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The correlations between kinesiophobia and shoulder pain, joint position sense, quality of life, and functional performance in patients with shoulder instability: A cross-sectional study

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ABSTRACT

Introduction: Shoulder pain significantly affects quality of life and functional performance. Psychological factors, particularly kinesiophobia, fear of movement due to anticipated pain or injury, are crucial to consider, as they can intensify pain and hinder recovery. This study aimed to explore the relationship between kinesiophobia and various dimensions of shoulder pain, including pain intensity, functional limitations, and quality of life.

Methods: A cross-sectional study was conducted with 80 participants (60 males, 20 females) experiencing shoulder pain. Participants completed the Tampa Scale for Kinesiophobia (TSK), the Shoulder Pain and Disability Index (SPADI), and the Quality of Life Index (QOL). Spearman's correlation and regression analyses were used to assess the relationships between kinesiophobia, pain, and function. Significance was set at $p \leq 0.05$.

Results: A weak but statistically significant positive correlation was found between TSK and SPADI ($\rho = 0.237$, $p = 0.027$). No significant correlations were observed between TSK and QOL ($\rho = -0.058$, $p = 0.617$) or JPS at 50°, 90°, and 125° of flexion (all $p > 0.05$). TSK significantly predicted SPADI scores ($\beta = 0.260$, $p = 0.015$), with each unit increase in TSK corresponding to a 0.574-point increase in SPADI.

Conclusion: Our findings indicated that higher TSK scores were associated with increased SPADI scores in individuals with shoulder instability and pain, but show little correlation with QOL or JPS.

Keywords: joint position sense, kinesiophobia, quality of life, shoulder instability, shoulder pain.
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INTRODUCTION

The shoulder joint complex, which includes the clavicle, scapula, and humerus, connects at the glenohumeral, sternoclavicular, and acromioclavicular joints. Muscle force secures the shoulder girdle to the thorax, creating a stable base for upper extremity movement.[1,2] The shoulder's need to balance mobility with stability makes it prone to injury and instability.[3] Studies suggest instability often results from repetitive microtrauma, especially in athletes and active people with a naturally loose joint capsule. Additionally, psychological factors can influence the effectiveness of interventions for shoulder pain.[4,5]

Kinesiophobia is an excessive, irrational, and debilitating fear of movement stemming from a perceived vulnerability to painful injuries or re-injuries.[6] For the last 20 years, it has emerged as a primary factor in musculoskeletal pain.[7] Kinesiophobia is also characterized by a negative interpretation of pain, an inability to separate negative thoughts from the pain experience, and feelings of helplessness. The condition can result from a direct encounter with pain or trauma or be learned through social interactions like observation or guidance.[8]

Joint position sense (JPS), a component of proprioception, assesses the ability to replicate joint angles during active or passive movements in both open and closed chain exercises.[9] JPS is crucial for maintaining muscle stiffness and coordination around the joint, enabling smooth movement, efficient task performance, and reducing the risk of injury. This sensory feedback is especially important for shoulder function, where stability is often compromised for a greater range of motion.[10]

Activities of Daily Living (ADLs) are commonly assessed using tools that target specific body parts. Functional tasks like

cooking and sweeping are key indicators of one's ability to perform essential daily activities.[11] Shoulder strength, mobility, and stability are especially important for maintaining function and health in individuals with shoulder pathologies.[12]

Quality of life (QOL) is a broad concept encompassing health, functionality, socioeconomic status, psychological and spiritual well-being, and family dynamics. It reflects individuals' satisfaction with life based on cultural, ethical, and religious values. Enhancing QOL can improve patient outcomes by addressing illness-related challenges.[13] It is also a useful measure of patient happiness and treatment goals.[14,15] Kinesiophobia negatively impacts QOL by promoting movement avoidance, which can lead to disability, hinder performance, and complicate pain management. Moreover, shoulder pain has been shown to impair both physical and mental aspects of QOL.[16]

Kinesiophobia can influence how pain and related information are processed, with a positive correlation indicating that higher pain levels are associated with increased fear of movement, especially in individuals with chronic musculoskeletal pain.[6] Although no specific tool exists to measure kinesiophobia, it is commonly assessed using the Tampa Scale of Kinesiophobia (TSK). While interest is growing in the individual effects of kinesiophobia, JPS, and functional performance, few studies have examined their interrelationships, particularly in those with shoulder instability. This gap underscores the need for further research into how psychological factors, such as fear of movement, affect proprioceptive accuracy and shoulder function.[18,19] Understanding the impact of kinesiophobia on JPS is crucial, as it may delay rehabilitation. Moreover, studies have shown that increased kinesiophobia can worsen pain, disability, and QOL.[6]

This study aimed to examine the relationship between kinesiophobia and shoulder pain, joint position sense, and functional performance in individuals with shoulder instability. Understanding these associations offered valuable insights to guide rehabilitation and improve recovery outcomes. The null hypothesis of this study posits that there are no correlations between kinesiophobia and shoulder pain, JPS, QOL, and functional performance in patients with shoulder instability. Conversely, the alternative hypothesis suggests that significant correlations do exist between kinesiophobia and these clinical outcomes. Identifying such relationships may contribute to the development of more comprehensive rehabilitation strategies that address both the physical and psychological aspects of recovery in this population.

