Journal Website

Article history:
Received 07 November 2023
Revised 12 December 2023
Accepted 18 January 2024
Published online 30 March 2024

Iranian Journal of Neurodevelopmental Disorders

Volume 3, Issue 1, pp 112-125

Journal of Neurodevelopmental Disorder

E-ISSN: 2980-9681

Investigating the Effectiveness of Drug Administration and Relaxation Therapy in Reducing Pain and Sleep Disorders in Rheumatoid Arthritis Patients

Sogand Ghassemzadeh[1], Sana Rabiee[2], Ashraf Sharifian jazi[3], Faezeh Hashemi[4], Zeynab AI Sadat Hosseini[5]*

1. Department of Psychology, Tonekabon Branch, Islamic Azad University, Tonekabon, Iran.
2. Department of Psychology, Karaj Branch, Islamic Azad University, Karaj, Iran.
3. Department of Rehabilitation Counseling, Islamic Azad University, Khomeinishahr Branch, Khomeinishahr, Iran.
4. Department of Psychology, Zahedan Branch, Islamic Azad University, Zahedan, Iran.
5. Department of Psychology, Hormozgamn Branch, Islamic Azad University, Hormozgamn, Lran (Corresponding author).

*** Corresponding author email address**: aramshhoseyni@gmail.com

A r t i c l e I n f o

Article type:
Original Research

How to cite this article:
Ghassemzadeh S, Rabiee S, Sharifian jazi A, Hashemi F, Hosseini Z. (2024). Investigating the Effectiveness of Drug Administration and Relaxation Therapy in Reducing Pain and Sleep Disorders in Rheumatoid Arthritis Patients. *Iranian Journal of Neurodevelopmental Disorders*, *3*(1), 112-125.
https://doi.org/10.61838/kman.jndd.3.1.10

A B S T R A C T

Objective: Rheumatoid arthritis is a long-lasting inflammatory condition that causes joint pain, stiffness, and sleep disorders, significantly impacting the well-being of individuals. The purpose of this research was to examine the efficacy of drug administration and relaxation therapy in alleviating pain and improving sleep quality in patients with rheumatoid arthritis.

Methods and Materials: The study used a quasi-experimental research design, including pre-test, post-test, and four months' follow-up. The study consisted of three groups: two experimental groups (one receiving drug therapy and the other receiving relaxation therapy) and a control group. The research included all patients diagnosed with rheumatoid arthritis and referred to the Iranian Rheumatology Center in Tehran from July to December 2023 as the statistical population. The sample included 60 participants who were selected using purposive sampling methods. In the drug therapy group, each patient was prescribed 3 mg of melatonin daily for one month. The relaxation therapy group, consisting of 20 participants, received six 90-minute sessions once a week, both in person and at home. The in-person sessions were held in suitable offices under the supervision of the Rheumatology Center. The research utilized the Pittsburgh Sleep Quality Index (PSQI) and the McGill Pain Questionnaire (MPQ) as research instruments. The data was analyzed statistically using the Kruskal-Wallis H method and analysis of covariance with repeated measures at a p-value of 0.05, utilizing SPSS statistical software version 27.

Findings: Based on the findings, the P-value for Between-Subjects Effects showed significance for the sleep disorder variable ($p<0.001$). Similarly, there was significance in the interaction effects between time and groups for the sleep disorder variable ($p=0.004$). In addition, the P-value for Between-Subjects Effects was also significant for the sensory pain variable ($p<0.001$). The study also discovered that the relationship between time and groups, along with the impacts within each group, were both statistically significant for the sensory pain variable ($p>0.05$). However, no differences were observed in any of the groups and stages for the emotional pain variable, indicating that the intervention methods did not affect emotional pain.

Conclusion: The current study found that drug therapy is successful in decreasing sleep disorders and providing long-term relief from sensory pain. On the other hand, relaxation therapy is not as effective as medication in reducing pain and sleep disorders. These findings will assist medical professionals in making informed decisions when selecting treatments for patients with rheumatoid arthritis.

Keywords: *Drug Therapy, Relaxation Therapy, Chronic Pain, Sleep Disorders, Rheumatoid Arthritis*

1. Introduction

Rheumatoid arthritis (RA) is a common, long-lasting autoimmune disease known for causing inflammation throughout the joints. It impacts roughly 1% of the global population, with a higher prevalence among women, and can also affect other organs in addition to the joints (Ausserwinkler et al., 2025). RA is correlated to a higher mortality rate, primarily due to an increased likelihood of cardiovascular disease, cancer, and infections. Several factors, including a compromised immune system, pre-existing medical conditions, and the use of glucocorticoids (GCs) and disease-modifying antirheumatic drugs (DMARDs), all play a role in elevating the risk (Domínguez-Casas et al., 2025). Research has shown that factors like insomnia, daytime tiredness, and irregular sleep patterns can increase the likelihood of developing RA (Liu et al., 2024). Additionally, high levels of stress have been connected to poor sleep quality in RA patients, which in turn affects their overall quality of life (Munir et al., 2024).

In rheumatoid arthritis (RA), ongoing inflammation of the synovium results in permanent damage to joints, such as narrowing of joint spaces, osteoporosis, and bone erosion. This continuous deterioration leads to structural harm to bones and cartilage and heightens the reactivity of the area to chemical messengers. As a result, these elements collectively contribute to the emergence of long-term pain in RA patients (Motyl et al., 2024). Chronic pain linked to RA is more prevalent in individuals with anxiety, females gender, and those with high levels of inflammation. Studies indicate that around half of these patients experience persistent pain even when their inflammation is adequately controlled, often due to both peripheral and central sensitization, as well as the presence of osteoarthritis (OA) and fibromyalgia (FM) (Mathias et al., 2021). Research has proposed that the intensity and duration of pain in RA are influenced by the source of the pain (inflammation and tissue damage) and the patient's perception of pain, with both physical factors (such as joint inflammation) and psychological factors (like pain interpretation and response) being significant contributors (Baerwald et al., 2024). Additionally, research has shown a connection between intense pain in patients with rheumatoid arthritis and poor sleep, fibromyalgia, depression, and sleep disorders (Weman et al., 2024).

Fatigue is a common symptom in rheumatoid arthritis patients and is more closely related to pain, mood, personality traits, and poor sleep than disease activity. Between 18.5 and 86.5% of individuals with RA experience sleep disorders like insomnia, poor sleep quality, and unrefreshing sleep (Brahem et al., 2024). Sleep disorders do not just affect the quality of life; they can also impact psychological and social well-being, disease activity, fatigue, and daytime tiredness. Furthermore, poor sleep quality can contribute to functional disability by exacerbating pain and fatigue severity (Singh & Kumar, 2024). Research by Abdelrahman et al. (2024) showed that RA patients often have poor sleep quality, anxiety, depression, and reduced quality of life, with disease activity playing a role in these factors. Greater disease severity tends to lead to increased anxiety and depression, poorer sleep quality and decreased quality of life (Abdelrahman et al., 2024). Another study revealed that individuals with RA frequently face sleep disorders, and those with low sleep quality are more likely to experience depressive symptoms, disease flare-ups, and intense pain (Azzam, 2024).

