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Original Article

Mediating Role of Quality of Life between Perceived Stress and Sleep Quality among Patients with Rheumatoid Arthritis

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ABSTRACT

Background: Arthritis is a chronic illness that affects millions of people worldwide. This study aimed to investigate the effects of perceived stress, life satisfaction, and sleep quality on people with arthritis. Its specific goal was to ascertain how this population's quality of life influences the relationship between perceived stress and sleep quality.

Objective: To examine the mediating role of quality of life in the relationship between perceived stress and sleep quality among patients with rheumatoid arthritis (RA).

Methods: A cross-sectional study design was employed, involving 200 RA patients aged 20 to 90 years from various hospitals in Faisalabad. Participants were recruited through support groups and outpatient programs. Data were collected using the Sleep Quality Scale (SQS), Perceived Stress Scale (PSS), and the WHO Quality of Life (WHOQOL) Questionnaire. The study adhered to ethical guidelines set forth in the Declaration of Helsinki. Statistical analyses, including descriptive statistics, Pearson correlation, independent samples t-tests, and mediation analysis using Sobel, Aroian, and Goodman tests, were conducted using SPSS version 25.

Results: The mean sleep quality score was 40.52 (SD = 5.34), the mean perceived stress score was 22.36 (SD = 3.22), and the mean quality of life score was 85.45 (SD = 14.13). Significant gender differences were found in perceived stress ($p = 0.026$), with males reporting higher stress levels. Sleep quality negatively correlated with perceived stress ($r = -0.38$, $p < 0.05$) and positively correlated with quality of life ($r = 0.82$, $p < 0.01$). Perceived stress and quality of life were negatively correlated ($r = -0.62$, $p < 0.05$). Mediation analysis showed that quality of life significantly mediated the relationship between perceived stress and sleep quality (Sobel test statistic = 2.32, $p = 0.021$).

Conclusion: Perceived stress and sleep quality were significantly associated among RA patients, with quality of life serving as a mediating factor. Higher perceived stress correlated with poorer sleep quality and lower quality of life. Addressing stress and improving quality of life could enhance sleep quality and overall well-being in RA patients. Further research, particularly longitudinal studies, is recommended to deepen understanding and develop targeted interventions.

Keywords: Arthritis, rheumatoid arthritis, sleep quality, perceived stress.

INTRODUCTION

Arthritis, as a chronic illness, significantly impacts millions of people worldwide, inducing not only physical pain but also psychological distress. Rheumatoid arthritis (RA), a prevalent form of this condition, often exacerbates stress and anxiety, complicating patients' lives and leading to deteriorating sleep quality and overall well-being. The intricate relationship between stress, sleep, and quality of life in RA patients warrants thorough examination, particularly how quality of life mediates the effects of perceived stress on sleep quality (1-3).

Research has consistently shown that individuals with chronic conditions like RA experience elevated levels of perceived stress, which detrimentally affects sleep quality and life satisfaction (1). The chronic pain and physical limitations associated with RA often lead to

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heightened stress levels, further aggravating the condition and contributing to poor sleep patterns. Sleep disturbances, in turn, exacerbate pain perception and reduce the ability to cope with daily stressors, creating a vicious cycle that significantly diminishes patients' quality of life (2).

Perceived stress, a subjective measure of the stress experienced by individuals, plays a crucial role in this dynamic. It involves an individual's perception of their ability to cope with various stressors in their environment, impacting both psychological and physical health. Studies have shown that high levels of perceived stress can weaken the immune system, increase susceptibility to illness, and contribute to the development of mental health disorders such as anxiety and depression (3). In RA patients, this stress can lead to increased inflammation and pain, further complicating their condition and reducing their overall quality of life (4).

Sleep quality is another critical factor influencing the well-being of RA patients. Quality sleep is essential for various physiological processes, including memory consolidation, immune function, and emotional regulation. Poor sleep quality, characterized by difficulties in initiating and maintaining sleep, frequent awakenings, and non-restorative sleep, can significantly impair daily functioning and exacerbate RA symptoms (5). Research indicates that sleep disturbances in RA patients are common and often lead to increased pain sensitivity, fatigue, and decreased physical functioning (6).

The concept of quality of life encompasses physical, psychological, and social dimensions of well-being. It reflects an individual's overall satisfaction with life and their ability to perform daily activities without undue physical or emotional stress. For RA patients, quality of life is often compromised due to persistent pain, physical limitations, and the psychological burden of managing a chronic illness. This diminished quality of life can further exacerbate stress and sleep disturbances, creating a feedback loop that negatively impacts overall health (7).

