

## Research Article

### Quality of Life in Rheumatoid Arthritis Patients and Rehabilitation

Khansa Mehmood<sup>1</sup>, Mohammad Waqas<sup>2</sup>, Mohsin Masood<sup>3</sup>, Komal Javaid<sup>4</sup>, Khoula Waseem<sup>5</sup>, Abdullah Khan Afzaal<sup>6</sup>, Naila Bajwa<sup>7</sup>, Athar Ahmed Saeed<sup>8</sup>, Saira Afzal<sup>9</sup>

<sup>(8)</sup>Queen Elizabeth Hospital, Gateshead, United Kingdom

<sup>(1-7)</sup>Mayo Hospital, Lahore/King Edward Medical University Lahore, Pakistan, <sup>(9)</sup>Mayo Hospital, Lahore/ King Edward Medical University Lahore, Pakistan.

#### ABSTRACT:

**Background:** About 1% of the world's population is afflicted by the chronic autoimmune illness rheumatoid arthritis, which has a high morbidity and death rate. Patients' mental health is deteriorating as a result of rheumatoid arthritis. Rehabilitation is a crucial aspect of the management of rheumatoid arthritis. Evidence suggests that rehabilitation can significantly improve the quality of life for persons with this illness. The association between rheumatoid arthritis, quality of life, and patients' mental health will be elucidated by this systematic review, as well as the efficiency of rehabilitation therapies in enhancing patients' quality of life.

**Objective:** To assess the quality of life in rheumatoid arthritis patients with special focus on mental health.

**Methodology:** After carefully reviewing the available literature, we carried searches in the databases Google Scholar, Cochrane Library, and PubMed. The terms "quality of life," "mental health in rheumatoid arthritis," and "rehabilitation in RA" were used as search terms. Articles addressing RA patients' quality of life, how RA affects mental health, and RA patient rehabilitation programs have to meet inclusion requirements.

**Results:** 7 of the 10 publications examined highlighted the effects of RA on mental health and QoL, while 3 papers addressed various rehabilitation techniques used with RA patients.

**Conclusions:** The results demonstrate a clear negative impact of rheumatoid arthritis on patients' mental health, including but not limited to anxiety, depression, etc. Rehabilitation strategies such as pain management programs, kinesiotherapy, post-isometric relaxation, yoga, Tai Chi, and Balneotherapy help enhance the quality of life of Rheumatoid Arthritis Patients.

**Corresponding Author:** Naila Bajwa

**Supervisor:** Prof. Dr. Saira Afzal | King Edward Medical University/ Mayo Hospital, Lahore.

**Key Words:** Rheumatoid arthritis, quality of life, mental health, rehabilitation.

## INTRODUCTION:

**A** chronic inflammatory disease with a 3:1 male to female ratio, rheumatoid arthritis primarily affects joints. The 45 to 60 age range is the most frequently impacted one<sup>1</sup>. A majority of research projects carried out in Northern European and North American regions predicted a prevalence of 0.5-1% and a mean yearly incidence of 0.02-0.05%. There seems to be a lesser prevalence of the disease in other regions of the world<sup>2</sup>. Besides this, the age-standardized daily number grew from 39.12 (95% UI: 30.13 to 48.56) per 100,000 individuals in 1990 to 39.57 (95% UI: 30.51 to 49.53) in 2019, with an EAPC of 0.12% (95% CI: 0.08% to 0.17%)<sup>3</sup>. Rheumatoid arthritis affects about 0.55% of urban residents in northern Pakistan, whilst it affects about 0.14% of those in southern Pakistan<sup>4</sup>. Compared to the general population, people with rheumatoid arthritis (RA) have higher death rates and a higher risk of developing cardiovascular disease (CVD)<sup>5</sup>. To diagnose rheumatoid arthritis, a patient must experience stiffness in their joints for at least an hour in the morning before seeing improvement. A physician must also observe swelling in at least three soft tissue joint areas, specifically the proximal interphalangeal, metacarpophalangeal, or wrist joints, and the swelling must be symmetric. Additionally, the presence of rheumatoid nodules and rheumatoid factor must be noted, along with radiographic erosions and periarticular osteopenia in hand or wrist joints. Criteria 1 through 4 must have been present for at least six weeks. There is no need for a list of exclusions or additional qualifications (classic, definite, or probable) when four or more criteria for rheumatoid arthritis are