Due to the complexities associated with this condition, effective treatment of RA is crucial. Early detection and prompt medical intervention can halt the advancement of joint damage, decrease disease activity, and prevent disability. On the other hand, delaying treatment may result in serious complications like pericarditis, vasculitis, and pulmonary granulomas. Research indicates that 40% of untreated individuals lose their ability to work within a decade (Mrid et al., 2022). Anti-inflammatory medications, such as corticosteroids, are commonly prescribed to alleviate the symptoms of RA. Moreover, disease-modifying antirheumatic drugs (DMARDs), including both traditional and biological ones, are accessible to decelerate the progression of the disease. Traditional DMARDs like methotrexate (MTX), leflunomide, sulfasalazine, and hydroxychloroquine are examples of such medications (Destiani et al., 2025). One research study suggested that pharmaceutical intervention can alleviate the severity of rheumatoid arthritis symptoms, slow the progression of the condition, and reduce the necessity for pain relief and steroid drugs. Nonetheless, the choice of treatment plan should be tailored to the individual patient's needs (Prasad et al., 2023). Another study concluded that early drug therapy can be effective in halting the progression of rheumatoid arthritis (Krijbolder et al., 2022).

Nevertheless, despite the existence of multiple medications, there is no known definitive cure for rheumatoid arthritis, with the primary objective of treatment being to alleviate pain and inflammation, preserve joint function, and prevent joint damage. Medications such as corticosteroids and DMARDs are frequently utilized in contemporary medicine, but their application is restricted due to the potential for serious side effects, expensive costs, and limited effectiveness in 30-40% of patients (Rafeeqi et al., 2025). Due to these challenges, relaxation therapy has emerged as a promising complementary approach. This treatment includes methods such as progressive muscle relaxation, deep breathing from the diaphragm, activities to increase

E-ISSN: 2980-9681

mindfulness, and behavioral techniques for relaxation. Its goal is to promote deep relaxation and mental balance by activating processes that regulate oneself (Andrena & Kurdi, 2023). A study revealed that five-finger relaxation can result in feelings of inner peace, increased happiness, and reduced stress and psychological tension, ultimately leading to pain relief and improved sleep quality in elderly individuals with rheumatoid arthritis (Dewi et al., 2022). Furthermore, research findings highlighted the potential benefits of progressive muscle relaxation for enhancing sleep quality and reducing fatigue in rheumatoid arthritis patients (Kılıç & Parlar Kılıç, 2023).

Rheumatoid arthritis is a long-term inflammatory condition that not only results in joint pain but also leads to significant sleep disorders among patients. These issues can have a detrimental impact on the overall quality of life and can hinder the treatment process. While drug therapy is typically used as the primary method to alleviate symptoms, alternative approaches like relaxation therapy may offer benefits in terms of pain reduction and sleep enhancement for patients. However, there is still a lack of information concerning the combined utilization and effectiveness of these two forms of treatment. This study aims to evaluate how well combining drugs with relaxation therapy can help reduce pain and improve sleep quality for people with rheumatoid arthritis.

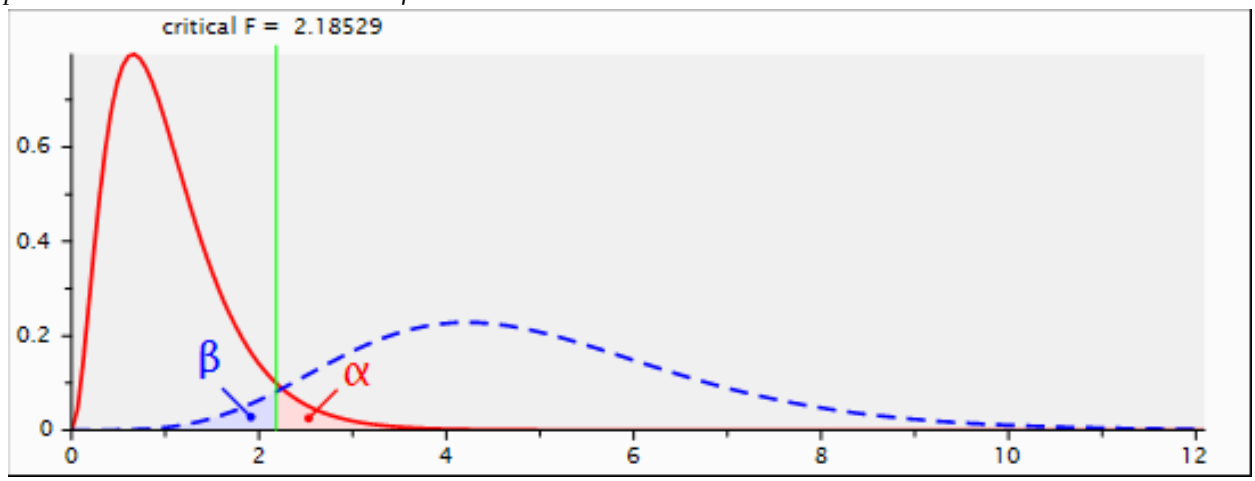
2. Methods and Materials

2.1. Study Design and Participants

The current research conducted a quasi-experimental study with a design consisting of a pre-test, post-test, and follow-up at two and four months, involving three groups: two experimental groups (one receiving drug and the other receiving relaxation therapy) and a control group. The study's statistical population consisted of all rheumatoid arthritis patients visiting the Iranian Rheumatology Center in Tehran from July to December 2023, diagnosed by rheumatology specialists. A sample of 60 individuals was purposively selected and randomly assigned to the experimental and control groups through a randomization method involving participants selecting numbers from an envelope. Sample size adequacy was determined using G-Power software with parameters set at α= 0.05, effect size= 0.20, and power test= 0.95 (Kang, 2021). The final sample size was 57 individuals, with an additional three participants allocated to each group to account for a potential researcher's error in selecting 60 individuals.

Figure 1

*Sample size calculation with G*Power software*



The criteria for including individuals in the study were rheumatoid arthritis as a medical condition, being 20 years of age or older, having adequate physical health to attend intervention sessions in person, having a medical record at the Iranian Rheumatism Center, never practicing yoga or relaxation in the previous 6 months, not being enrolled in any other educational program, and experiencing sleep disorders. In contrast, criteria for exclusion from the study encompassed poor attendance at intervention sessions (missing more than one session) or irregular medication use, having physical or mental limitations that hinder relaxation exercises, lacking access to social networks and the Internet for online exercises, being consistently tardy for sessions, providing incorrect answers on the questionnaire, or failing to complete more than five questions on the questionnaire. Furthermore, individuals with pre-existing medical conditions such as diabetes, hypertension, seizures, and those using sleep medication regularly were also excluded. Additionally, patients who had experienced adverse effects from melatonin use were not considered for the study. Nevertheless, melatonin generally has few side effects when