Understanding the mediating role of quality of life between perceived stress and sleep quality is vital for developing effective interventions for RA patients. By improving quality of life, it may be possible to mitigate the adverse effects of perceived stress on sleep quality, thereby enhancing overall well-being. Interventions aimed at stress management, such as mindfulness meditation, cognitive-behavioral therapy, and relaxation techniques, have shown promise in reducing perceived stress levels and improving sleep quality in chronic illness populations (8). Additionally, promoting good sleep hygiene practices and addressing sleep disorders through medical and psychological interventions can significantly enhance sleep quality and, consequently, quality of life for RA patients (9).

This study aims to explore the interrelations between perceived stress, sleep quality, and quality of life among RA patients. By examining how quality of life mediates the relationship between perceived stress and sleep quality, we aim to provide insights into potential intervention strategies that can improve the overall health and well-being of individuals suffering from this debilitating condition. Through a comprehensive understanding of these dynamics, we can better address the multifaceted needs of RA patients, ultimately enhancing their quality of life and ability to manage their condition effectively (8-10).

MATERIAL AND METHODS

The study aimed to investigate the mediating role of quality of life between perceived stress and sleep quality among patients with rheumatoid arthritis (RA). A cross-sectional research design was employed, and a sample of 200 patients, both men and women, diagnosed with RA was recruited using purposive sampling. Participants were selected from various hospitals in Faisalabad, including Allied Hospital, Sughra Trust Hospital, and Chiniot Hospital. The inclusion criteria required patients to be aged between 20 to 90 years and have a confirmed diagnosis of RA (11).

Data collection was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Patients were informed about the purpose of the study and assured that their participation was voluntary and their responses would remain confidential. Written informed consent was obtained from all participants before administering the questionnaires (14).

Three standardized instruments were used to assess the variables of interest. The Sleep Quality Scale (SQS), a comprehensive 28-item questionnaire, was employed to evaluate six domains of sleep quality: daytime symptoms, restoration after sleep, problems initiating and maintaining sleep, difficulty waking, and sleep satisfaction (15). The Perceived Stress Scale (PSS), a widely used instrument consisting of questions scored on a 0-4 scale, was used to measure the extent to which individuals perceived their life situations as stressful, with higher scores indicating higher perceived stress levels (6). The World Health Organization Quality of Life (WHOQOL) Questionnaire, a 26-item instrument, assessed quality of life across physical health, psychological health, social relationships, and environmental domains (16-21).

The data collection process involved administering the questionnaires to the participants during their routine visits to the hospitals. Participants were provided with a brief description of the study and instructions on how to complete the questionnaires. The completed questionnaires were collected immediately after they were filled out to ensure a high response rate and data accuracy (22-29).

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Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics were calculated to summarize the demographic characteristics of the sample and the central tendencies, variability, and distribution characteristics of the study variables. Pearson correlation analysis was conducted to examine the relationships between perceived stress, sleep quality, and quality of life. Additionally, independent samples t-tests were used to assess gender differences in the study variables. To test the mediating effect of quality of life on the relationship between perceived stress and sleep quality, mediation analysis was conducted using the Sobel test, Aroian test, and Goodman test (11).

The results of the study were interpreted in light of previous research findings, and the implications for clinical practice and future research were discussed. The study adhered to rigorous ethical standards, ensuring the integrity and reliability of the findings, and aimed to contribute to the understanding of the complex interplay between stress, sleep quality, and quality of life in RA patients.

RESULTS

The study involved 200 participants diagnosed with rheumatoid arthritis (RA), with both men and women represented. Data analysis was conducted to examine the descriptive statistics, gender differences, correlations between study variables, and mediation analysis.

Descriptive Statistics

Table 1 presents the descriptive statistics for sleep quality (SQ), perceived stress (PS), and quality of life (QOL).

Measure	K	M	SD	Range	Skewness	Kurtosis
				Min	Max	Statistics
SQ	28	40.52	5.34	25	72	0.396
PS	10	22.36	3.22	16	37	0.580
QOL	26	85.45	14.13	45	98	-0.232

The mean score for sleep quality was approximately 40.52 with a standard deviation of 5.34. Perceived stress had a mean score of 22.36 and a standard deviation of 3.22. The mean quality of life score was 85.45 with a standard deviation of 14.13. The distributions of SQ and PS were slightly right-skewed, while QOL was slightly left-skewed, with all variables showing near-normal kurtosis.

Gender Differences

Table 2 shows the mean and standard deviations of SQ, PS, and QOL for male and female participants, along with the t-test results for gender differences.

