Original Article

Association between Sleep Quality and Musculoskeletal Pain in Patients with Osteoarthritis

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ABSTRACT

Background: Osteoarthritis (OA) is a prevalent degenerative joint disease that significantly impacts quality of life, primarily through pain and disability. Existing research indicates a strong correlation between sleep quality and pain management in OA patients, suggesting that sleep may play a crucial role in modulating perceived pain and overall well-being.

Objective: The objective of this study was to investigate the association between sleep quality and musculoskeletal pain in patients diagnosed with osteoarthritis, aiming to identify potential therapeutic targets for improving patient outcomes.

Methods: This cross-sectional study was conducted at the University of Lahore teaching hospital, Jinnah Hospital. After obtaining approval from the hospital's ethics committee and informed consent from participants, data was collected using the Numeric Pain Rating Scale (NPRS) and Pittsburgh Sleep Quality Index (PSQI) from 170 diagnosed osteoarthritis patients of varying ages (18-40 years). The data were statistically analyzed using SPSS version 25, employing descriptive statistics for demographic data, and chi-square tests to explore the association between sleep quality and pain levels.

Results: The mean age of the study participants was 28.74 (SD = 7.001). Among the participants, 15.3% reported no pain, 10.6% mild pain, 41.2% moderate pain, and 32.9% severe pain. Regarding sleep quality, 35.3% of patients reported good sleep, whereas 64.7% experienced poor sleep. The chi-square analysis indicated a significant association between pain levels and sleep quality ($p < 0.05$).

Conclusion: The study demonstrated a significant relationship between sleep quality and the severity of musculoskeletal pain among osteoarthritis patients. These findings suggest that interventions aimed at improving sleep may enhance pain management and thus the overall health status of OA patients.

Keywords: Osteoarthritis, Sleep Quality, Musculoskeletal Pain, Numeric Pain Rating Scale, Pittsburgh Sleep Quality Index, Chi-Square Test, SPSS.

INTRODUCTION

Osteoarthritis (OA) is a common degenerative joint disorder that predominantly affects the elderly, significantly impairing their quality of life by causing pain and disability (1). It is often accompanied by disrupted sleep, which further deteriorates the well-being of individuals with OA (2). Research has consistently shown that poor sleep can exacerbate the perception of pain, leading to increased inflammation and functional impairments, thereby establishing a reciprocal relationship between sleep quality and musculoskeletal discomfort (3, 4). The significance of sleep in the overall health and well-being of individuals is well-documented, with various studies highlighting the intricate connection between sleep disturbances and musculoskeletal pain (5). This relationship extends beyond mere correlation, suggesting that the quality and quantity of sleep can significantly influence both physiological and psychological health (6).

Hays R.D. emphasized the importance of evaluating sleep quality to fully understand its impact on physical and mental health, a perspective that represents a shift from historical views on sleep in the context of OA (6). Additionally, the link between obstructive sleep apnea and pain highlights the potential for improved sleep to alleviate the pain experienced by patients, potentially reducing sleep-related issues (7). The prevalence of musculoskeletal disorders (MSD) remains a major public health concern, often characterized by pain and associated with poor sleep quality, which further complicates the clinical picture (8, 9).

Emerging research has begun to explore the concept of somatic intelligence (SQ) and its relationship with pain in individuals suffering from MSD, suggesting that SQ might be a more reliable indicator of pain than the reverse (10-13). Understanding the complex interplay between sleep quality and pain in OA patients is crucial for developing effective treatment strategies that not only manage pain but also improve patient well-being and potentially reduce healthcare costs. By focusing on this bidirectional relationship, healthcare providers can formulate more holistic approaches to treating OA, which could also play a role in its prevention and management. This enhanced understanding is essential for improving the outcomes for patients with OA, emphasizing the need for comprehensive care that addresses both pain and sleep disturbances (14).

MATERIAL AND METHODS

Prior to the commencement of the study, necessary approvals were obtained from the hospital administration to include patients diagnosed with osteoarthritis in the research at the University of Lahore teaching hospital, Jinnah Hospital. Participants provided informed consent, adhering to the principles outlined in the Declaration of Helsinki regarding ethical conduct in human research. The study enrolled individuals of both sexes diagnosed with osteoarthritis, ensuring a diverse sample population (4, 9).

Data collection was conducted through structured surveys, focusing on assessing the severity of pain using the Numeric Pain Rating Scale (NPRS) and sleep quality using the Pittsburgh Sleep Quality Index. This approach allowed for a standardized measurement of musculoskeletal pain and sleep disturbances among the participants. After collection, the data was securely stored to minimize any potential biases and to ensure the confidentiality of participant information.

