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Assessment of Sleep Disturbances and Quality of Life in Egyptian Women with Rheumatoid Arthritis: A Case-Control Study

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ABSTRACT

Background: Rheumatoid arthritis (RA) is a chronic autoimmune inflammatory disease that primarily affects synovial joints, causing damage and eventual loss of function. It is more common in women. One possible explanation for the high prevalence of poor health-related quality of life (HRQoL) is systemic chronic inflammation. There are likely numerous causes for poor HRQoL to which RA disease activity is a major contributor. Additionally, RA patients frequently experience sleep disruptions, which they have recognized as a possible contributing factor to their poor HRQoL.

Objective: This study aimed to assess the prevalence of sleep disturbances in Egyptian women with RA and to evaluate the relation between sleep disturbances, disease activity, and QoL**.**

Patients and methods: The study included 56 female patients who had been diagnosed with RA. The Disease Activity Score (DAS) 28 scale was used to measure disease activity. The Health Assessment Questionnaire scale (SF36) was used to examine each subject. To assess sleep disruption, the Pittsburgh Sleep Quality Index (PSQI) was employed.

Results: Subjective sleep quality, habitual sleep efficiency, sleep disturbance, and the overall PSQI score were all considerably greater for RA patients than for the healthy control group. Disease activity, CRP, ESR levels, pain, QoL, and sleep disruption were all significantly correlated.

Conclusion: Disruption of RA patients' quality of sleep. Disease activity and poor health quality are particularly linked to poor sleep quality.

Keywords: RA, Sleep quality, DAS, QoL.

INTRODUCTION

The symptoms of Rheumatoid arthritis, a chronic systemic inflammatory disease with no known origin, include tiredness, morning stiffness, and symmetrical, polyarticular pain and swelling [(1)]. RA is more prevalent in industrialized nations and has a worldwide incidence of 0.1% to 1% [(2)].

According to many studies, between 54% and 70% of people with RA experience sleep difficulties, as a result issues with sleep quality are a significant concern for these patients [(3)]. In people with RA, sleep disruptions reduce their everyday activities and affect their QoL [(4)]. While sleep issues worsen as the disease progresses, pain and functional impairment are more closely linked to worse sleep [(5)].

One possible explanation for the high prevalence of depression and poor HRQoL in RA is systemic chronic inflammation. High CRP levels were associated with worse HRQoL ratings in subjects without mental illness [(6)].

Therefore, this study aimed to assess the prevalence of sleep disturbances in Egyptian women with RA and to evaluate the relation between sleep disturbances and disease activity and QoL.

PATIENTS AND METHODS

Patients: 56 female patients over the age of 18 who had been diagnosed with RA using the 2010ACR/EULAR categorization criteria were included in this cross-sectional research [(7)]. As a control, we recruited 56 volunteers who were of the same sex and age. Between April and September 2024, patients were gathered from Menoufia University Hospitals' Outpatient Clinic for Rheumatology, Rehabilitation and Physical Medicine.

Exclusion criteria: Patients who were bedridden and had significant co-morbidities, such as cancers or end-stage organ failure. Also, pregnant women and those with other rheumatic conditions.

Methods: Demographic information (Age, gender, and degree of formal education), body weight, and height were obtained at the time of registration. All patients had laboratory tests and a medical examination by a single rheumatologist, who also calculated the illness duration and scored the DAS-28 [(8)]. Patients were categorized as being in remission (< 2.6), mild (2.6-< 3.2), moderate (3.2-5.1), or severe (> 5.1) disease activity.

The QoL was assessed using a generic questionnaire [**Short form 36 (SF-36**)]**:** It is one of the most widely used methods for assessing the QoL of different patient groups and the general public. The questionnaire consists of 36 items and is used to examine two variables of QoL: Physical component summary (PCS) and mental component summary (MCS). Quality of life (QoL) in the physical dimension (PCS) is divided into four sub-scales:

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physical functioning (PF), role of limits owing to physical difficulties (RP), bodily pain (BP), and general health perception.

