

## Mental health and sleep quality of patients with rheumatoid arthritis

Zahra Kamiab<sup>1</sup>, Mohammad Reza Mirzabeigi Abadi<sup>2</sup>, Zahra Jahanshahi<sup>3</sup>, Mitra Abbasifard<sup>4\*</sup>

<sup>1</sup> Assistant professor of community medicine, Department of community medicine, School of Medicine, Rafsanjan University of Medical Sciences, Rafsanjan, Iran. <sup>2</sup> Assistant Professor of Psychiatry, Department of Psychiatry, School of Medicine, Moradi Educational and Treatment Hospital, Rafsanjan University of Medical Sciences, Rafsanjan, Iran. <sup>3</sup> General Physician, Clinical Research Development Unit, Ali-Ibn Abi-Talib Hospital, Rafsanjan University of Medical Sciences, Rafsanjan, Iran. <sup>4</sup> Department of Internal Medicine, School of Medicine; Clinical Research Development Unit, Ali-IbnAbi-Talib Hospital, Rafsanjan University of Medical Sciences, Rafsanjan, Iran.

Rheumatoid arthritis (RA) is one of the most common autoimmune diseases causing many physical and mental complications, and disorders in patients. This study aimed to evaluate the mental health and sleep quality of RA patients referred to the Rafsanjan Rheumatology Clinic. This descriptive-analytical study was conducted on 35 patients and 35 healthy people referring to Rheumatology Clinic of Rafsanjan. Data collection tools included demographic information, Depression, Anxiety and Stress Scale 21 (DASS21), and Pittsburgh Sleep Quality Index. Then, the data were analyzed by SPSS 20 and using independent t-test, Chi-square, and multivariate analysis of covariance. The total score of DASS21 indicated that stress, anxiety, and depression in the patient was significantly higher than the healthy group. In comparison to the healthy group, patients' mean total scores for sleep and all of its subscales (apart from subjective sleep quality) were considerably higher ( $P = 0.001$ ). The mean total score of sleep, and all its subscales (except the subjective sleep quality) in the patients was significantly higher than the healthy group, indicating that they had a lower sleep quality. Based on the results of our study, mental health, and sleep quality are common problems in RA patients. Therefore, along with standard treatments for the disease, attention should be paid to mental health, and sleep status of affected patients.

**Keywords:** Mental health; Sleep quality; Rheumatoid arthritis; Depression; Anxiety, Stress

### Introduction

Rheumatoid arthritis (RA) is a chronic systemic inflammatory disease affects the diarthrodial joints that leads to the destruction, deformation or reduction of joint function [1]. Women are about three times more likely than males to be afflicted by this condition [2]. RA prevalence is 1% [2]. According to estimates, this illness is more common in

urban than rural parts of Iran, with a rural frequency of 0.33% [3]. Disability in this disease is common and significant, so that in a study, the prevalence of disability in RA patients was higher than healthy people [4]. Although the etiology of this disease is still unknown, epidemiological studies showed that this disease is the result of complex interactions of genetic, environmental, and immune factors [5]. RA not

only has no definitive treatment [6], but also leads to a severe decline in people's performance, and a decrease in independence in performing daily activities [7]. Mental and psychological issues arise because of the occurrence of social and communication difficulties, such as impairment in social functioning and restriction to engage in social activities [8]. Decreased quality of life, mental health problems, and sleep disorders are common in these patients [9]. Mental health disorder is one of the important problems that usually has a high prevalence in RA patients, which is 1.5 to 2 times higher compared to the same group with the general population [10]. Depression, which is the most important factor in the global burden of disease in the general population, is recognized as comorbidity of RA in rheumatology community, so that its prevalence in RA patients is about 17% [11]. The diagnosis of an incurable chronic disease, the loss of social responsibilities and job owing to sickness, disability, and even medicine side effects are some of the factors that contribute to the increased incidence of depression in these people [12]. Anxiety is another disorder whose prevalence is high in these patients [13]. One of the factors that cause anxiety disorders in these patients is stress, and it is mainly one of the most common causes of inability to refer to the medical centers at the community level [14]. These factors can cause RA in susceptible people [15]. Another common problem in RA patients is sleep disorder [16]. The prevalence of sleep disorder was observed in more than half of patients with RA [17]. The prevalence of sleep disorders in RA patients (63%) is much higher than the general population (8.4%) [18, 19]. Sleep is the foundation of physical and mental health; therefore, in addition to causing mental problems, any sleep disorder reduces an individual's mental ability [20]. One of the most crucial elements in determining one's health and quality of life is how well one sleeps, which has a growing impact on immune system performance [21, 22]. Regarding RA has profound effects on the quality of life in terms of its chronic, hard and painful mobility and and debilitating nature, evaluation of sleep quality mental health provides valuable indicators for