METHODS

This cross-sectional study included 80 male and female patients diagnosed with shoulder instability at King Abdulaziz Hospital in Makkah, Saudi Arabia. Participants were selected using non-probabilistic convenience sampling based on predefined inclusion criteria. Ethical approval was obtained from the Institutional Review Board of the Saudi Ministry of Health (H-02-K-076-1223-1054).

The required sample size was calculated using G*Power 3.1.9.4, referencing prior studies that utilized the TSK. Using a power of 0.80, alpha of 0.05, beta of 0.20, and a correlation coefficient of 0.30, the minimum required sample size was determined to be 67. To minimize bias and improve reliability, the final sample size was increased to 80 participants. The flow chart was shown in Figure 1.

Inclusion criteria consisted of males and females aged 25–60 years diagnosed with shoulder instability. Exclusion criteria included any history of psychiatric disorders, neurological deficits, or previous shoulder fractures. Eligible individuals were informed of the study's objectives, benefits, potential risks, and time commitments. Those who agreed to participate signed a written informed consent form.

The participants' demographic data, including age, height, and weight, were recorded. They completed three self-reported questionnaires: the TSK, the Shoulder Pain and Disability Index (SPADI), and the QOL Index. JPS was assessed using a universal goniometer by trained physiotherapists following standardized procedures, which included assessor training, equipment calibration, and clear instructions. All data were securely stored on a password-protected

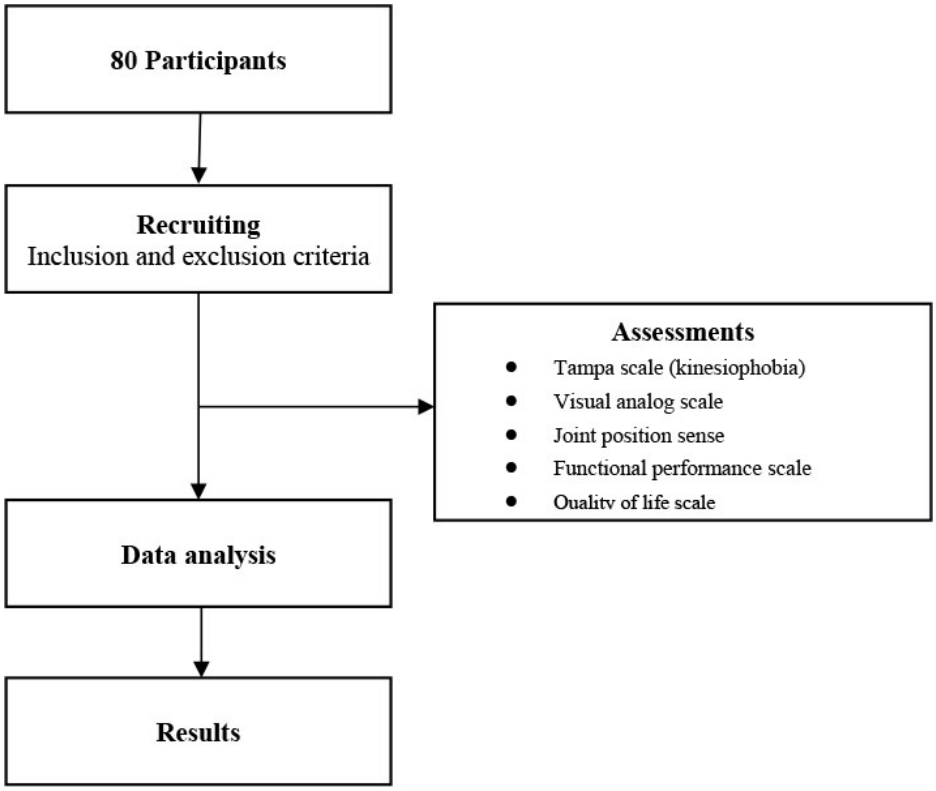

Figure 1. The flow chart of the study.

laptop. Safety protocols were followed to prevent and address adverse events such as muscle spasms, with clinical support provided as necessary.