QoL in the mental dimension (MCS) includes four sub-scales: vitality (VT), social functioning (SF), role of limitation owing to emotional issues (RE), and self-assessment of mental health.

The scale has values ranging from 0 to 100 for each category. Higher scores on each subscale (Which ranges from 0 to 100) indicate a better HRQoL. The physical and mental components of the eight scales are combined to get physical (PCS) and mental (MCS) component summary scale scores [(9)].

Sleep quality was evaluated using the PSQI, which analyzes the patient's self-reported sleep quality over the previous month [(10)]. Subjective sleep quality, sleep latency, length, habitual sleep efficiency, sleep disruptions, use of sleeping medicine, and daytime dysfunction are the seven aspects of sleep quality that are measured by the 19-item scale. The sum of the individual scores from the seven components is used to produce the global PSQI score, which ranges from 0 to 21. Poor sleep quality is said to be indicated by a score of six or above.

Ethical approval: Menoufia Faculty of Medicine Ethics Committee (3/2024 PMRR 9-2) authorized this study. After receiving all of the information, each participant signed a permission. The Helsinki Declaration was followed throughout the course of the investigation.

Statistical analysis

On a PC that was compatible with IBM, SPSS statistical software version 26 was used to tabulate and analyze the collected data. Quantitative data were presented as mean ± SD, qualitative data were presented as numbers and percentages. The qualitative characteristics of the examined subgroups were compared using the Pearson X^2-test. Mann Whitney U test (U) was used to compare two quantitative non-normally distributed data sets. Student t-test was used to evaluate the difference between two quantitative regularly distributed variables. The association between more than two quantitative variables that are not normally distributed was examined by Kruskall Wallis test. Spearman correlation was used to demonstrate the relationship between two non-normally distributed quantitative variables. A P-value ≤ 0.05 was judged statistically significant.

RESULTS

The current study comprised 56 RA female patients. Their average age was 48.75 ± 10.99 years, with a BMI of 28.54 ± 4.25 kg/m^2. The illness duration was 10.34 ± 6.97 years. The DAS28 revealed that RA patients represented all levels of disease activity. Regarding marital status, 39 patients (69.6%) were married. Twenty patients had a high degree of education. The RA group's descriptive statistics for the nine SF36 domains revealed a low mean for each domain when compared to the control group.

As shown in table (1), statistically significant differences were seen between RA patients and control in the FS-36's averages for physical functioning, limit due to physical health, limit due to emotional difficulties, pain, and general health ($p < 0.0001$). Both groups' descriptions of the mental and physical components differed considerably ($p<0.001$ and $p<0.0008$ respectively).

Compared to healthy people, RA patients had a substantially higher PSQI global score ($p < 0.034$). In the categories of subjective sleep quality, habitual sleep efficiency, and sleep disturbance, the RA patients scored noticeably higher. Our findings showed that, in comparison with healthy people (44.6%), 64.3% of RA participants had poor sleep quality (PSQI > 5).