E-ISSN: 2980-9681

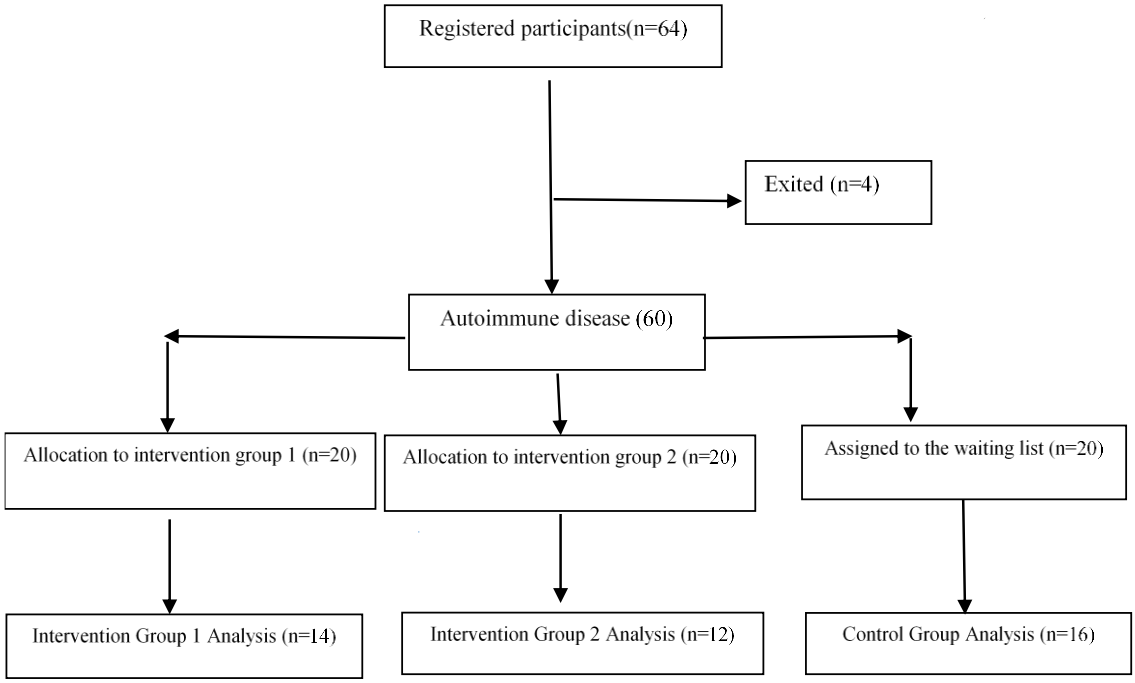
taken in appropriate doses and for short durations, with reported side effects including tiredness, nightmares, and temporary drowsiness.

The implementation of the research involved obtaining necessary permits before researchers contacted the Iranian Rheumatism Center. After coordinating with the center, announcements were made for interventions and research, both online and in person. Patients were purposefully selected based on the announcements for participation. Out of the 64 selected individuals, the researcher explained the research objectives and ethical principles in an initial virtual interview. They also provided written information for participating in the intervention sessions. Those who did not meet the criteria were not included. The 60 chosen participants gave their consent through a survey. Before being placed in either drug therapy, relaxation therapy, or control groups, the individuals underwent a preliminary test.

The drug therapy group, consisting of 20 participants, followed a regimen where each patient was prescribed 3 mg of melatonin daily for a month after completing questionnaires. The basis of this approach came from a previous research project called "Exploring How Melatonin Affects Sleep Quality in Patients," which also incorporated the use of melatonin and comparable evaluation instruments (Farshchian et al., 2020). The dosage and administration of the medication were overseen by a psychiatrist involved in the study to ensure proper monitoring. Patients were regularly contacted via phone during the treatment period for any issues or changes, and they were also physically visited once a week for a total of four visits at the rheumatism center. On the other hand, the relaxation therapy group, also consisting of 20 participants, underwent six 90-minute sessions once a week that included both in-person and at-home exercises based on a protocol from Bernstein et al. in 2000 (Bernstein et al., 2000). Individuals in the relaxation therapy group not only received in-person training but also engaged in specialized home exercises. Researchers maintained weekly communication with participants after in-person sessions through social media platforms and training groups to address any queries. Participants in virtual groups received relaxation therapy sessions through the use of video tutorials. In-person training sessions were held in appropriate offices at training workshops overseen by the Rheumatism Center. After the study, the control group was given a series of home exercise sessions via video tutorials for ethical reasons. Table 1 provides a detailed summary of the treatment sessions for the relaxation therapy group. Experimental groups completed post-test questionnaires at the end of the final session, with responses to research questionnaires collected again two months later. Follow-up measurements were conducted four months post-intervention for both research and control groups, utilizing virtual groups and video tutorials. Figure 2 demonstrates the CONSORT flow chart.

Figure 2

The flow diagram of the study



E-ISSN: 2980-9681

2.2. Data CollectionTolls

Pittsburgh Sleep Quality Index (PSQI): Buysse and colleagues (1989) created a tool to assess the quality of sleep and differentiate between those who have good or bad sleep (Buysse et al., 1991). The questionnaire assesses the patient's perception of sleep quality in the last 4 weeks. It includes 18 questions and seven subscales: subjective sleep quality, sleep latency, duration, habitual sleep efficiency (ratio of restful sleep duration to total time in bed), sleep discrepancy, use of sleeping medications, and daytime dysfunction. Scores on the scale range from 0 to 54, with higher scores indicating lower sleep quality. In Iran, a study has confirmed the questionnaire's reliability and validity, showing a Cronbach's alpha coefficient ranging from 0.78 to 0.82 (Mirzaei & Khodabakhshi-Koolaee, 2018). The researcher in this study found the Cronbach's alpha coefficient of the scale to be 0.71. McGill Pain Questionnaire (MPQ): Melzack developed a brief, 12-question self-assessment tool in 1975 to evaluate pain (Melzack, 1975). These questions evaluate the effects of pain on patients' daily lives, how others respond to their communication about pain, and their involvement in day-to-day activities. The questionnaire has two main components: sensory (9 words) and emotional (3 words). Responses range from 0 (not at all) to 3 (severe), with 0 being the lowest score and 36 being the highest. In their study, researchers discovered that the scale showed strong internal reliability with a score of 0.76 (Golmakani, 2018). The precision of the scale in Iran was confirmed by evaluating it against other instruments using the Test-Retest approach (Amin et al., 2012). The study found that the Cronbach's alpha value for the measurement was 0.77.