the implementation of appropriate treatments, which can be effective to improve treatment, care, and rehabilitation programs [22]. Therefore, the present study was designed by the purpose of evaluating mental health, and sleep quality in RA patients referred to the Rheumatology Clinic of Rafsanjan in 2020.

### Materials and Methods

This descriptive-analytical study was carried out on RA patients who referred to the Rheumatology Clinic of Rafsanjan in 2020. The standard deviation difference between two groups was obtained 2.43 using convenience sampling method, based on the findings of the study by Sariyildiz et al. (2014), and considering the values of  $\alpha=0.05$  and  $\beta=0.02$ . Using the following formula, 35 people were estimated in each group [23].

$$n = \frac{(z_{1-\frac{\alpha}{2}} + z_{1-\beta})^2 (\sigma_1^2 + \sigma_2^2)}{(\mu_1 - \mu_2)^2}$$

Thirty-five RA patients and 35 healthy companions of other referring patients (who were matched in terms of age and gender by individual matching) were chosen from among the clientele of the Rafsanjan Rheumatology Clinic as the samples. The inclusion criteria in the patient group included RA disease based on the classification criteria of American College Rheumatology/European League Against Rheumatism (ACR/EULAR) 2010 criteria [24], not suffering from any chronic physical and mental illness, and not abusing drugs. The inclusion criteria in the healthy people group included not suffering from any chronic diseases, autoimmune diseases, and not abusing drugs. Serious family disputes, a history of chronic illnesses (diabetes, hypertension, hypo- or hyperthyroidism), a failure to complete the questionnaire, and a person's lack of happiness were among the exclusion criteria in both groups. After the approval of the code of ethics committee, and the completion of the informed consent form by the subjects, data collection was done by examining the patients' records and files

and conducting telephone or face-to-face interviews using the researcher-made checklist. Pittsburgh Sleep Quality Index (PSQI) was used to measure sleep quality and Depression, Anxiety and Stress Scale 21 (DASS21) was used to measure anxiety, stress, and depression. Demographic and laboratory variables collected from the files and interviews were measured, including age, gender, weight, marital status, place of residence, education level, smoking, Rheumatoid Factor [RF], C-Reactive Protein (CRP), anti-cyclic Citrullinated Peptide (Anti CCP), type of used drug, the disease duration, and the disease activity using Disease Activity Score 28 (DAS-28), which is one of the most complete tools for measuring the severity of RA disease. In the DAS-28 index, values  $\leq 3.2$  indicate mild disease activity, 3.2-5.1 moderate disease activity, and  $\geq 5.2$  high disease activity [25, 26].

**PSQI questionnaire:** This scale was created by Daniel J Buysse et al. in 1989 at the Pittsburgh Institute to measure sleep quality, and help diagnose sleep disorders; and they estimated the validity and reliability of the questionnaire at 80% [27]. The score of each question is between 0 and 3, and the scores of 0, 1, 2, and 3 in each question determines the normal status, the existence of a mild, moderate, and severe problem, respectively. An individual's overall sleep quality score, which ranges from 0 to 21, is calculated by adding the values from each of the seven components. A total score of 5 or greater denotes poor sleep; the higher the score, the worse the sleep. The validity and reliability of Pittsburgh questionnaire were, respectively, confirmed by the content validity method and retesting in several domestic and foreign studies and reported from 0.83 to 0.98 [28].