Table (1): Comparison between RA patients and controls

Variable	RA (n=56)		Controls (n=56)		Test of significance	p-value
	No.	%	No.	%		
Demographic characteristics						
Marital status						
Single	17	30.4	13	23.2	$\chi2$=0.73	0.393
Married	39	69.6	43	76.8		
Educational level						
≤ High	36	64.3	14	25	$\chi2$=17.49	**<0.001***
>High	20	35.7	42	75		
Age (Years)	48.75 ±10.99		48.50 ±8.49		t=3.37	**0.621**
BMI (kg/m^2)	28.54 ±4.25		28.29 ±2.86		t=0.37	0.714
Clinical characteristics						
Disease duration (Years)	10.34 ±6.97		---		---	---
PGA	6.27 ±2.23		---		---	---
PhGA	5.43 ±2.09		---		---	---
ESR	39.77 ±32.21		---		---	---
DAS 28	4.27 ±1.44		---		---	---
Disease activity						
Remission	9	16.1	---	---	---	---
Low	6	10.7				
Moderate	21	37.5				
High	20	35.7				
PSQI						
Subjective sleep quality	1.41 ±0.97		0.84 ±0.73		U=3.37	**0.001***
Sleep latency	1.46 ±1.01		1.13 ±0.88		U=1.88	0.061
Sleep duration	1.04 ±1.13		1.11 ±0.97		U=0.53	0.600
Habitual sleep efficiency	0.61 ±1.09		0.14 ±0.40		U=2.20	**0.028***
Sleep disturbance	1.59 ±0.65		1.23 ±0.66		U=2.94	**0.003***
Use of sleep medication	0.27 ±0.82		0.39 ±0.78		U=1.55	0.121
Daytime dysfunction	1.23 ±0.85		1.02 ±0.56		U=1.54	0.248
Global PSQI	7.61 ±4.51		5.86 ±2.99		U=2.12	**0.034***
Sleep quality						
Good	20	٣٥.٧	31	٥٥.٤	$\chi2$=4.36	**0.037***
Poor	36	٦٤.٣	25	٤٤.٦		
SF 36						
Physical functioning	49.38 ±30.17		68.21 ±21.14		U=3.35	**0.001***
Limit due to physical health	37.50 ±42.64		65.18 ±33.94		U=3.76	**<0.001***
Limit due to emotional problems	35.12 ±45.58		62.19 ±33.12		U=3.78	**<0.001***
Energy/fatigue	42.50 ±19.91		49.11 ±16.52		U=1.95	0.051
Emotional well being	53.50 ±15.57		54.87 ±18.38		U=0.26	0.793
Social functioning	53.35 ±27.33		60.04 ±16.76		U=0.90	0.371
Pain	40.80 ±24.75		55.67 ±18.69		U=3.51	**<0.001***
General health	39.11 ±16.54		53.71 ±10.74		U=4.93	**<0.001***
Health change	36.69 ±26.06		42.86 ±20.06		U=1.55	0.121
PCS	41.70 ±24.60		60.69 ±15.91		U=4.26	**<0.001***
MCS	46.46 ±22.58		56.21 ±14.75		U=2.64	**0.008***

*: statistically significant, $\chi2$: chi-squared test, t: student t test, u: Mann Whitney u test, pcs: physical component summary, mcs: mental component summary.

Table (2) showed that higher RA disease activity was associated with deterioration across all PSQI categories, with statistical significance in subjective sleep quality, sleep latency and duration, and daytime functioning. Global PSQI was significantly different among low, moderate, and high disease activity groups (Significant only between high group and low group).

Table (2): PSQI in relation to disease activity among studied RA patients (n=56)

PSQI items	Disease activity (n=56)				K	p-value
	Remission (n=9)	Low (n=6)	Moderate (n=21)	High (n=20)		
	Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD		
Subjective sleep quality	0.89 ±1.05	1.00 ±0.89	1.19 ±0.93	2.00 ±0.73	13.12	**0.004***
Sleep latency	1.22 ±0.97	1.00 ±0.89	1.19 ±1.08	2.00 ±0.80	8.91	**0.030***
Sleep duration	0.00 ±0.00	0.83 ±0.98	1.05 ±0.97	1.55 ±1.28	12.55	**0.006***
Habitual sleep efficiency	0.22 ±0.67	0.50 ±1.23	0.67 ±1.24	0.75 ±1.07	2.41	0.491
Sleep disturbance	1.33 ±0.50	1.50 ±0.55	1.43 ±0.75	1.90 ±0.55	7.23	0.065
Use of sleep medication	0.00 ±0.00	0.11 ±0.33	0.14 ±0.66	0.55 ±1.15	3.30	0.348
Daytime dysfunction	0.67 ±0.52	0.95 ±0.74	1.00 ±0.71	1.80 ±0.83	14.45	**0.002***
Global PSQI	4.78 ±3.11	5.50 ±4.18	6.62 ±3.72	10.55 ±4.50	13.16	**0.004***

*: Statistically significant, K: Kruskal Wallis test.