The TSK consisted of 17 items rated on a 4-point Likert scale, with total scores ranging from 17 (no kinesiophobia) to 68 (severe kinesiophobia). A score of 37 or higher indicated the presence of kinesiophobia. JPS was measured by assessing shoulder flexion at three angles (55°, 90°, and 125°), using three trials per angle. The goniometer was positioned according to standard anatomical landmarks to ensure accurate measurement.

Pain intensity was measured using the Visual Analog Scale (VAS), where participants marked their pain level on a 0–10 cm line, with 0 indicating no pain and 10 indicating the worst pain imaginable. SPADI included 13 items—five assessing pain and eight assessing disability—scored using VAS, where higher scores indicated greater dysfunction. The QOL Index, developed by Ferrans and Powers, included two sections with 33 items each, rated on a 1–6 scale to assess satisfaction and importance. Scores from both sections were weighted and summed, ranging from 0 to 30, with scores ≥19 reflecting high quality of life.

Statistical analysis was performed using SPSS version 20.0. Descriptive statistics, including means and standard deviations, were calculated. Data normality was assessed using the Shapiro-Wilk test, histograms, and Q-Q plots. Pearson correlation coefficients were used to examine the relationships between kinesiophobia and variables such as pain intensity, JPS, QOL, and functional performance. Simple linear regression analysis was conducted to evaluate the predictive role of kinesiophobia on these outcomes. Statistical significance was set at $p \leq 0.05$.

RESULTS

Table 1 presents the participants' characteristics, showing no significant demographic differences between males and females. Normality testing using the Kolmogorov–Smirnov test indicated that the data were not normally distributed. Therefore, Spearman's correlation was used to examine relationships among TSK, SPADI, QOL, and JPS at flexion angles of 50°, 90°, and 125°. A weak but statistically significant positive correlation was found between TSK and SPADI (rho = 0.237, p = 0.027), suggesting that higher kinesiophobia is associated with increased shoulder pain and disability. In contrast, TSK showed a very weak, non-significant negative correlation with QOL (rho = −0.058, p = 0.617). Similarly, correlations between TSK and JPS were very weak and non-significant at 50° (rho = 0.089, p = 0.415), 90° (rho = −0.098, p = 0.367), and 125° (rho = −0.145, p = 0.181) (Table 2).

Regression analysis identified TSK as a significant predictor of SPADI scores, with the model indicating a weak to moderate effect. Each 1-point increase in TSK corresponded to a 0.574-point rise in SPADI, with the intercept representing the baseline SPADI score when TSK is zero, also statistically significant. These findings suggest that while kinesiophobia is weakly but significantly associated with shoulder pain and disability, its relationship with QOL and JPS is minimal and not statistically significant (Table 3).

DISCUSSION

Statistical analysis revealed a weak but significant positive correlation between TSK and SPADI scores. Regression analysis showed that a 1-point increase in TSK was associated with a 0.574-point rise in SPADI, indicating a weak to moderate effect. This suggests that kinesiophobia may not be the primary contributor to shoulder pain and disability; factors such as the chronicity or type of injury may play a more significant role in shoulder instability. Previous studies have reported similar correlations between TSK and SPADI in various shoulder pathologies, including shoulder impingement syndrome, shoulder pain, subacromial impingement syndrome, and chronic shoulder pain.[31–34]

Brahmakshatriya and Banker documented a notable positive correlation between TSK and SPADI in individuals with shoulder impingement syndrome, reporting a moderate-strength association, stronger than that found in the current study.[31] Mintken et al.

Table 1. The demographic characteristics of the participants

Gender	Male (n=60)	Female (n=20)	Average
Height (CM)	167.21	160	163.6
Weight (KG)	74.47	69.45	71.96
BMI	26.6	27.1	26.85
Age (years)	47.94	47.4	47.67

n, number of participants

Table 2. Spearman's correlation coefficients between the parameters

	TSK	SPADI	QOL	JPS 50°	JPS 90°	JPS 125°
TSK	1	0.237 (p=0.027)	-0.058 (p=0.617)	0.089 (p=0.415)	-0.098 (p=0.367)	-0.145 (p=0.181)

JPS test scores were measured at flexion angles of 50°, 90°, and 125°.

JPS, joint position sence; SPADI, Shoulder Pain and Disability Index; TSK, Tampa Scale for Kinesiophobia; Quality of Life Index (QOL).