Table 1

Summary of relaxation therapy sessions

Session	Content
First	- Teaching the basic principles - An introduction to the therapy method - Understanding the causes of stress and the process of relaxing 16 muscle groups gradually while maintaining a steady breathing pattern to promote relaxation - Each individual was given a visual tool to assist them in practicing at home - Use relaxation techniques following the therapist's guidance
Second	- Listen to podcasts at home to practice throughout the study period - -Document your relaxation techniques in a report
Third	The presenter identified a specific body part, and the participants were required to promptly flex and relax that muscle for a duration of 5 to 10 seconds. They were then instructed to resume the initial position upon hearing the word "release." In addition, the presenter evaluated home workout routines.
Fourth	- Examination of previous meetings - The client is encouraged to practice specific stretching exercises for their elbows as frequently as they can - Teaching the proper technique for pulling the shoulders back and engaging and tightening the abdominal muscles.
Fifth	- Conduct a workshop to evaluate the skills learned - Assess the abilities acquired by the attendees - Do home workouts
Sixth	- Summary of acquired skills and targeted workouts - Applying the techniques at home

2.3. Data Analysis

This research utilized descriptive statistics such as mean and standard deviation to describe the data and examined research hypotheses using Kruskal-Wallis H, analysis of covariance with repeated measures, at a significance level of 0.05, conducted with SPSS statistical software version 27. The Kolmogorov-Smirnov test was used to evaluate the normal distribution, while the Levene test was employed to assess the homogeneity of variances. Additionally, the Bonferroni post hoc test was employed to compare means.

3. Findings and Results

This research collected information from patients with rheumatism in four stages: pre-test, post-test, two-month follow-up, and four-month follow-up, including groups undergoing drug therapy, relaxation therapy, and control. Initially, the researcher examined the demographic characteristics of the participants, dividing them into age groups (20-30 years, 36-40 years, 41 years and above) and educational levels (Diploma, Bachelor, Higher education). Marital status and gender were factors considered in the study, with participants classified as single or married. The

E-ISSN: 2980-9681

findings from the Kruskal Wallis Test showed no significant variations among participants based on demographic factors (P>0.05).

Table 2

Demographic characteristics in the experimental and control groups

Variables		Drug Therapy		Relaxation Therapy		Control		Total		Kruskal-Wallis H	P value
	Demographic Information	N	%	N	%	N	%	N	%		
Age	20 to 30 Years	5	35.7%	4	33.3%	5	31.3%	14	33.3%	0.867	0.648
	36 to 40 Years	7	50.0%	3	25.0%	7	43.8%	17	40.5%		
	41 and up	2	14.3%	5	41.7%	4	25.0%	11	26.2%		
Education	Diploma	2	14.3%	3	25.0%	6	37.5%	11	26.2%	2.385	0.304
	Bachler	5	35.7%	2	16.7%	5	31.3%	12	28.6%		
	Higher Education	7	50.0%	7	58.3%	5	31.3%	19	45.2%		
Gender	Man	1	7.1%	3	25.0%	3	18.8%	7	16.7%	1.527	0.466
	Female	13	92.9%	9	75.0%	13	81.3%	35	83.3%		
Marital Status	Single	12	85.7%	11	91.7%	12	75.0%	35	83.3%	1.422	0.491
	Married	2	14.3%	1	8.3%	4	25.0%	7	16.7%		

The researcher analyzed the mean and variability of the research variables in the different research groups as shown in Table 3.

Table 3

Description of research variables

Variable	TIME	Groups	N	M	SD	Min	Max
Sleep Disorder	Pre-test	Drug Therapy	14	26.214	4.949	22	37
		Relaxation Therapy	12	24.917	4.033	22	36
		Control	16	23.813	1.834	22	29
	Post-test	Drug Therapy	14	23.929	1.817	22	27
		Relaxation Therapy	12	26.500	5.126	22	37
		Control	16	24.188	1.424	22	27
	Follow up1	Drug Therapy	14	20.357	1.550	19	24
		Relaxation Therapy	12	24.000	2.558	20	27
		Control	16	26.938	5.483	22	39
	Follow up2	Drug Therapy	14	19.571	1.651	17	23
		Relaxation Therapy	12	24.500	2.316	20	27
		Control	16	24.750	4.698	20	36
Sensory Pain	Pre-test	Drug Therapy	14	16.929	1.542	15	19
		Relaxation Therapy	12	17.250	1.422	15	19
		Control	16	17.188	1.471	15	19
	Post-test	Drug Therapy	14	15.500	1.401	14	18
		Relaxation Therapy	12	16.333	1.435	15	19

E-ISSN: 2980-9681

		Control	16	16.688	1.580	15	19
		Drug Therapy	14	15.143	1.292	14	18
	Follow up1	Relaxation Therapy	12	16.167	1.267	15	18
		Control	16	17.063	1.611	15	19
		Drug Therapy	14	14.143	1.027	13	17
	Follow up2	Relaxation Therapy	12	15.917	1.311	15	18
		Control	16	16.813	1.515	15	19
		Drug Therapy	14	4.643	1.499	2	7
	Pre-test	Relaxation Therapy	12	4.500	1.567	2	7
		Control	16	4.750	1.528	2	7
		Drug Therapy	14	4.857	1.460	2	7
	Post-test	Relaxation Therapy	12	4.833	1.267	3	7
Emotional Pain		Control	16	4.875	1.455	2	7
		Drug Therapy	14	4.357	1.737	2	7
	Follow up1	Relaxation Therapy	12	4.750	1.357	3	7
		Control	16	4.813	1.559	2	7
		Drug Therapy	14	4.071	1.685	2	6
	Follow up2	Relaxation Therapy	12	4.583	1.621	2	7
		Control	16	4.500	1.549	2	7

Table 3 displays the mean and standard deviation of the research variables' scores for the participants. It can be observed that the mean of the sleep disorder variable in the drug therapy, relaxation therapy, and control groups did not differ significantly during the pre-test phase. However, the mean scores of the sleep disorder variable in the drug therapy group decreased in the later stages compared to the relaxation therapy and control groups. No differences were observed in the relaxation therapy and control groups. Similarly, the mean of the Sensory pain variable did not vary much among the three groups in the pre-test stage. However, the scores of the sensory pain variable in the drug therapy group decreased in the later stages compared to the control group and relaxation therapy. Additionally, there was no significant difference in the emotional pain variable among the three groups in the various stages. The researcher examined the results of the analysis of the covariance test with repeated measurements in Table ٤.

Table 4

Covariance analysis test

Variable	Source	SS	MS	F	P-value	Eta Squared
Sleep Disorder	TIME	6.530	3.265	0.294	0.746	0.008
	TIME⁎ Pre-test	7.135	3.567	0.321	0.726	0.008
	TIME⁎ Group	186.162	46.541	4.193	0.004	0.181
	Group	448.475	224.238	18.283	< .001	0.490
Sensory Pain	TIME	0.323	0.161	0.118	0.889	0.003
	TIME⁎ Pre-test	0.227	0.113	0.083	0.921	0.002
	TIME⁎ Group	8.692	2.173	1.582	0.188	0.077
	Group	80.081	40.040	12.533	< .001	0.397
Emotional Pain	TIME	0.164	0.082	0.061	0.941	0.002
	TIME⁎ Pre-test	1.297	0.324	0.241	0.914	0.013
	TIME⁎ Group	1.046	0.523	0.389	0.679	0.010

E-ISSN: 2980-9681

	Group	2.488	1.244	0.280	0.757	0.015

According to the results of the covariance analysis presented in Table 4, the P-value for Between-Subjects Effects in the Sleep disorder variable was found to be statistically significant ($p<0.001$), suggesting a notable difference among the study groups in terms of the impact of the initial evaluation phase. Furthermore, the interaction effects between time and groups for the sleep disorder variable also showed a significant P-value ($p=0.004$). Additionally, the P-value for Between-Subjects Effects in the sensory pain variable was significant ($p<0.001$), suggesting a significant difference between the research groups while holding the effects of the pre-test stage constant. The statistical analysis revealed that both the interaction effects between time and groups, and the intra-group effects for the sensory pain variable were statistically significant at a level of $p>0.05$. Nonetheless, no notable distinction was detected in any of the groups or stages regarding the emotional pain factor, suggesting that the intervention techniques failed to influence emotional pain. In Table 5, the researcher analyzed the pairwise interaction effects between stages and groups specifically for the sleep disorder variable.