present<sup>6</sup>. In rheumatoid arthritis, several autoantibodies, including rheumatoid factor (RF) and anticitrullinated protein antibodies (ACPA), are produced<sup>7</sup>. All facets of quality of life (QOL) are impacted by rheumatoid arthritis, including physical function limitations, physical disabilities, pain, mental health disorders (such as anxiety and depression), and social, environmental, and sexual dysfunction<sup>8</sup>. Rheumatoid arthritis (RA) has been linked in a study to detrimental changes in mental health. This is typically attributed to inflammation-related symptoms and the negative effects of RA on functioning and quality of life. The risk of depression is rising with RA, which has a significant impact on quality of life<sup>9</sup>. In 54.8% of RA patients, there was an association of sexual dysfunction with the disease activity along with age and duration of RA<sup>10</sup>. The commonest extra-articular manifestation is Iron deficiency anemia in Patients with RA<sup>11</sup>. Adults with rheumatoid arthritis were included in a 2019 study that compared web-based rehabilitation interventions with standard care, waiting lists, no treatment, or another web-based intervention. However, the results of the single trial were inconclusive<sup>12</sup>. An educational-behavioral joint protection program helped subjects with moderate-to-severe RA experience less pain and disability, improving their health status, according to a 2007 randomized controlled trial. This strategy might effectively support drug therapy in these patients<sup>13</sup>. Regarding treatment with conventional disease-modifying anti-rheumatic drugs (cDMARDs), Higher adherence scores were found in female RA patients than in males and lower scores in low disease activity groups than in other disease activity groups with various determinants<sup>14</sup>.

Despite various studies being carried out on the quality of life in rheumatoid arthritis patients and rehabilitation, fewer studies relate to QOL concerning mental health issues in patients with rheumatoid arthritis and rehabilitation programs to lessen and cure these mental health problems. This systematic review aims to study the relationship between mental health issues in RA patients, and quality of life. It also aims to examine the effects of rehabilitation on the quality of life and independence of these patients.

## **MATERIALS AND METHODS:**

We've done a systematic review of the literature to uncover relevant research on rheumatoid arthritis patients' quality of life, with a emphasis on mental health and rehabilitation. In carryout a thorough literature review, we followed the PRISMA guidelines. The following sections outline the approaches utilized in this review.

We made use of the Cochrane Library, PubMed, and Google Scholar databases. Quality of life, mental health in rheumatoid arthritis, and rehabilitation in RA were the search terms that we employed. Searches that were part of this systematic review were conducted between February 2023 and August 2023.

We included studies that dealt with the quality of life in rheumatoid arthritis patients, the impact of rheumatoid arthritis on the mental health of patients, rehabilitation programs for RA patients, and articles which were mostly from the year 2005 to 2022 including cross sectional studies, cohorts, original research papers, randomized controlled trial, case reports, systematic reviews.

We rejected studies that did not mention the quality of

life in RA patients, articles that were unrelated to the patient's mental health, rehabilitation programs for patients other than RA patients, articles published before 2005, and articles with very small sample sizes.

In the initial stage of selecting research, the writers sorted through the collected papers based on their titles and abstracts. During the second step, each of the four reviewers examined the complete text of the papers that passed the 'identification and abstract' screening individually. One of the writers reviewed all of the titles and abstracts found through the searches, while the other four authors reviewed any full-text articles found. To gather data from the included papers, one author followed the 2020 PRISMA guidelines check-list. One of the evaluators gathered information regarding the attributes of the encompassed research (such as the nation and date of release). The information gathered was collated in a narrative format by illustrating the research qualities and findings derived from the written works.