Our results showed that sociodemographic variants in patients with RA like age, marital status, and BMI did not affect sleep quality. Table (3) showed ESR, patient global assessment, physician global assessment, and accordingly higher disease activity were significantly related to poor sleep. However, disease duration didn't affect sleep quality. RA poor sleepers with (PSQI > 5) had significantly lower SF36 in all domains than good sleepers.

Table (3): Comparison between good and poor sleep quality among RA patients

Variable	Sleep quality				Test of significance	p-value
	Good (n=20)		Poor (n=36)			
	No.	%	No.	%		
Demographic characteristics						
Marital status: Single	7	35	10	27.8		
Married	13	65	26	72.2	$\chi2$=0.32	0.573
Educational level: ≤ High	15	75	21	58.3		
>High	5	25	15	41.7	$\chi2$=1.56	0.212
Age (Years)	48.60 ±11.49		48.83 ±10.88		t=0.07	0.941
BMI (kg/m^2)	29.18 ±3.97		28.18 ±4.41		t=0.86	0.394
Clinical characteristics						
Disease duration (Years)	9.25 ±6.70		10.94 ±7.13		U=0.81	0.420
PGA	4.95 ±1.93		7.00 ±2.06		U=3.14	**0.002***
PhGA	4.25 ±1.80		6.08 ±1.98		U=3.10	**0.002***
ESR	27.15 ±22.01		46.78 ±35.02		U=2.27	**0.023***
DAS 28	3.58 ±1.19		4.66 ±1.43		t=3.03	**0.004***
Disease activity						
Remission	3	15	17	47.2	$\chi2$=7.84	**0.044***
Low	4	20	2	5.6		
Moderate	8	40	13	36.1		
High	5	25	4	11.1		
SF 36						
Physical functioning	69.25 ±22.78		38.33 ±28.23		U=3.67	**<0.001***
Limit due to physical health	57.50 ±45.95		26.39 ±36.81		U=2.20	**0.028***
Limit due to emotional problems	63.34 ±44.46		19.44 ±38.53		U=3.39	**0.001***
Energy/fatigue	54.50 ±17.31		35.83 ±18.22		U=3.49	**<0.001***
Emotional well being	65.00 ±17.79		49.24 ±16.37		U=2.95	**0.003***
Social functioning	66.25 ±22.62		46.18 ±27.36		U=2.67	**0.008***
Pain	58.50 ±22.38		30.97 ±20.31		U=3.98	**<0.001***
General health	53.00 ±13.32		31.39 ±12.74		U=4.61	**<0.001***
Health change	46.50 ±20.07		31.25 ±27.63		U=2.63	**0.008***
PCS	59.56 ±19.89		31.77 ±21.26		U=4.16	**<0.001***
MCS	62.27 ±19.76		37.67 ±19.15		U=3.76	**<0.001***

*: Statistically significant, $\chi2$: Chi-squared test, t: Student t test, U: Mann-Whitney U test, PCS: physical component summary; MCS: mental component summary.

Table (4) showed that disease activity as general and its main variables (patient global assessment, physician global assessment and ESR) had high significant correlation with global PSQI and negatively with SF-36 physical and mental components. Additionally, SF-36 physical and mental components had high significant negative correlation on sleep quality.