**DASS21 questionnaire:** This questionnaire was designed by Lovibond, which includes 21 questions, and three stress scales [questions 18, 14, 12, 11, 8, 6, and 1), anxiety (questions 20, 19, 15, 9, 7, 4, and 2), and depression (questions 21, 17, 16, 13, 10, 5, and 3). The total score of each subscale is obtained through the sum of the scores of the related questions. The questions are based on a 4-point Likert scale, where 0 means nothing about me and 3 means

everything about me. The overall score of each of these subscales was doubled in the current research since the DASS-21 is a condensed version of the main scale (which consists of 42 questions). The total score of this tool in the stress subscales is equal to 33, anxiety 200, and depression is 280. For depression (normal = 0-4, mild = 5-6, moderate = 7-10, severe = 11-13, and very severe = 14), for anxiety (normal = 0-3, mild = 4-5, moderate = 6-7, severe = 8-9, and very severe = 10+), and for stress (normal = 0-7, mild = 8-9, moderate = 10-12, severe = 13-16, and very severe = 17) are considered as criteria [29]. The depression, anxiety, and stress subscales of this questionnaire have internal consistency scores of 0.81, 0.73, and 0.81, respectively, according to Afzali's research in relation to Iranian society [30].

The current study was reviewed by the ethics committee of Rafsanjan University of Medical sciences and received the ethics code of [IR.RUMS.REC.1399.221]. After entering the data into SPSS statistical software version 20, independent t-test was used to compare quantitative variables in two groups and Chi-square test was used to compare qualitative variables. In order to compare the two groups without the confounding influence of additional factors, multivariate analysis of covariance (MANCOVA) was performed.

## Results

The mean age in the patient group was  $51.69 \pm 12.64$  years and in the healthy group was  $50.14 \pm 15.45$  years ( $P = 0.298$ ). The comparison of other demographic variables is shown in [Table 1](#). Based on the results of this table, except the place of residence, there was no statistically significant difference in other variables. Examining the patients' status in terms of the disease activity (DAS28) showed that most of the patients were in the moderate and severe subgroup. RF was positive in 85.7%, CRP in 82.0%, and anti-CCP in 91.4% of cases. Considering drug use, it was found that hydroxychloroquine was used in 51.4%, prednisolone in 94.3%, methotrexate in 91.4%, and azathioprine in 2.9% of the patients [Table 2](#).

**Table 1.** Comparison of the frequency of demographic variables in the two groups

Variables		Patient n=35	Healthy n=35	p-value*
<b>Gender</b>	Male	12 (34.3)	13 (37.1)	0.803
	Female	23 (65.7)	22 (62.9)	
<b>Smoking</b>	Yes	12 (34.3)	5 (14.3)	0.051
	No	23 (65.7)	30 (85.7)	
<b>Occupation</b>	Unemployed	19 (54.3)	14 (40)	0.643
	Self-employed	10 (28.6)	12 (34.3)	
	Government employee	6 (17.1)	9 (25.7)	
<b>Place of residence</b>	City	23 (65.7)	31 (88.6)	0.044
	Village	12 (34.3)	4 (11.4)	
<b>Education level</b>	Diploma and less	27 (77.1)	22 (62.9)	0.192
	University degree	8 (22.9)	13 (37.1)	
<b>Marital status</b>	Single	10 (28.6)	18 (51.4)	0.051
	Married	25 (71.4)	17 (48.6)	

The data in the table are reported as "number (percentage)"

\* Chi-square test

**Table 2.** Distribution of clinical characteristics in RA patients

Variable		Frequency	Percentage
<b>Disease activity</b>	Mild	4	11.4
	Moderate	16	45.7
	Severe	15	42.9
<b>RF</b>	Positive	30	85.7
	Negative	5	14.3
<b>CRP</b>	Positive	29	82.9
	Negative	6	17.1
<b>Anti-CCP</b>	Positive	32	91.4
	Negative	3	8.6
Taking hydroxychloroquine	Yes	18	51.4
	No	17	48.6
Taking prednisolone	Yes	33	94.3
	No	2	5.7
Taking methotrexate	Yes	32	91.4
	No	3	8.6
Taking azathioprine	Yes	1	2.9
	No	34	97.1

