform activities of daily living during movement. This may be due to concerns about possible com-

plications, such as falling or dislocating the chest tube while performing activities or moving. Previous studies have shown that fear of movement and concern about damaging the surgical site after spinal surgery affect patients' fear of falling. Kinesiophobia has been found to increase fear of falling in patients who have undergone spinal surgery, and these patients are often reluctant to move during the early recovery period due to fear of falling.[20] This study is, to our knowledge, the first in the literature to investigate the relationship between levels of kinesiophobia and ADLs in postoperative patients with chest tubes.

Study Limitations

Despite the significant findings of the study, there are some limitations. Firstly, the study sample consisted of patients who underwent surgery in the thoracic surgery clinic of only one hospital. The results of this single-center study may have limited generalizability to the wider patient population. Second, the study focused only on early postoperative effects and did not evaluate long-term outcomes, such as rehospitalization, or examine relationships between variables. Third, data were collected through patient self-reports and researcher observations, which may have led to bias or incomplete information, potentially affecting the study's results. The study can account only for accurately measured variables or characteristics and cannot control for bias due to unmeasured confounding factors.

Conclusion

The findings of this study indicated that kinesiophobia and decreased mobility were significantly associated with reduced independence in ADLs in patients with chest tubes following thoracic surgery. These results suggest that fear of movement and functional mobility limitations should be considered important components of nursing assessment and care planning for this patient population. Although causal relationships cannot be established due to the correlational design of the study, the strong associations observed highlight the clinical relevance of systematically evaluating levels of kinesiophobia, mobility, and ADLs in the postoperative period. From a nursing perspective, these findings underscore the importance of closely monitoring patients' movement-related fears and functional status and integrating these factors into individualized care plans. Nurses may play a key role in identifying patients at risk for functional dependence and in supporting care strategies aimed at promoting safe mobilization and maintaining independence in ADLs. In this context, surgical nurses are encouraged to consider incorporating psychoeducational and supportive approaches targeting kinesiophobia and mobility into routine postoperative care and follow-up. Future longitudinal and multicenter studies with larger samples are recommended to further examine nursing approaches aimed at reducing kinesiophobia and enhancing mobility, and to investigate their associations with functional recovery, quality of life, and post-discharge outcomes. In addition, qualitative studies exploring patients' experiences of kinesiophobia related to chest tubes may provide deeper insight into their perceptions and needs and help guide the development of patient-centered nursing interventions.

Ethics Committee Approval: The study was approved by the Mardin Artuklu University Non-interventional Clinical Research Ethics Committee (Approval Number: 2024/8-27, Date: 06.08.2024).

Informed Consent: Written informed consent was obtained from the participants.

Conflict of Interest: The authors have no conflicts of interest to declare.

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