Table (4): Correlation between some parameters & global PSQI and SF-36 components among studied RA patients (n=56)

Parameters	Global PSQI		SF-36 components			
			PCS		MCS	
	Rho	p-value	rho	p-value	rho	p-value
Age (Years)	0.035	0.798	-0.254	0.059	-0.199	0.142
BMI (kg/m^2)	-0.142	0.297	-0.092	0.500	-0.125	0.357
Disease duration (Years)	0.031	0.819	-0.214	0.113	-0.171	0.208
PGA	0.544	**<0.001***	-0.846	**<0.001***	-0.729	**<0.001***
PhGA	0.502	**<0.001***	-0.816	**<0.001***	-0.717	**<0.001***
ESR	0.403	**0.003***	-0.644	**<0.001***	-0.513	**<0.001***
DAS 28	0.465	**<0.001***	-0.728	**<0.001***	-0.602	**<0.001***
PCS	-0.668	**<0.001***	----	-----	0.829	**<0.001***
MCS	-0.594	**<0.001***	٠.٨٢٩	**<0.001***	**----**	**----**

*: Statistically significant, rho: Correlation coefficient, PCS: physical component summary; MCS: mental component summary.

DISCUSSION

The physical and emotional aspects of well-being are significantly impacted by RA, a chronic autoimmune illness. The SF36 questionnaire, the most used general indicator of health status, was utilized in this study to examine the QoL in RA patients. SF-36 profiles in RA have been the subject of several prior investigations. It is a useful instrument for RA patients [(1)]. RA has a significant and varied impact on patients' QoL, including their emotional and physical health. Clinical examination often reveals physical impairment, but the doctor may overlook psychological and social morbidities [(11)].

QoL scores on the SF-36 questionnaire between RA patients and general population participants in this study showed that the two groups differed on nearly every scale, especially in the SF-36 domains for limitations related to physical functioning, limitations due to physical health, limitations due to emotional problems, pain, and general health (p <0.0001). Furthermore, high disease activity indicators reflected by DAS 28, ESR, ph GA, and Pt GA had a substantial negative connection with both the mental and physical domains of the SF-36. This is in line with a research conducted by Sohag on 26 Egyptian patients who had early-stage RA, where the SF-36 measure likewise revealed a reduction in QoL [(12)]. Additionally, **Birrell *et al.*** [(13)] examined 86 RA patients and discovered that the SF-36 measured mild to substantial health status deterioration, with notable deviations from both chronic illness states like low back pain and population norms. The authors of similar studies came to the conclusion that people with RA had a much poorer QoL than people in healthy populations [(14)]. Even worse than those with other chronic conditions such Sjögren's syndrome, asthma/chronic bronchitis, heart disease, hypertension, diabetes mellitus, migraine, and dermatological illness, according to one research, was the QoL of RA patients [(15)]. Numerous pieces of evidence indicate that arthritis has a catastrophic impact on HRQoL. According to data from 322 individuals across 11 US states, a major survey clearly shows that persons with arthritis experience much higher HRQoL impairment than those without [(16)].

Our findings are contradicted with **Martinec *et al.*** [(17)] who found no statistically significant changes in the QOL between RA patients and the general population.

According to some research, there is a correlation between disease activity and the mental and physical aspects of HRQoL [(13, 18)]. However, other research has shown that physical health is more strongly correlated with disease activity than mental health [(19)]. Similarly, many other studies using the RAQOL, an RA-specific measure, reported that disease activity in RA hurt QOL [(20)]. **Yacoub *et al.*** [(21)] looked at how a sample of 250 Moroccan people with RA were affected by disease-related factors that affected their QoL. According to their findings, the primary factors associated with a disruption in QoL were disease duration, pain severity, disease activity, immunological status, and functional impairment.

Age and the mental and physical domains on the SF36 had a negative link in this study, but it is not statistically significant. The fact that our group consisted of middle-aged ladies rather than old people explains why this contradicts the findings of Hussein's prior work [(22)]. Given that physical function deteriorates with age, it is not unexpected that a higher mean age was linked to worse physical functioning and total PCS among the 31 studies that were suitable for inclusion in the study [(23)]. The positive correlation between mean age and the mental health domain—a higher mean age was linked to better mental health—

was more significant. Despite being in conflict with a prior literature analysis, this research found that older RA patients over 75 had lower HRQoL [24].