RA, rheumatoid arthritis; RF, rheumatoid factor; CRP, C-reactive protein; anti-CCP, anti-citrullinated peptide

When the respondents' mental health was examined, it was discovered that there was a statistically significant difference between the two groups' total DASS21 questionnaire scores, making patients' scores greater than those of healthy individuals. Comparing two groups showed a statistically significant difference in terms of stress, anxiety, and depression, so that the score was higher in sick people than in healthy people [Table 3](#). The examination of the sleep status of the subjects showed that the mean total score of sleep, and all its subscales (except

the subjective sleep quality) in the patients was significantly higher than the healthy group, indicating that they had a lower sleep quality [Table 4](#). Multivariate covariance analysis was performed to control the confounding effect of smoking, place of residence, education level, and marital status variables. After removing the confounding effect of desired variables, only the mean values of the sleep efficiency, sleep disorder, and the overall score of the questionnaire in the two groups had a statistically significant difference [Table 5](#).

**Table 3.** Mean and standard deviation of DASS21 questionnaire scores and its subscales in the two groups

Variable	Group	Mean ± SD	P-value*
Stress subscale	Patient	27.54 ± 7.58	0.022
	Healthy	22.97 ± 8.68	
Anxiety subscale	Patient	29.31 ± 7.42	0.001
	Healthy	21.89 ± 8.48	
Depression subscale	Patient	30.97 ± 7.33	0.001
	Healthy	22.29 ± 9.02	
Total score DASS	Patient	87.83 ± 20.07	0.001
	Healthy	67.14 ± 24.92	

\*Independent t-test  
DASS21, Depression, Anxiety and Stress Scale 21

**Table 4.** Mean and standard deviation of the score of the PSQI questionnaire and its subscales in the subjects of the two groups

Variable	Group	Mean ± SD	P-value*
Subjective sleep quality	Patient	2.11 ± 0.83	0.628
	Healthy	2.30 ± 1.11	
Delay in falling asleep	Patient	2.09 ± 0.66	0.038
	Healthy	1.69 ± 0.90	
Sleep duration	Patient	1.06 ± 1.16	0.023
	Healthy	0.51 ± 0.74	
Sleep efficiency	Patient	1.20 ± 1.25	0.001
	Healthy	0.09 ± 0.64	
Sleep disorder	Patient	2.06 ± 0.64	0.001
	Healthy	1.49 ± 0.70	
Taking sleeping pills	Patient	1.54 ± 1.07	0.033
	Healthy	0.91 ± 1.34	
Daily dysfunction	Patient	20.03 ± 0.95	0.012
	Healthy	1.31 ± 1.32	
The total score of PSQI questionnaire	Patient	12.09 ± 2.78	0.001
	Healthy	8.06 ± 4.00	

\*Independent t-test  
PSQI, Pittsburgh Sleep Quality Index

**Table 5.** Relationship between sleep quality and DASS21 score with the disease

Dependent variables	Sum of squares type III	Degrees of freedom	Sum of squares	F statistic	p-value*
DASS21 total score	417.96	1	417.96	0.901	0.346
Stress subscale	12.60	1	12.60	0.188	0.666
Anxiety subscale	45.28	1	45.28	0.820	0.369
Depression subscale	103.32	1	103.32	1.72	0.195
Subjective sleep quality	0.33	1	0.33	0.654	0.554
Delay in falling asleep	0.269	1	0.269	0.428	0.515
Sleep duration	1.89	1	1.89	2.04	0.158
Sleep efficiency	4.05	1	4.05	5.47	0.023
Sleep disorder	2.99	1	2.99	7.33	0.009
Taking sleeping pills	0.007	1	0.007	0.005	0.944
Daily dysfunction	0.45	1	0.45	0.359	0.551
The total score of the questionnaire	39.47	1	39.47	4.008	0.050

\* Multivariate analysis of covariance test  
DASS21, Depression, Anxiety and Stress Scale 21

Correlation analysis between the disease activity, and the quality of sleep, showed that there is a

negative and non-significant correlation among them ( $r = -0.030$ ,  $P\text{-value} = 0.862$ ).