Table 5

Post Hoc Comparisons - Group ✲ TIME

Variable			MD	SE	t	p_{bonf}
Sleep Disorder	Drug Therapy, Post-test	Relaxation Therapy, Post-test	-2.717	1.347	-2.017	0.828
		Control, Post-test	-0.528	1.288	-0.410	1.000
		Drug Therapy, Follow up 1	3.697	1.286	2.876	0.120
		Relaxation Therapy, Follow up 1	-0.218	1.346	-0.162	1.000
		Control, Follow up 1	-3.387	1.266	-2.676	0.188
		Drug Therapy, Follow up 2	4.277	1.286	3.327	0.035
		Relaxation Therapy, Follow up 2	-0.716	1.346	-0.532	1.000
		Control, Follow up 2	-1.020	1.266	-0.806	1.000
		Control, Post-test	2.189	1.304	1.678	1.000
		Control, Post-test	6.414	1.346	4.764	< .001
		Drug Therapy, Follow up 1	2.499	1.360	1.837	1.000
	Relaxation Therapy, Post-test	Relaxation Therapy, Follow up 1	-0.670	1.304	-0.514	1.000
		Control, Follow up 1	6.993	1.346	5.194	< .001
		Drug Therapy, Follow up 2	2.001	1.360	1.471	1.000
		Relaxation Therapy, Follow up 2	1.696	1.304	1.300	1.000
		Drug Therapy, Follow up 1	4.225	1.266	3.338	0.032
		Relaxation Therapy, Follow up 1	0.310	1.304	0.238	1.000
		Control, Follow up 1	-2.859	1.199	-2.384	0.392
	Control, Post-test	Drug Therapy, Follow up 2	4.804	1.266	3.796	0.007
		Relaxation Therapy, Follow up 2	-0.188	1.304	-0.144	1.000
		Control, Follow up 2	-0.493	1.199	-0.411	1.000

E-ISSN: 2980-9681

	Relaxation Therapy, Follow up 1	-3.915	1.347	-2.907	0.105
	Control, Follow up 1	-7.084	1.288	-5.498	< .001
Drug Therapy, Follow up 1	Drug Therapy, Follow up 2	0.580	1.286	0.451	1.000
	Relaxation Therapy, Follow up 2	-4.413	1.346	-3.278	0.035
	Control, Follow up 2	-4.717	1.266	-3.728	0.009
	Control, Follow up 1	-3.169	1.304	-2.430	0.350
Relaxation Therapy, Follow up 1	Drug Therapy, Follow up 2	4.495	1.346	3.338	0.032
	Relaxation Therapy, Follow up 2	-0.498	1.360	-0.366	1.000
	Control, Follow up 2	-0.803	1.304	-0.615	1.000
Control, Follow up 1	Drug Therapy, Follow up 2	7.663	1.266	6.056	< .001
	Relaxation Therapy, Follow up 2	2.671	1.304	2.047	0.816
	Control, Follow up 2	2.366	1.199	1.973	0.886
Drug Therapy, Follow up 2	Relaxation Therapy, Follow up 2	-4.993	1.347	-3.708	0.009
	Control, Follow up 2	-5.297	1.288	-4.112	0.002
Relaxation Therapy, Follow up 2	Control, Follow up 2	-0.305	1.304	-0.233	1.000

Figure 3

Pairwise analysis of the interaction effects between stages and groups for the Sleep disorder variable

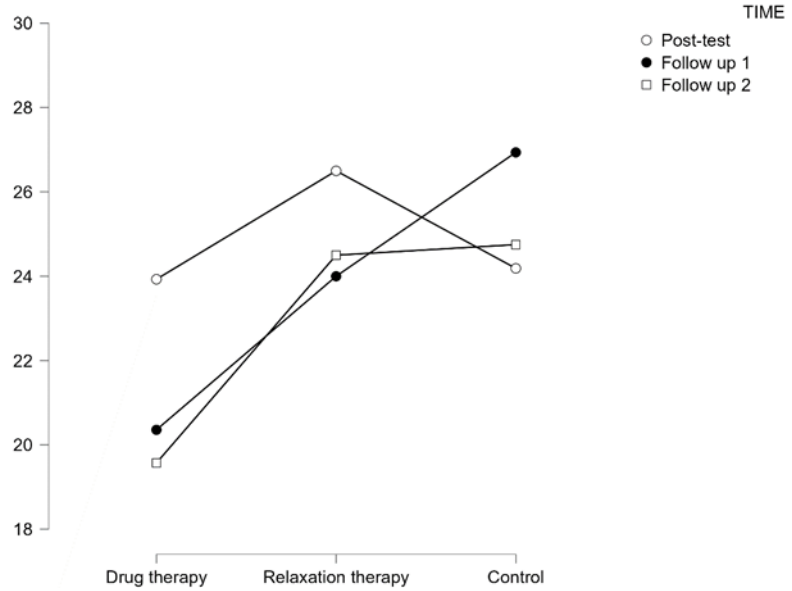


Table 5 and Figure 3 show that there was a significant discrepancy between the drug therapy group in the post-test stage and the drug therapy group in the follow-up 2 stage (P=0.035). This suggests that the level of sleep disorder in individuals decreased over time, as indicated by the positive mean difference. Additionally, there was a notable distinction between the control group in follow-up 1 and the drug therapy group in follow-up 2 (P<0.001). The data revealed a significant variation in the sleep disorder variable

E-ISSN: 2980-9681

between the control group in the post-test stage and the drug therapy group in the follow-up 2 (P=0.007) and follow-up 1 (P=0.035) stages. In addition, there was a notable distinction observed between the drug therapy group at follow-up 1 and the control group at follow-up 1 (P<0.001) as well as follow-up 2 (P=0.009). The negative mean difference indicates a decrease in the amount of sleep disorder over time compared to the control group, highlighting the effectiveness of drug therapy in addressing sleep disorders. However, the lack of variance between the first and second follow-up stages implies that this effect was not long-lasting.