Table 3. Linear regression analysis showing the predictive relationship between the Tampa Scale for Kinesiophobia as the independent variable and SPADI as the dependent variable

Model	Unstandardized Coefficients (B)	Standard Error	Standardized Coefficients (Beta)	*t*-value	*p*-value
Constant	26.861	9.552	-	2.812	0.006
TSK Scale	0.574	0.231	0.26	2.485	0.015

SPADI, Shoulder Pain and Disability Index; TSK, Tampa Scale for Kinesiophobia.

observed a significant correlation between TSK and the SPADI pain subscale, although no correlation was found with the disability subscale.[32] However, they reported significant correlations between the Fear-Avoidance Beliefs Questionnaire (FABQ), which assesses how fear and avoidance beliefs influence pain and disability, and both SPADI subscales.[32] While the correlation between TSK and SPADI was not the primary focus of Clausen et al.'s study, they found a weak to moderate positive association in patients with subacromial impingement syndrome.[33] Similarly, Kocyigit and Akyol identified a moderate to strong correlation between TSK and both SPADI subscales in individuals with chronic shoulder pain.[34]

Consistent with these findings, our results suggest that patients with elevated TSK scores are at increased risk for significant shoulder pain and disability. This may be due to the complex interplay of fear avoidance behaviors, reduced mobility, heightened pain sensitivity, and psychological factors. Therefore, addressing kinesiophobia through targeted interventions, such as cognitive-behavioral therapy and graded exposure to movement, may be essential for improving clinical outcomes in this population.

Our findings suggest that higher levels of kinesiophobia are associated with reduced QOL. One possible explanation is that restricted joint mobility increases fear of movement, which may be exacerbated by psychological factors and heightened pain perception. Fear of reinjury can also hinder proper exercise participation, further diminishing QOL. Although the correlation between TSK and QOL in this study was weak and negative ($r = -0.058$, $p = 0.617$), it reflects a trend seen in previous research. Studies on patients with chronic subacromial pain syndrome, chronic low back pain, and neck pain have consistently reported a negative relationship between kinesiophobia and QOL.[35–37]

A positive but non-significant correlation was observed between TSK and JPS at 50° ($r = 0.089$, $p = 0.415$), while weak negative correlations were found at 90° ($r = -0.098$, $p = 0.367$) and 125° ($r = -0.145$, $p = 0.181$). These findings suggest that participants had poor JPS at 50°, supporting the idea that elevated TSK may impair proprioceptive accuracy within this range.[22] One possible explanation is that fear of movement leads individuals to avoid pain-inducing activities, resulting in reduced exposure to functional movement patterns and diminished proprioception. Additionally, the association between high TSK and increased shoulder pain may further disrupt joint position awareness by heightening pain perception.[22]

Tsuda et al. found significantly reduced JPS in individuals with traumatic shoulder instability compared to healthy controls.[38] Beyond the 50° angle, patients may rely on compensatory movements, particularly at 90° and 125°, to avoid discomfort, which could account for the negative correlations. These compensatory strategies likely disrupt normal proprioceptive input.[22] Psychological factors also contribute; Yoon et al. noted that patients with shoulder instability reported mild pain even before rehabilitation, indicating that anticipated pain may influence their perception of movement and discomfort.[39]

This study had several limitations that should be considered when interpreting the results. The sample was predominantly male, which may have influenced outcomes due to physiological gender differences. Participant data on qualifications and occupations were not collected, potentially affecting their awareness and experience with shoulder conditions. The wide age range (25–60 years) lacked subgroup classifications, limiting age-specific analysis. Additionally, the relatively small sample size may reduce the reliability of the findings. A broader, more diverse sample across different regions in Saudi Arabia would offer a more comprehensive perspective.

CONCLUSION

This study investigated the relationships between kinesiophobia, shoulder pain, JPS, and functional performance in individuals with shoulder instability. TSK scores showed a positive correlation with SPADI and JPS at 50° of flexion, but not at 90° or 125°. A negative correlation was found between TSK and QOL. Future research should categorize participants by age and pain levels to better assess shoulder outcomes. Increasing the sample size would enhance the accuracy and generalizability of results. Longitudinal studies, exploration of diverse demographics, and comparisons using alternative assessment tools are also recommended. As this study was limited to King Abdulaziz Hospital in Makkah, future studies should include multiple cities and hospitals across the country.

CONFLICT OF INTEREST

The authors declare no conflicts of interest, financial or otherwise, that could influence their roles, responsibilities, or decisions. This statement affirms their commitment to transparency and integrity.

FUNDING

This study was entirely self-funded by the researchers, with no external financial support, to ensure transparency and integrity in reporting.

ETHICAL CONSIDERATION

The study was approved by the Institutional Review Board of the Saudi Ministry of Health (H-02-K-076-1223-1054), and all participants provided informed consent.

AUTHOR CONTRIBUTIONS

ATK, RSA, SBH, RGB, AMA, AMG, and RBA conceived the study design. All authors contributed to data collection. Data analysis was performed by ATK, AMA, AMG, and RBA. The manuscript was written by ATK, RGB, MAA, and AMG; reviewed by ATK, RSA, SBH, NKA, SMA, RGB, AMA, ASA, MAA, AMG, and RBA; and revised by ATK, MSA, MAA, and AMG.

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