## Discussion

The present study was conducted to evaluation of mental health, and sleep quality in RA patients. The findings of this study showed that there was a statistically significant difference between the RA patients and controls in terms of sleep adequacy, sleep disorders, and overall sleep quality score. In the study by Katchamart et al. (2019) the results indicated a high frequency of anxiety and depression and a direct correlation between depression and anxiety in RA patients [33]. Kwiatkowska et al. stated that depression is high in RA patients [34]. In a study in Slovakia, it was reported that depression and anxiety are high in RA patients. It was shown that depression and anxiety are predictors of pain and disability caused by the disease [35].

The results of the present study showed that the mental health in these patients is not good. However, after controlling for confounding variables, this difference was not statistically significant, which may have been caused by the small sample size in the current research. Future investigations with a larger sample size and a more suitable design should investigate this difference. This study's results showed that the score related to the sleep quality questionnaire in the patient group was higher than that of healthy group, indicating that they have lower sleep quality. According to the findings of the research by Choi et al., sleep disruption is associated with pain, mood, and disease activity in 42% of cases and may be linked to RA in the other instances [36]. As well as, a Korean study showed that subjective sleep quality decreased by increasing disease activity [37].

The mechanism of the effect of disease activity on sleep quality is not completely clear. Many studies anyway, showed its association with joint stiffness and pain. In a survey conducted by Choi et al. it was shown that pain is one of the most common underlying reasons leads to sleep disorder [36]. Chronic pain, and sleep-related problems are a risk factor for depressive symptoms in RA patients, which in turn may have a greater impact, since depression was reported as a predictor of poor sleep quality [37]. Recent research has shown that in RA patients, poor sleep quality reduces the pain threshold and increases pain intensity [27]. According to Shi et al., sleep

disorders are more common in RA patients than in the general population, and they are also more common in individuals with high disease activity [38]. Goes et al. stated that RA patients had lower sleep quality compared to the control group [39]. Delay in falling asleep and sleep disorders are among the subscales that are considered in sleep quality. Low sleep quality is related to disruption of daily functioning, use of sleeping pills, and sleep efficiency. The importance of sleep quality plays a fundamental role in the physical and mental health of patients with RA. According to researchers, depression in RA patients causes mental health problems, which worsen the severity of the patients' physical symptoms. These individuals' sleep patterns may contribute to their depression [40]. Another finding in this study is the lack of difference between anxiety and depression among patient and healthy group. The results of Amao Wei et al.'s study showed that the frequency of depression and anxiety in the patients with rheumatoid arthritis was higher than in the healthy group [41]. Moreover, the results of Khan et al.'s study showed that the levels of anxiety, depression and stress in the patients with RA were significantly higher compared to age- and sex-matched healthy control group [42]. Low education level is linked to despair and anxiety in RA patients, according to a prior research [43]. Consequently, the fact that there was no difference in the levels of anxiety and depression between the two groups in this research may be attributable to the patients' high level of education. One of the strengths of this study is the presence of a healthy control group, leading to comparison of some variables. One of the limitations of this research is the type of study that does not allow investigating causal relationships. Therefore, since the sample size was small and was selected from a clinic by convenience sampling method, the obtained results cannot be generalized to all RA patients. Another limitation of our study was the lack of marital status and smoking matching. with rheumatoid arthritis was higher than in the healthy group [41]. Moreover, the results of Khan et al.'s study showed that the levels of anxiety, depression and stress in the patients with RA were significantly higher compared to age- and sex-matched healthy control group [42]. Low education level is linked to despair and anxiety in

in RA patients, according to a prior research [43]. Consequently, the fact that there was no difference in the levels of anxiety and depression between the two groups in this research may be attributable to the patients' high level of education. One of the strengths of this study is the presence of a healthy control group, leading to comparison of some variables. One of the limitations of this research is the type of study that does not allow investigating causal relationships. Therefore, since the sample size was small and was selected from a clinic by convenience sampling method, the obtained results cannot be generalized to all RA patients. Another limitation of our study was the lack of marital status and smoking matching.

## Conclusion

This study's findings show that the mental health, and sleep quality in RA patients is not at favorable level. In order to enhance the mental health and sleep quality of patients, conventional therapies and any required consultations should be offered in addition to the usual disease-related treatments for mental health and sleep quality.