We employed a narrative strategy in our extensive review in accordance with the PRISMA 2020 principles (Checklist). The researchers decided not to do a meta-analysis.

## **RESULTS:**

The PRISMA flow diagram (Figure 1) depicts the systematic review approach that was used in this investigation. A total of 525 records were discovered after a thorough search of multiple databases, with an additional 3 records discovered from external sources such as reference lists and expert suggestions. 246 records were screened using inclusion and exclusion criteria after duplicates were eliminated. 53 full-text publicat-

ions were evaluated for eligibility out of these after 193 records were removed for not fitting the predetermined criteria. A total of 10 papers were included in the final systematic review after 40 publications were ultimately rejected for a variety of reasons, including improper research design, irrelevant population, and inadequate data. The characteristics of the included studies are summarized in Table 1. The studies were published between 2005 and 2022, with sample sizes ranging from 50 to 500 participants in a single study. Systematic reviews included a greater number of studies, thus a greater number of participants as listed. The majority of the studies were conducted in Europe (n=6), with few in North America (n=2), South America (n=1), and Asia (n=1). Countries are listed in Table 1.

Six original research articles and four systematic reviews were included. Of the six original research articles, the study design varied, with five being observational studies, and one being a cross-sectional study. As for the systematic reviews, three systematic reviews were of studies that were controlled trials, with one being observational studies. Observational studies mainly focused on mental health problems in patients with RA (n=5). Systematic reviews mainly focused on rehabilitation and management programs. The primary outcomes of interest were to find a correlation between the mental health level & problems with rheumatoid arthritis and its physical manifestations and to find the efficacy of rehabilitation programs as whole and individual efficacy of certain rehabilitation activities such as yoga, Tai Chi, and Balneotherapy.

Due to the variability of research designs, participants, and outcomes investigated, a narrative synthesis was

done for the included studies. The findings from the narrative synthesis suggest that rheumatoid arthritis has a detrimental effect on the mental health of a patient, with significant association with problems such as anxiety and depression. This association mainly rests upon factors such as poor quality of life, higher levels of pain, poor coping strategies, and poor physical performance.

Findings also suggest that the interventions, as rehabilitation programs and coping strategies, have promising efficacy and safety for the targeted population. Several studies reported statistically significant improvements in the primary outcome measures compared to the control group, indicating the potential effectiveness of the intervention. It is important to mention that the extent of the impact differed between the various studies, and a few of them had limited sample sizes, which could constrain the applicability of the results. Additionally, it is worth highlighting that in some of the included studies, the monitoring period was quite brief, and there is insufficient data on the long-term effectiveness.