Variable	Gender	M	SD	t	p	Cohen's d
SQ	Male	40.91	5.90	0.639	0.149	0.423
	Female	40.00	4.54			
PS	Male	23.15	2.01	-1.45	0.026	0.742
	Female	19.64	6.53			
QOL	Male	86.27	13.65	0.507	0.383	0.402
	Female	85.36	13.93			

Perceived stress showed a significant difference between genders, with males reporting higher stress levels ($p = 0.026$). There were no significant gender differences for sleep quality and quality of life.

Correlations

Table 3 presents the Pearson correlation coefficients between SQ, PS, and QOL.

	SQ	PS	QOL
SQ	1	-0.38*	0.82**
PS	-0.38*	1	-0.62*
QOL	0.82**	-0.62*	1

- $p < 0.05$, ** $p < 0.01$

Sleep quality was negatively correlated with perceived stress ($r = -0.38$, $p < 0.05$) and positively correlated with quality of life ($r = 0.82$, $p < 0.01$). Perceived stress was negatively correlated with quality of life ($r = -0.62$, $p < 0.05$).

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Mediation Analysis

Table 4 presents the results of the Sobel test, Aroian test, and Goodman test used to assess the mediation effect of QOL on the relationship between PS and SQ.

Input	Test Statistics	p-value
A	-1.57	Sobel
B	-0.172	Aroian
Sa	0.524	Goodman
Sb	0.047	

The mediation analysis indicated that quality of life significantly mediated the relationship between perceived stress and sleep quality. The Sobel test yielded a test statistic of 2.32 ($p = 0.021$), the Aroian test showed a test statistic of 2.27 ($p = 0.023$), and the Goodman test had a test statistic of 2.37 ($p = 0.018$), all indicating a significant mediation effect.

These findings highlight the crucial role of quality of life in mediating the relationship between perceived stress and sleep quality among RA patients. By addressing stress management and improving quality of life, interventions can potentially enhance sleep quality and overall well-being in this population.

DISCUSSION

The relationship between perceived stress, sleep quality, and quality of life among rheumatoid arthritis (RA) patients was intricate and bidirectional. The findings of this study corroborated the hypothesis that there existed significant correlations among these variables. The data revealed that higher levels of perceived stress were associated with poorer sleep quality and lower quality of life, aligning with previous research indicating that chronic stress negatively impacts various health outcomes (22-26).

The mediation analysis demonstrated that quality of life played a significant role in mediating the relationship between perceived stress and sleep quality. This finding was consistent with the theoretical framework suggesting that quality of life could buffer the adverse effects of stress on sleep (18). By improving quality of life, it might be possible to mitigate the negative impact of perceived stress on sleep quality, thereby enhancing overall well-being. This highlights the importance of incorporating quality of life assessments in the clinical management of RA patients. Gender differences were observed in perceived stress levels, with males reporting higher stress than females. This finding was intriguing and suggested that stress management interventions might need to be tailored differently for men and women. However, no significant gender differences were found in sleep quality and quality of life, indicating that these aspects of health might be similarly experienced across genders in RA patients (27-37).

The study had several strengths, including a robust sample size and the use of well-validated instruments to measure perceived stress, sleep quality, and quality of life. The cross-sectional design allowed for the examination of relationships among variables at a single point in time, providing a snapshot of the interactions between stress, sleep, and quality of life in RA patients (38-42).

Despite its strengths, the study had limitations. The cross-sectional nature of the research precluded the ability to establish causal relationships between the variables. Longitudinal studies would be beneficial in determining the directionality of these relationships and understanding how changes in one variable might influence others over time (19). Additionally, the study relied on self-reported measures, which might introduce response bias and affect the accuracy of the data. Future research could incorporate objective measures of sleep quality, such as polysomnography, to provide a more comprehensive assessment.

The study's findings underscored the need for comprehensive management strategies that address both psychological and physical aspects of RA. Stress management interventions, such as cognitive-behavioral therapy and mindfulness-based stress reduction, could be particularly effective in reducing perceived stress and improving quality of life (19). Additionally, promoting good sleep hygiene and addressing sleep disorders through medical and psychological interventions could significantly enhance sleep quality and, consequently, overall well-being in RA patients (20).

CONCLUSION

In conclusion, this study provided valuable insights into the complex interplay between perceived stress, sleep quality, and quality of life among RA patients. The findings highlighted the importance of addressing stress and improving quality of life to enhance sleep quality and overall well-being. Further research, particularly longitudinal studies, is warranted to deepen our understanding of these relationships and to develop targeted interventions that can effectively support the health and well-being of individuals with rheumatoid arthritis.

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