A significant distinction was observed between the relaxation therapy group and the control group in the post-test stage and follow-up 1, with a P-value of less than 0.001. Similarly, there was a significant variance between the drug therapy group in the follow-up stage 1 and the relaxation therapy group in the follow-up stage 2, with a P-value of 0.035. The negative mean difference suggests that the amount of sleep disorder decreased more in the drug therapy group. In addition, a notable difference was noted between the relaxation therapy group in the follow-up stage 1 and the drug therapy group in the follow-up stage 2, with a P-value of 0.032. Furthermore, a significant distinction was found between the relaxation therapy group in Follow-up 2 and the control group in follow-up 2, with a P-value of 0.009, and in the control group and follow-up 2, with a P-value of 0.002. We can infer from the similar results in the relaxation therapy groups and the control group that the effectiveness of relaxation therapy in alleviating sleep disorders may not be superior. Table 6 presents the researcher's analysis of pairwise comparisons between research groups for the sensory pain variable.

Table 6

Bonferroni's post hoc test to examine differences between three groups

Variables	TIME	(I) Group	(J) Group	MD	Std. Error	P-value
Sensory Pain	Post-test	Drug Therapy	Relaxation Therapy	-0.779	0.584	0.571
			Control	-1.144	0.543	0.125
		Relaxation Therapy	Control	-0.365	0.565	1.000
	Follow up1	Drug Therapy	Relaxation Therapy	-0.992	0.564	0.260
			Control	-1.894*	0.524	0.003
		Relaxation Therapy	Control	-0.902	0.545	0.319
	Follow up2	Drug Therapy	Relaxation Therapy	-1.725*	0.517	0.006
			Control	-2.630*	0.480	p<0.001
		Relaxation Therapy	Control	-0.905	0.500	0.234

Table 6 displays a significant difference in the sensory pain category between the drug therapy and the control group during follow-up phases 1 and 2 (P<0.01). The difference in scores between the two groups and the decrease in mean scores in this category during the two stages of follow-up 2 and follow-up 1 in the drug therapy experimental group as opposed to the control group indicate that any intervention involving drug therapy in this study has an impact on the sensory pain category leading to its decrease, and this decrease is enduring. Conversely, as there was no significant distinction between the relaxation therapy and the control group, it is evident that relaxation therapy did not yield a meaningful impact on sensory pain.

4. Discussion and Conclusion

The present study aimed to investigate the effectiveness of medication and relaxation therapy in reducing pain and sleep disorders in rheumatoid arthritis patients. According to the results of this study, drug therapy reduced sleep disorders in rheumatoid arthritis patients, but it was not sustainable over time. This treatment also reduced sensory pain and had a sustainable effect. However, relaxation therapy was not an effective treatment for sleep disorders and sensory pain.

The current study's results, indicating that drug therapy alleviates sleep disorders and sensory pain in individuals with rheumatoid arthritis, align with previous research findings (Alimoradian et al., 2023; Palimi et al., 2022; Prasad et al., 2023; Krijbolder et al., 2022). According to Alimoradian et al. (2023), administering silymarin to RA patients led to reductions in liver enzymes, hepatotoxicity, renal complications, and pain severity (Alimoradian et al., 2023). Another study demonstrated that taking 3 mg of melatonin daily for 60 days significantly enhanced sleep quality, reduced disease activity, and alleviated pain severity in rheumatoid arthritis patients (Palimi et al., 2022). Drug therapy was also found to ameliorate the severity of RA symptoms, slow disease progression, and decrease the need for pain-relieving medications like analgesics and steroids (Prasad et al., 2023). Krijbolder et al. (2022) also noted in their research that early pharmacological intervention could effectively impede the advancement of rheumatoid arthritis (Krijbolder et al., 2022).

E-ISSN: 2980-9681

Drug therapy is essential in addressing inflammatory conditions such as rheumatoid arthritis, as it helps improve sleep quality by reducing inflammation, controlling pain, and alleviating the adverse effects of the illness. Nonsteroidal anti-inflammatory drugs (NSAIDs) and disease-modifying antirheumatic drugs (DMARDs) can help alleviate sleep disorders associated with these conditions. Additionally, biological drugs target inflammatory factors, such as interleukins and tumor necrosis factor (TNF-α), to enhance systemic symptoms (Destiani et al., 2025). Inflammatory arthritis patients may experience various types of pain beyond inflammation, affecting their overall quality of life. Drug therapy can help address non-inflammatory pain by modulating the nervous systems and controlling inflammation. Anti-inflammatory medications, steroids, and immunomodulatory can enhance physical function by inhibiting pain pathways and reducing nerve sensitivity (Das & Choy, 2023). The relationship between sleep and the immune system is reciprocal, with sleep deprivation exacerbating inflammation and symptoms, while reduced inflammation can improve sleep quality. Sleep also aids in inflammation reduction by regulating immune responses. Novel treatments incorporating immune modulators and supplements like melatonin aim to enhance sleep quality. The use of medications such as corticosteroids and monoclonal antibodies can enhance the quality of sleep by decreasing levels of inflammation, pain, and inflammatory cytokines (Ditmer et al., 2021). The difference in the long-term effects of drug therapy on sleep disorders as opposed to pain can be attributed to the unique nature of these issues; pain is more physiological and directly impacted by anti-inflammatory drugs and painkillers, while sleep disorders are affected by multiple complex factors. The effectiveness of medications is also influenced by how they work; painkillers and anti-inflammatory drugs have a more sustained impact, whereas sleep aids may offer immediate relief but can become less effective over time due to tolerance buildup. Additionally, some hypnotics carry the risk of dependence or decreased quality of normal sleep, which is less common with analgesics and anti-inflammatory drugs (Radwan & Borai, 2021).

Furthermore, previous research contradicts the idea that relaxation therapy is ineffective in addressing sleep disorders and sensory pain (Dewi et al., 2022; Kılıç & Parlar Kılıç, 2023). A study suggested that five-finger relaxation could lead to inner peace, happiness, and decreased stress and psychological tension, ultimately helping alleviate pain and enhance sleep quality in elderly individuals with rheumatism (Dewi et al., 2022). Another study also discovered that progressive muscle relaxation could help improve the quality of sleep and reduce fatigue in patients with rheumatoid arthritis (Kılıç & Parlar Kılıç, 2023).

Several factors could explain this difference. One factor is the variation in relaxation techniques used in the studies. Dewi et al. (2022) utilized the five-finger relaxation technique, while Kılıç et al. (2023) focused on progressive muscle relaxation (Dewi et al., 2022; Kılıç & Parlar Kılıç, 2023). This discrepancy in intervention types might impact the efficacy of the methods, as some techniques target muscle tension reduction while others aim at mental relaxation. The variations in tools for measurement and evaluation methods could also have contributed to the disparate outcomes, with different studies potentially using more sensitive scales to assess pain and sleep quality. Furthermore, psychological and lifestyle factors might have influenced the effectiveness of relaxation therapy, particularly if participants in the current study were highly stressed or less cooperative during the exercises (Dewi et al., 2022; Kılıç & Parlar Kılıç, 2023).