## Acknowledgment

The authors are grateful to the Clinical Research Development Unit of Ali-Ibn-Abi-Talib Rafsanjan Hospital for their cooperation and support in the implementation of the project.

## Conflict of interest

No conflict of interest.

## Funding

No funds

## References

1. Scherer HU, Häupl T, Burmester GR. The etiology of rheumatoid arthritis. *J Autoimmun* 2020; 110:102400. doi: 10.1016/j.jaut.2019.102400.
2. van der Woude D, van der Helm-van AH. Update on the epidemiology, risk factors, and disease outcomes of rheumatoid arthritis. *Best Pract Res Clin Rheumatol* 2018; 32(2):174-87. doi: 10.1016/j.berh.2018.10.005.
3. Davatchi F, Banihashemi AT, Gholami J, Faezi ST, Forouzanfar MH, Salesi M, et al. The prevalence of musculoskeletal complaints in a rural area in Iran: a WHO-ILAR COPCORD study [stage 1, rural study] in Iran. *Clin Rheumatol* 2009; 28(11):1267-74. doi: 10.1007/s10067-009-1234-8.
4. Myasoedova E, Davis III JM, Achenbach SJ, Matteson EL, Crowson CS. Trends in prevalence of functional disability in rheumatoid arthritis compared with the general population. *Mayo Clin Proceeding* 2019; 94(6):1035-9. doi: 10.1016/j.mayocp.2019.01.002
5. Smolen JS, Aletaha D, McInnes IB. Rheumatoid arthritis. *The Lancet* 2016; 388(10055):2023-38.
6. Conigliaro P, Triggianese P, De Martino E, Fonti GL, Chimenti MS, Sunzini F, et al. Challenges in the treatment of rheumatoid arthritis. *Autoimmun Rev* 2019; 18(7):706-13. doi: 10.1016/j.autrev.2019.05.007
7. Salehi Z, Norouzi Tabrizi K, Hoseini MA, Sedghi Goyaghaj N, Soltani PR. The Rheumatoid Arthritis patients. *J Clin Nurs Midwifery* 2017; 4(3).
8. Arvidsson S, Bergman S, Arvidsson B, Fridlund B, Tingström P. Effects of a self-care promoting problem-based learning programme in people with rheumatic diseases: A randomized controlled study. *J Adv Nurs* 2013; 69(7):1500-14. doi: 10.1111/jan.12008.
9. Machin AR, Babatunde O, Haththotuwa R, Scott I, Blagojevic-Bucknall M, Chew-Graham CA, et al. The association between anxiety and disease activity and quality of life in rheumatoid arthritis: a systematic review and meta-analysis. *Clin Rheumatol* 2020; 39(5):1471-82. doi: 10.1007/s10067-019-04900-y.
10. Marrie RA, Hitchon CA, Walld R, Patten SB, Bolton JM, Sareen J, et al. Increased burden of psychiatric disorders in rheumatoid arthritis. *Arth Care Res* 2018; 70(7):970-8. doi: 10.1002/acr.23539.
11. Matcham F, Rayner L, Steer S, Hotopf M. The prevalence of depression in rheumatoid arthritis: a systematic review and meta-analysis. *Rheumatology* 2013; 52(12):2136-48. doi: 10.1093/rheumatology/ket169.
12. Vallerand I, Patten S, Barnabe C. Depression and the risk of rheumatoid arthritis. *Curr Opin Rheumatol* 2019; 31(3):279. doi: 10.1097/BOR.0000000000000597.
13. Watad A, Bragazzi NL, Adawi M, Aljadef G, Amital H, Comaneshter D, et al. Anxiety disorder among rheumatoid arthritis patients: insights from real-life data. *J Affect Disord* 2017; 213:30-4. doi: 10.1016/j.jad.2017.02.007
14. Rice DB, Mehta S, Serrato J, Pope JE, Harth M, Sequeira K, et al. Stress in patients diagnosed with rheumatoid arthritis compared to chronic pain. *Rehabil Psychol* 2017; 62(4):571-9. doi: 10.1037/rep0000103.
15. Fragoulis GE, Cavanagh J, Tindell A, Derakhshan M, Paterson C, Porter D, et al. Depression and anxiety in an early rheumatoid arthritis inception cohort. associations with demographic, socioeconomic and disease features. *RMD Open* 2020; 6(3):e001376.
16. Benlidayi IC. Sleep impairment: an obstacle to achieve optimal quality of life in rheumatoid arthritis. *Rheumatol Int* 2018; 38(12):2183-92. doi: 10.1136/rmdopen-2020-001376.
17. Duruöz MT, Çağrı Ü, Ulutatar F, Toprak CS, Gündüz OH. The validity and reliability of Turkish version of the Jenkins Sleep Evaluation Scale in Rheumatoid Arthritis. *Arch Rheumatol* 2018; 33(2):160. doi: 10.5606/ArchRheumatol.2018.6376
18. Wali SO, Abaalkhail B. Prevalence of restless legs syndrome and associated risk factors among middle-aged Saudi population. *Ann Thorac Med* 2015; 10(3):193-8. doi: 10.4103/1817-1737.160839.