The mean QoL domain and disease duration did not statistically significantly correlate. This finding is in contrast to a study conducted in Egypt that found that the length of the disease had the greatest impact on both mental and physical function [25], with longer disease duration being associated with greater impairment. The results show lifelong mood depressed symptoms significantly contribute to HRQoL impairment in RA patients and the higher prevalence of depression among RA patients may be connected to this. However, in another study by **Hyphantis *et al.*** [26] showed that longer disease duration was linked to better MCS in RA patients. The explanation offered is that patients who have had their symptoms for a longer period of time may be more accepting of their condition than those who have just recently developed it. This debate may be influenced by differences in the socioeconomic and demographic traits of the communities under study.

In the present study, the mean PSQI score (PSQI > 5), indicated poor sleep quality in the patients of RA was (64.3%) compared to healthy subjects (44.6%). In their study to evaluate psychosocial factors and sleep quality in RA patients, **Abdelrahman and his colleagues** [27] found similar results, showing that 63.3% of RA participants had poor sleep quality, which was considerably greater than that of healthy people. According to earlier studies, 30–75% of RA patients have been shown to have poor sleep quality [28]. In their investigation, **Guo *et al.*** [29] found that RA patients had a significant prevalence of sleep problems. Our findings are supported by **Suriyidiz *et al.*** [30] research, which included 94 RA patients and 52 healthy controls. The study also indicated that RA patients had poor sleep quality.

Our findings demonstrated that deficits across all PSQI areas were associated with increased disease activity. Similar to our findings, other researchers have shown increased disease activity in RA patients who had poor sleep quality [31]. Our findings are consistent with those of **Radwan and Borai** [32] who used the DAS28 score to evaluate sleep quality in Egyptian RA patients and its relationship to disease activity. They found that poor sleep was associated with greater levels of disease activity. Consistent with these findings, a research that was conducted in the Korean population found that illness activity had a negative correlation with the SF-36 physical component and a substantial correlation with poor sleep quality [33].

Conversely, **Grabovac *et al.*** [34] found no link between poor sleep quality and disease activity. Furthermore, there was no correlation between disease activity and sleep quality, according to **Kim *et al.*** [35]. According to **Abdelrahman *et al.*** [27]**,** age and the length of the illness had no influence on the quality of sleep.

LIMITATIONS

Despite being statistically valid, the sample size was small. Male RA could not be represented by our sample. These results only assessed subjective sleep quality because the PSQI was used to measure sleep quality. Due to socioeconomic issues, polysomnography—the gold standard method for evaluating sleep disorders—was not utilized. We did not evaluate the impact of biological therapy, disease-modifying anti-rheumatic medications, and steroids on patient treatment. Furthermore, none of the participants in this trial were on biologics. It was impossible to determine causal linkages or track changes in linked parameters over time due to the cross-sectional study design. Finally, a variety of comorbidities that were not assessed in our study may have contributed to functional impairment and poor sleep, which may have impacted our study variables.

CONCLUSION

Our study demonstrated that RA significantly impacted patients' health-related QoL. Also, RA patients had poor sleep quality. The impact of disease activity and HRQoL on sleep quality had been shown.