It is important to recognize that relaxation therapy is a non-pharmacological approach centered on mind-body relaxation, primarily concentrating on alleviating muscle tension and psychological stress (Andrena & Kurdi, 2023). Nevertheless, it might not be as effective in addressing sensory pain and sleep disorders in rheumatoid arthritis patients. The reason for this could be due to a variety of factors, such as the inflammatory characteristics of pain in rheumatoid arthritis caused by immune responses and damage to tissues, which require medication for managing inflammation (Mrid et al., 2022). On the other hand, various factors such as chronic pain, hormonal changes, depression, and anxiety could contribute to sleep difficulties in these patients. In such cases, relying solely on relaxation therapy may not be sufficient (Abdelrahman et al., 2024; Ditmer et al., 2021).

The severity and persistence of pain in rheumatoid arthritis may be such that relaxation therapy has a limited impact on the perception and experience of pain, given that these pains are more influenced by neuroimmunological mechanisms rather than just muscular and psychological tensions. Furthermore, the effectiveness of relaxation therapy may also hinge on the implementation method, intervention duration, and patient cooperation level, with the success of these approaches typically reliant on consistent practice and psychological acceptance (Mathias et al., 2021).

Despite the accomplishments of the current study, there are some limitations to be aware of when trying to apply the results more broadly. A drawback is the small sample size, which may not accurately reflect the entire patient population. Increasing the sample size or including data from different regions or multiple centers is advised for a more thorough analysis. Another limitation is the variability in patient responses to medications and treatments, which could impact the study outcomes. To tackle this issue,

E-ISSN: 2980-9681

patients may be sorted into groups according to their unique traits to improve treatment simulations. Adverse effects of medications could also have influenced patient perspectives, suggesting the need for clearer information on side effects and access to psychological counseling in similar studies. Additionally, relying on self-reported assessments for sleep quality may introduce inaccuracies, recommending the use of sleep recording devices or standardized measures for more precise evaluation. The failure of patients to follow treatment instructions was a difficulty that may have impacted outcomes, highlighting the need to improve patient education and counseling in future research to enhance treatment adherence. Furthermore, environmental, psychological, and social factors that may influence patient health and pain were not accounted for in the study, highlighting the necessity to investigate and control variables such as stress, economic status, and social aspects in study designs. The variations in severity and type of rheumatoid arthritis across individuals can also impact treatment effectiveness, emphasizing the need for patient classification based on disease characteristics for more accurate treatment analysis. The study results may have been affected by some patients incorporating complementary therapies like acupuncture and nutritional supplements. As a result, future research should focus on examining how complementary treatments impact various types of patients at the same time.

The results of this study show that drug therapy is successful in decreasing sleep disorders and reducing the ongoing sensation of pain. However, relaxation therapy is not as potent as medication in alleviating pain and sleep disorders. The results of this research can assist healthcare professionals in selecting appropriate treatments for patients with rheumatoid arthritis. Based on these findings, it is recommended that treatment facilities for rheumatic patients integrate drug therapy with psychological support or counseling for enhanced quality of life. Given the stronger impact of drug therapy on pain reduction, doctors can tailor treatment plans more precisely to ensure patients receive optimal care. By leveraging the positive effects of drug therapy on sensory pain and sleep disorders, physicians can use this approach to manage disease symptoms more efficiently. These study results will prompt further investigation into the efficacy of both pharmacological and non-pharmacological treatments for chronic conditions like rheumatoid arthritis. Additionally, these findings may serve as a foundation for future research on combined treatments and the effectiveness of psychological interventions such as relaxation therapy.

Authors' Contributions

All author significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

Acknowledgments

We hereby thank all individuals for participating and cooperating us in this study.

Declaration of Interest

The authors report no conflict of interest.

Funding

According to the authors, this article has no financial support.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Each participant received an informed consent form to understand the study's objectives.

References

Abdelrahman, M. S., Shaddad, A. M., Khaleel, W. G. E., Talaat, E. A., Safwat, S. M., & Farrag, S. (2024). Sleep quality, anxiety, depression, and quality of life in rheumatoid arthritis patients and impact of disease activity. Egyptian Rheumatology and Rehabilitation, 51(1), 10. https://doi.org/10.1186/s43166-024-00242-z

Alimoradian, A., Garshasbi, M., Asafari, M., Golitaleb, M., Tabar, R. M., Mortaji, S., & Tajik, R. (2023). Effect of silymarin on hepatic complications caused by methotrexate and its analgesic effects in patients with rheumatoid arthritis. 10.61186/sjku.28.4.95

Amin, M. R., Siratinayer, M., Abadi, A., & Moradyan, T. (2012). Correlation between visual analogue scale and short form of McGill questionnaire in patients with chronic low back pain. https://www.cabidigitallibrary.org/doi/full/10.5555/20123144997

Andrena, D., & Kurdi, F. (2023). Application of Relaxation Therapy on Chronic Pain in the Elderly with Hypertension at UPT PSTW Jember: A Case Study. Jurnal Kesehatan Komunitas Indonesia, 3(1), 59-80. doi.org/10.58545/jkki.v3i1.58

Ausserwinkler, M., Gensluckner, S., Frey, V., Gostner, I., Paulweber, B., Trinka, E., ... & Wernly, B. (2025). Cerebrovascular risk in rheumatoid arthritis patients: insights from carotid artery atherosclerosis in the Paracelsus 10,000 study. Rheumatology International, 45(2), 1-10. https://doi.org/10.1007/s00296-024-05781-4

Azzam, A. I. (2024). The impact of sleep problems on rheumatoid arthritis Disease Activity. Sleep Medicine Research, 15(2), 106-112. https://doi.org/10.17241/smr.2023.02075

E-ISSN: 2980-9681

Baerwald, C., Stemmler, E., Gnüchtel, S., Jeromin, K., Fritz, B., Bernateck, M., ... & Baron, R. (2024). Predictors for severe persisting pain in rheumatoid arthritis are associated with pain origin and appraisal of pain. Annals of the Rheumatic Diseases, 83(10), 1381-1388. https://doi.org/10.1136/ard-2023-225414

Bernstein, D. A., Borkovec, T. D., & Hazlett-Stevens, H. (2000). New directions in progressive relaxation training: A guidebook for helping professionals. Praeger Publishers/Greenwood Publishing Group. https://psycnet.apa.org/record/2000-03365-000

Brahem, M., Chebil, A., Abid, H., Jomaa, O., Sarraj, R., Jebali, B., ... & Younes, M. (2024). Sleep disorders in rheumatoid arthritis patients. The Egyptian Rheumatologist, 46(3), 107-111. https://doi.org/10.1016/j.ejr.2024.03.001

Buysse, D. J., Reynolds, C. F., Monk, T. H., Hoch, C. C., Yeager, A. L., & Kupfer, D. J. (1991). Quantification of subjective sleep quality in healthy elderly men and women using the Pittsburgh Sleep Quality Index (PSQI). Sleep, 14(4), 331-338. https://doi.org/10.1093/sleep/14.4.331

Das, D., & Choy, E. (2023). Non-inflammatory pain in inflammatory arthritis. Rheumatology, 62(7), 2360-2365. https://doi.org/10.1093/rheumatology/keac671