The analysis of the data was carried out using the Statistical Package for the Social Sciences (SPSS), version 25. Qualitative data were analyzed by calculating frequencies and percentages, which were then visually represented through bar charts and pie charts to facilitate an intuitive understanding of the data distributions. Quantitative data analysis involved the computation of means and standard deviations. These statistical measures were visually represented in histograms, providing a clear depiction of the data's distribution. To establish the correlation between sleep quality and musculoskeletal pain, a chi-square test was employed, confirming the statistical significance of the observed relationships.

RESULTS

In the presented study, the descriptive statistics of age among patients diagnosed with osteoarthritis were analyzed, showing a mean age of 28.74 years with a standard deviation of 7.001 years. The ages of participants ranged from a minimum of 18 to a maximum of 40 years, indicating a relatively young cohort for an osteoarthritis study (Table 1).

The distribution of musculoskeletal pain severity among the study participants was detailed in Table 1. Of the 170 patients analyzed, 26 (15.3%) reported no pain, 18 (10.6%) experienced mild pain, 70 (41.2%) had moderate pain, and 56 (32.9%) suffered from severe pain. This suggests a predominant occurrence of moderate to severe pain among the cohort.

Regarding sleep quality, 60 patients (35.3%) reported good sleep quality, whereas a significantly larger group of 110 patients (64.7%) experienced poor sleep quality. This distribution highlights a major tendency towards poor sleep among individuals suffering from osteoarthritis, as detailed in Table 2.

Table 1: Descriptive Statistics of Age, Musculoskeletal Pain, Sleep Quality, and Results of Chi-Square Test

Variable	Statistic	Value
Age	Mean	28.74
	Standard Deviation	7.001
	Minimum	18
	Maximum	40

Table 2: Distribution of Musculoskeletal Pain, Sleep Quality, and Gender

Variable	Category	Frequency	Percentage (%)	Chi Square P Values
Musculoskeletal Pain	No Pain	26	15.3	0.000
	Mild Pain	18	10.6	
	Moderate Pain	70	41.2	
	Severe Pain	56	32.9	
Sleep Quality	Good Sleep	60	35.3	
	Poor Sleep	110	64.7	
Gender Distribution	Male	61	35.9	
	Female	109	64.1	

The gender distribution within the study showed that 61 participants (35.9%) were male, and 109 (64.1%) were female, suggesting a higher prevalence of the condition among females (Table 1).

Statistical analysis using the Pearson Chi-Square test revealed a significant association between the level of musculoskeletal pain and sleep quality ($p < 0.05$). The chi-square value was reported as 0.000, indicating a statistically significant correlation where increased pain levels are associated with poorer sleep quality, as illustrated in the Chi-Square Test Results section of Table 1. This finding underscores the reciprocal relationship between pain and sleep, where effective management of one could positively influence the other.

DISCUSSION

In the current study, the demographic profile of the 170 osteoarthritis patients showed a gender distribution of 35.9% male and 64.1% female, with an age range of 18 to 40 years and a mean age of 28±7 years. Among these participants, 15.3% reported no pain, while the majority experienced varying degrees of discomfort: 10.6% had mild pain, 41.2% moderate pain, and 32.9% severe pain. Sleep quality assessments revealed that 35.3% of patients had good sleep quality, whereas 64.7% suffered from poor sleep quality. These findings align with earlier research, such as the study by Roehrs and colleagues (2012), which found that even modest chronic sleep deprivation could exacerbate the body's sensitivity to pain (14). This is particularly relevant for chronic conditions like osteoarthritis, where pain management is crucial. Similarly, the work of Parmelee et al. (2015) emphasized the intricate connections between sleep disturbances, pain, disability, and depressive symptoms in osteoarthritis patients, highlighting the need for holistic treatment approaches that address both sleep and pain (15).

The association between poor sleep quality and higher pain levels observed in this study underscores the bidirectional relationship between sleep and pain. Enhancing sleep quality might reduce pain perception and, consequently, improve the overall quality of life for osteoarthritis sufferers. These observations suggest that interventions targeting sleep could potentially be as crucial as direct pain management strategies (16). However, the study has limitations that must be considered. The age range of participants was relatively narrow, focusing on a younger cohort, which might limit the generalizability of the findings to older populations typically more affected by osteoarthritis. Additionally, the cross-sectional nature of the study prevents the establishment of causality between sleep quality and pain levels (17-19).

Future research should consider longitudinal designs to track changes in sleep and pain over time to better understand the causal relationships and potential for intervention. It would also be beneficial to include older adults to see if the observed associations hold across a broader age range. Moreover, investigating the effectiveness of specific sleep improvement interventions on pain perception in osteoarthritis patients could offer practical insights for clinical applications (20).

CONCLUSION

In conclusion, this study contributes to the growing body of evidence supporting the interconnected nature of sleep and pain in osteoarthritis patients. While highlighting the potential benefits of targeting sleep in treatment strategies, it also calls attention to the need for further research to explore these relationships in more diverse and older populations.

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