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REFERENCES

1. **Benjamin I, Griggs R, Wing E *et al.* (2015):** Andreoli and Carpenter's Cecil Essentials of Medicine E-Book; Elsevier Health Sciences: Amsterdam, The Netherlands, Pp: 426-34. https://www.elsevier.com/about/policies-and-standards/copyright/permissions
2. **Almutairi K, Nossent J, Preen D *et al.* (2021):** The global prevalence of rheumatoid arthritis: A meta-analysis based on a systematic review. Rheumatol Int., 41: 863–877.
3. **Goes A, Reis L, Silva M *et al.* (2017):** Rheumatoid arthritis and sleep quality. Rev Bras De Reumatol., 57: 294–298.
4. **Tański W, Świątoniowska-Lonc N, Tomasiewicz A *et al.* (2022):** The impact of sleep disorders on the daily activity and quality of life in rheumatoid arthritis patients—A systematic review and meta-analysis. Eur Rev Med Pharmacol Sci., 26: 3212–29.
5. **Lauren L, Torbjörn Å, Lars A *et al.* (2022):** Sleep problems in rheumatoid arthritis over 12 years from diagnosis: Results from the Swedish EIRA study. RMD Open, 8: e001800. doi: 10.1136/rmdopen-2021-001800.
6. **Maes M, Berk M, Goehler L *et al.* (2012):** Depression and sickness behavior are Janus-faced responses to shared inflammatory pathways. BMC Med., 10 (1): 1–9.
7. **Aletaha D, Neogi T, Silman A *et al.* (2010):** 2010 rheumatoid arthritis classification criteria: an American College of Rheumatology/European 104 League Against Rheumatism collaborative initiative. Ann Rheum Dis., 69: 1580–1588.
8. **Prevoo M, Hof van't M, Kuper H *et al.* (1995):** Modified disease activity scores include twenty-eight-joint counts: development and validation in a

prospective longitudinal study of patients with rheumatoid arthritis. Arthritis Rheum., 38: 44–8.