Destiani, D. P., Dewi, S., Sulaiman, S. A., Alfian, S. D., Barliana, M. I., & Abdulah, R. (2025). AMPD1 and MTHFR genes are not associated with calcium levels in rheumatoid arthritis patients with methotrexate therapy in Indonesia. Scientific Reports, 15(1), 1-8. https://doi.org/10.1038/s41598-024-69604-z

Dewi, R., Nurani, M. D., Fatmala, S. D., Wahida, A. Z., Budhiana, J., & Arsyi, D. N. (2022). The Five Finger Relaxation Techniques on Pain and Sleep Quality In Rhematic Patients In Sukabumi Village, Working Area Of The Selabatu Health Center, Sukabumi City. International Journal of Nursing and Health Services (IJNHS), 5(6), 501-510. https://doi.org/10.35654/ijnhs.v5i6.650

Ditmer, M., Gabryelska, A., Turkiewicz, S., Białasiewicz, P., Małecka-Wojciesko, E., & Sochal, M. (2021). Sleep problems in chronic inflammatory diseases: prevalence, treatment, and new perspectives: a narrative review. Journal of Clinical Medicine, 11(1), 67. https://doi.org/10.3390/jcm11010067

Domínguez-Casas, L. C., Ferraz-Amaro, I., Castañeda, S., & Blanco, R. (2025). Severe Respiratory Infections in Rheumatoid Arthritis Patients: An Observational Study of 528 Patients from a Single University Hospital. Journal of Clinical Medicine, 14(4), 1174. https://doi.org/10.3390/jcm14041174

Farshchian, N., Shirzadi, M., Farshchian, F., Tanhaye, S., Heydarheydari, S., & Amirifard, N. (2020). Evaluation of the melatonin effect on sleep quality in cancer patients. Tehran University of Medical Sciences Journal, 78(1), 38-42. http://tumj.tums.ac.ir/article-1-10371-fa.html

Golmakani, N. (2018). Comparison and correlation between visual analogue scale and different dimensions of the short form of McGill pain questionnaire in post cesarean pain evaluation. Nursing And Midwifery Journal, 16(9), 622-630. http://unmf.umsu.ac.ir/article-1-3611-en.html

Kang, H. (2021). Sample size determination and power analysis using the G* Power software. Journal of educational evaluation for health professions, 18. 10.3352/jeehp.2021.18.17

Kılıç, N., & Parlar Kılıç, S. (2023). The effect of progressive muscle relaxation on sleep quality and fatigue in patients with rheumatoid arthritis: A randomized controlled trial. International Journal of Nursing Practice, 29(3), e13015. https://doi.org/10.1111/ijn.13015

Krijbolder, D. I., Verstappen, M., van Dijk, B. T., Dakkak, Y. J., Burgers, L. E., Boer, A. C., ... & van der Helm-van, A. H. (2022). Intervention with methotrexate in patients with arthralgia at risk of rheumatoid arthritis to reduce the development of persistent arthritis and its disease burden (TREAT EARLIER): a randomised, double-blind, placebo-controlled, proof-of-concept trial. The Lancet, 400(10348), 283-294. https://doi.org/10.1016/S0140-6736(22)01193-X

Liu, B., Qian, Y., Lin, H., Zhao, S., Ying, J., Chen, W., ... & Mao, Y. (2024). Sleep pattern, genetic risk, and the risk of incident rheumatoid arthritis: A cohort study. Sleep Health, 10(6), 635-642. https://doi.org/10.1016/j.sleh.2024.08.009

Mathias, K., Amarnani, A., Pal, N., Karri, J., Arkfeld, D., Hagedorn, J. M., & Abd-Elsayed, A. (2021). Chronic pain in patients with rheumatoid arthritis. Current Pain and Headache Reports, 25, 1-11. https://doi.org/10.1007/s11916-021-00973-0

Melzack, R. (1975). The McGill Pain Questionnaire: major properties and scoring methods. pain, 1(3), 277-299. https://doi.org/10.1016/0304-3959(75)90044-5

Mirzaei, F., & Khodabakhshi-Koolaee, A. (2018). The relationship between sleep quality and perceived social support with loneliness in elderly men. Journal of Gerontology, 2(4), 11-20. http://joge.ir/article-1-182-en.html

Motyl, G., Krupka, W. M., & Maślińska, M. (2024). The problem of residual pain in the assessment of rheumatoid arthritis activity. Reumatologia, 62(3), 176. 10.5114/reum/189779

Mrid, R. B., Bouchmaa, N., Ainani, H., El Fatimy, R., Malka, G., & Mazini, L. (2022). Anti-rheumatoid drugs advancements: New insights into the molecular treatment of rheumatoid arthritis. Biomedicine & Pharmacotherapy, 151, 113126. https://doi.org/10.1016/j.biopha.2022.113126

Munir, M., Javaid, Z. K., Mahmood, K., Fareed, M., Mubeen, A., & Ali, A. L. (2024). Mediating Role of Quality

E-ISSN: 2980-9681

of Life between Perceived Stress and Sleep Quality among Patients with Rheumatoid Arthritis. Journal of Health and Rehabilitation Research, 4(2), 1570-1575. https://doi.org/10.61919/jhrr.v4i2.1176

Palimi, T., Zilaee, M., Rajaei, E., & Karandish, M. (2022). Effects of Melatonin on Sleep Quality and Disease activity in patients with rheumatoid arthritis. Sleep Medicine Research, 13(1), 38-45. https://doi.org/10.17241/smr.2022.01207

Prasad, P., Verma, S., Surbhi, Ganguly, N. K., Chaturvedi, V., & Mittal, S. A. (2023). Rheumatoid arthritis: advances in treatment strategies. Molecular and cellular biochemistry, 478(1), 69-88. https://doi.org/10.1007/s11010-022-04492-3

Radwan, A., & Borai, A. (2021). Quality of sleep in rheumatoid arthritis patients: Relationship with disease activity, depression and functional status. The Egyptian Rheumatologist, 43(2), 183-187. https://doi.org/10.1016/j.ejr.2020.08.002

Rafeeqi, T. A., Pandith, R. A., Shah, A., Zakir, M., Anjum, N., Ara, I., & Ahmed, N. Z. (2025). Serum biomarkers in rheumatoid arthritis patients and effect of unani herbal formulation Qurs-e-hudar on these biomarkers suggesting the anti-IL-6 effect. Journal of Herbal Medicine, 100999. https://doi.org/10.1016/j.hermed.2025.100999

Singh, G., & Kumar, V. (2024). Sleep quality is poor in rheumatoid arthritis patients and correlates with anxiety, Depression, and poor quality of life. Mediterranean Journal of Rheumatology, 35(3), 423. 10.31138/mjr.221022.sqp

Weman, L., Salo, H., Kuusalo, L., Huhtakangas, J., Vähäsalo, P., Backström, M., ... & Sokka-Isler, T. (2024). Intense symptoms of pain are associated with poor sleep, fibromyalgia, depression and sleep apnea in patients with rheumatoid arthritis and psoriatic arthritis. A register-based study. Joint Bone Spine, 91(5), 105744. https://doi.org/10.1016/j.jbspin.2024.105744

E-ISSN: 2980-9681