19. Mustafa M, Bawazir Y, Merdad L, Wali S, Attar S, Fathaldin O, et al. Frequency of sleep disorders in patients with rheumatoid arthritis. *Open Access Rheumatol* 2019; 11:163.
20. Alimirzaei R, Forouzi MA, Abazari F, Mohammadalizadeh S, Haghdoost A. Sleep quality and some associated factors in Kerman students of nursing and midwifery. *J Health Develop* 2015; 4(2):146-57.
21. Roustaei N, Jamali H, Jamali MR, Nourshargh P, Jamali J. The association between quality of sleep and health-related quality of life in military and non-military women in Tehran, Iran. *Oman Med J* 2017; 32(2):124. doi: 10.5001/omj.2017.22.
22. Purabdollah M, Lakdizaji S, Rahmani A, Hajalilu M, Ansarin K. Relationship between sleep disorders, pain and quality of life in patients with rheumatoid arthritis. *J Caring Sci* 2015; 4(3):233-41.
23. Sariyildiz MA, Batmaz I, Bozkurt M, Bez Y, Cetincakmak MG, Yazmalar L, et al. Sleep quality in rheumatoid arthritis: relationship between the disease severity, depression, functional status and the quality of life. *J Clin Med Res* 2014; 6(1):44-52. doi: 10.4021/jocmr1648w.
24. Wallace ZS, Naden RP, Chari S, Choi H, Della-Torre E, Dicaire JF, et al. The 2019 American college of rheumatology/European league against rheumatism classification criteria for IgG4-related disease. *Arthritis Rheumatol* 2020; 72(1):7-19. doi: 10.1002/art.41120.
25. Prevoo ML, Van'T Hof M, Kuper HH, Van Leeuwen MA, Van De Putte LB, Van Riel PL. Modified disease activity scores that include twenty-eight-joint counts development and validation in a prospective longitudinal study of patients with rheumatoid arthritis. *Arthritis Rheum* 1995; 38(1):44-8. doi: 10.1002/art.1780380107.
26. Felson DT, Anderson JJ, Boers M, Bombardier C, Chernoff M, Fried B, et al. The American College of Rheumatology preliminary core set of disease activity measures for rheumatoid arthritis clinical trials. *Arthritis Rheum* 1993; 36(6):729-40. doi: 10.1002/art.1780360601.
27. Aloba OO, Adewuya AO, Ola BA, Mapayi BM. Validity of the Pittsburgh sleep quality index [PSQI] among Nigerian university students. *Sleep Med* 2007; 8(3):266-70. doi: 10.1016/j.sleep.2006.08.003
28. Rezaei B. Factors related to sleep quality among elderly residing at Isfahan nursing homes. *Iran Jf Geriat Nurs* 2016; 2(2):37-49.
29. Lovibond PF, Lovibond SH. The structure of negative emotional states: Comparison of the depression anxiety stress scales [DASS] with the Beck depression and anxiety inventories. *Behav Res Ther* 1995; 33(3):335-43. doi: 10.1016/0005-7967(94)00075-U.
30. Afzali A, Delavar A, Borjali A, Mirzamani M. Psychometric properties of DASS-42 as assessed in a sample of Kermanshah High School students. *J Res Behav Sci* 2007; 5(2):81-92.
31. Katchamart W, Narongroeknawin P, Chanapai W, Thaweerattakul P. AB0331 depression and anxiety in patients with rheumatoid arthritis. *BMJ Publishing Group Ltd* 2019; 1623. doi: 10.1136/annrheumdis-2019-eular.3169.