9. **Ware J, Gandek B (1998):** Overview of the SF-36 health survey and the international quality of life assessment (IQOLA) project. J Clin Epidemiol., 51 (11): 903–12.
10. **Suurmeijer T, Waltz M, Moum T *et al.* (2001):** Quality of life profiles in the first years of rheumatoid arthritis: results from the EURIDISS longitudinal study. Arthritis Rheum., 45 (2): 111–21.
11. **Tosa E, Albu A, Popa M (2016):** The effect of physical therapy on the improvement of the quality of life in rheumatoid arthritis patients. Civil Sport., 17: 29–34.
12. **Al-Fadl E, Ismail M, Thabit M *et al.* (2014):** Assessment of health-related quality of life, anxiety and depression in patients with early rheumatoid arthritis. Egypt Rheumatol., 36: 51–56.
13. **Birrell F, Hassell A, Jones P *et al.* (2000):** How does the short form 36 health questionnaire (SF-36) in rheumatoid arthritis (RA) relate to RA outcome measures and SF-36 population values? A cross-sectional study. Clin Rheumatol., 19: 195–199.
14. **Taylor W, Myers J, Simpson R *et al.* (2004):** Quality of life of people with rheumatoid arthritis as measured by the World Health Organization Quality of Life Instrument, Short Form (WHOQOL-BREF): Score distributions and psychometric properties. Arthritis Rheum., 51: 350–357.
15. **Strömbeck B, Ekdahl C, Manthorpe R *et al.* (2000):** Health related quality of life in primary Sjögren's syndrome, rheumatoid arthritis and fibromyalgia compared to normal population data using SF-36. Scand Rheumatol., 29: 20–28.
16. **Centers for Disease Control and Prevention (2000):** Health-related quality of life among adults with arthritis-behavioral risk factor surveillance system, 11 states, 1996-1998. MMWR. Morbidity and Mortality Weekly Report, 49 (17): 366-69.
17. **Martinec R, Pinjatela R, Balen D (2019):** Quality Of Life in Patients with Rheumatoid Arthritis – A Preliminary Study. Acta Clin Croat., 58: 157-166.
18. **Alishiri G, Bayat N, Salimzadeh A *et al.* (2011):** Health-related quality of life and disease activity in rheumatoid arthritis. J Res Med Sci., 16 (7): 897–903.
19. **Skevington S, Lotfy M, O'Connell K (2004):** The World Health Organization's WHOQOL-BREF Quality of Life Assessment: Psychometric Properties and Results of the International Field Trial. A Report from the WHOQOL Group. Quality of Life Research, 13: 299-310.
20. **Sunar I, Garip Y, Yilmaz O *et al.* (2015):** Disease activity (rheumatoid arthritis disease activity index-5) in patients with rheumatoid arthritis and its association with quality of life, pain, fatigue, and functional and psychological status. Arch Rheumatol , 30: 144–150.
21. **Yacooub Y, Amine B, Laatiris A *et al.* (2012):** Health related quality of life in Moroccan patients with rheumatoid arthritis. Clin Rheumatol., 31: 1471-7.
22. **Hussein W (2017):** The Quality of Life in Patients with Rheumatoid Arthritis in Baghdad, 2017: A Cross-Sectional Study. International Journal of Medical Research & Health Sciences, 6 (11): 20-34.
23. **Wells G, Boers M, Shea B *et al.* (199):** Sensitivity to change of generic quality of life instruments in patients with rheumatoid arthritis: preliminary findings in the generic health OMERACT study. OMERACT/ILAR Task Force on Generic Quality of Life. Life Outcome Measures in Rheumatology. International League of Associations for Rheumatology. The Journal of Rheumatology, 26 (1): 217-21.
24. **Hillsdon M, Brunner E, Guralnik J *et al.* (2005):** Prospective study of physical activity and physical function in early old age. American Journal of Preventive Medicine, 28 (3): 245-50.
25. **Gamal R, Mahran S, El Fotoh N *et al.* (2016):** Quality of life assessment in Egyptian rheumatoid arthritis patients: Relation to clinical features and disease activity. The Egyptian Rheumatologist, 38: 65–70.
26. **Hyphantis T, Kotsis K, Tsifetaki N *et al.* (2013):** The relationship between depressive symptoms, illness perceptions and quality of life in ankylosing spondylitis in comparison to rheumatoid arthritis. Clin Rheumatol., 32 (5): 635–44.
27. **Abdelrahman M, Shaddad A, Khaleel W *et al.* (2024):** Sleep quality, anxiety, depression, and quality of life in rheumatoid arthritis patients and impact of disease activity. Egypt Rheumatol Rehabil., 51: 10. DOI:10.1186/s43166-024-00242-z
28. **Matcham F, Scott I, Rayner L *et al.* (2014):** The impact of rheumatoid arthritis on quality-of life assessed using the SF-36: a systematic review and meta-analysis. Semin Arthritis Rheum., 44 (2): 123–30.
29. **Guo G, Fu T, Yin R *et al.* (2016):** Sleep quality in Chinese patients with rheumatoid arthritis: Contributing factors and effects on health-related quality of life. Health Qual Life Outcomes, 14: 151. doi: 10.1186/s12955-016-0550-3
30. **Sariyildiz M, Batmaz I, Bozkurt M *et al.* (2014):** Sleep quality in rheumatoid arthritis: Relationship between the disease severity, depression, functional status and the quality of life. J Clin Med Res., 6: 44-52.
31. **Kontodimopoulos N, Stamatopoulou E, Kletsas G *et al.* (2020):** Disease activity and sleep quality in rheumatoid arthritis: A deeper look into the relationship. Expert Rev Pharmacoecon Outcomes Res., 20: 595-602.
32. **Radwan A, Borai A (2021):** Quality of sleep in rheumatoid arthritis patients: Relationship with disease activity, depression and functional status. Egyptian Rheumatologist, 43 (2): 183-187.
33. **Moldofsky H (2010)**: Rheumatic manifestations of sleep disorders. Curr Opin Rheumatol., 22 (1): 59–63
34. **Grabovac I, Haider S, Berner C *et al.* (2018):** Sleep Quality in Patients with Rheumatoid Arthritis and Associations with Pain, Disability, Disease Duration, and Activity. J Clin Med., 7 (10): 336. doi: 10.3390/jcm7100336.
35. **Kim S, Kim H, Kim S *et al.* (2018)**: Sleep quality independently affects health-related quality of life and cognitive function in Korean female patients with rheumatoid arthritis: a case-control study's. Korean Med Sci., 33 (35): e216. doi: 10.3346/jkms. 2018. 33.e216.