32. Chassin-Troubert AM, Lillo C, Prieto S, Castro A, Gatica H, Carrasco P, et al. AB0325 Prevalence of anxiety/depression in patients with rheumatid arthritis at the university of Chilies clinical hospital and their associations with idease activity indexies and quality of life. *BMJ Publishing Group Ltd* 2019; 1623. doi: 10.1136/annrheumdis-2019-eular.8003.
33. Ng KJ, Huang KY, Tung CH, Hsu BB, Wu CH, Lu MC, et al. Risk factors, including different biologics, associated with depression and anxiety in patients with rheumatoid arthritis: a cross-sectional observational study. *Clin Rheumatol* 2020;39(3):737-46. doi: 10.1007/s10067-019-04820-x
34. Kwiatkowska B, Kłak A, MaślińskaM, Mańczak M, Raciborski F. Factors of depression among patients with rheumatoid arthritis. *Reumatologia* 2018; 56(4):219. doi: 10.5114/reum.2018.77973.
35. Soósová MS, Macejová Ž, Zamboriová M, Dimunová L. Anxiety and depression in Slovak patients with rheumatoid arthritis. *J Mental Health* 2017; 26(1):21-7. doi.org/10.1080/09638237.2016.1244719.
36. Choi G, Lee SY, Lee JM, Lee Th, Jeong HJ, Jung CG, et al. Sleep quality in rheumatoid arthritis, and its association with disease activity in a Korean population. *Korean J Intern Med* 2015; 30:384-90. 10.3904/kjim.2015.30.3.384.
37. Westhovens R, Van der Elst K, Matthys A, Tran M, Gilloteau I. Sleep problems in patients with rheumatoid arthritis. *J Rheumatol* 2014; 41:31-40. doi: 10.3899/jrheum.130430.
38. Shi L, Han X, Shi R, Niu H, Xiaofeng L, Wang C. Correlation analysis of sleep quality and disease activity in patients with rheumatoid arthritis. *Chinese J Rheumatol* 2018; 22(7):435-9.
39. Goes AC, Reis LA, Silva MB, Kahlow BS, Skare TL. Rheumatoid arthritis and sleep quality. *Revista Brasileira de Reumatologia* 2017; 57:294-8.
40. Radwan A, Borai A. Quality of sleep in rheumatoid arthritis patients: Relationship with disease activity, depression and functional status. *Egyptian Rheumatol* 2021;43(2):183-7. doi: 10.1016/j.ejr.2020.08.002\_
41. Amaowei EE, Anwar S, Sridhar KK, Shabbir K, Mohammed EH, Bahar AR, et al. Correlation of Depression and Anxiety With Rheumatoid Arthritis. *Cureus* 2022; 14(3). doi: 10.7759/cureus.23137.
42. Khan A, Pooja V, Chaudhury S, Bhatt V, Saldanha D. Assessment of depression, anxiety, stress, and quality of life in rheumatoid arthritis patients and comparison with healthy individuals. *Industrial Psychiatr J* 2021; 30(Suppl 1):S195. doi: 10.4103/0972-6748.328861.
43. Evers AW, Kraaimaat FW, Geenen R, Jacobs JW, Bijlsma JW. Longterm predictors of anxiety and depressed mood in early rheumatoid arthritis: A 3 and 5 year followup. *J Rheumatol* 2002; 29:2327-36.
44. Treharne GJ, Kitas GD, Lyons AC, Booth DA. Well-being in rheumatoid arthritis: The effects of disease duration and psychosocial factors. *J Health Psychol* 2005; 10:457-74. doi: 10.1177/1359105305051416.