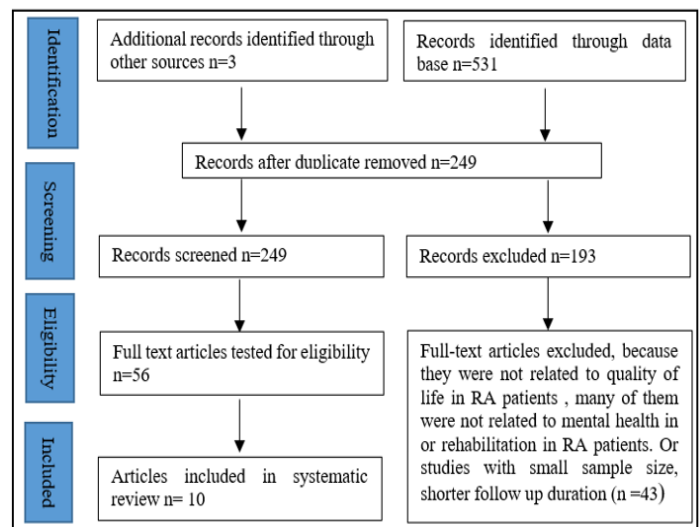


Figure: SEQ Figure \\* ARABIC 1. Prisma Flow diagram

Table 1: Characteristics of Studies

Sr. No.	Author & Year of Publication	References	Title	Country	Study Design	Participants	Sample Size	Intervention	Outcome
1	Beşirli et al 2020	15	The Relationship Between Anxiety ,Depression, Suicidal Ideation and Quality of Life in Patients with Rheumatoid Arthritis	Turkey	Observational study	Adult patients with RA	1(50)	Beck Scale for Suicidal Ideation (BSSI) Hospital Anxiety and Depression Scale (HADS) The Short Form -36 (SF-36)	Positive correlation between anxiety and disease activity in patients with RA
2	Nas et al 2011	16	The impact of psychological status on health-related quality of life in patients with rheumatoid arthritis	Turkey	Cross sectional	Adult patients with RA	1(421)	RAQoL SF-36 Hospital Anxiety and Depression Scale (HADS) Nottingham Health Profile (NHP)	Depression and anxiety cause poor quality of health in RA patients
3	Smith et al 2008	17	The effects of anxiety and depression on weekly pain in women with arthritis	US	Observational longitudinal study or cohort study	Adult women with arthritis	1(240)	Hospital Anxiety & Depression Scale (HADS)Visual Analogue Scales (VAS) 4-point scale for assessing amount of difficulty while performing daily tasks	Anxiety and depression both significantly associated with pain
4	Ziarko et al 2008	18	Mental Health and Rheumatoid Arthritis: Toward Understanding the Emotional Status of People with Chronic Disease	Poland	Cross-sectional observational study.	Adult Patients with RA	1(85)	HospitalAnxiety and Depression Scale (HADS) Ego- Resiliency Scale by Block & Kremen pain Coping Strategies Questionnaire (CSQ)Visual Analogue Scale (VAS)	Patients with RA experience higher level of anxiety & depression; patients with coping strategies had comparatively lower levels
5	Pope et al 2020	19	Management of Fatigue in Rheumatoid Arthritis	Canada	Literature Review	Adult Patients with RA	47(337 31)	PROMIS Fatigue score	Fatigue in RA relies on multiple variables such as high pain, multi morbidity,obesity ,personality Fractors and depressed mood
6	Nebhinani et al 2022	20	Quality of Life, Social Support, Coping Strategies, and Psychiatric Morbidity in Patients with Rheumatoid Arthritis: A Cross-sectional Study from North India	India	Cross-Sectional Study	Adult patients with severe rheumatoid arthritis (RA)	1(40)	Coping Strategy Checklist World Health Organization Quality of Life-BREF	60% of patients had psychiatric disorders, which were associated with pain, functional impairment, and disease severity
7	Akyuz Et al 2018	21	The Efficacy of Tai Chi and Yoga in Rheumatoid Arthritis and Spondyloarthropathies: A narrative biomedical review	Turkey	Systematic Review	Adult Patients with RA	15(789)	CDAI HADS BRAF-NRS PDI GIS FACIT-Fatigue CPAQ	Yoga and Tai Chi show potential benefits for patients with RA in reducing disease severity and improving quality of life

8	Fernandez-Gonzalez et al 2021	22	Therapeutic Benefits of Balneotherapy on Quality of Life of Patients with Rheumatoid Arthritis: A Systematic Review	Spain	Systematic Review	Adult Patients with RA	7(346)	Health Assessment Questionnaire (HAQ) Visual Analogue Scale (VAS) Arthritis Impact Measurement Scales (AIMS) Keitel functional test (KFI) Disease Activity Score (DAS28) SF-12	Balneotherapy benefits the quality of life of patients over short term; Long term study still to be carried out
9	Srikesavan et al 2019	12	Web-based rehabilitation interventions for people with rheumatoid arthritis: A systematic review	UK	Systematic Review	Adult patients with RA	4(567)	McMaster-Toronto Arthritis Patient Preference Disability Questionnaire & Health Assessment Questionnaire RAND 36 RAQoL Arthritis Self-Efficacy Scale Arthritis Impact Measurement Scale-2	Web-based interventions not adequately researched: long term studies with better framework needed
10	Senra et al 2017	23	Health-related quality of life and depression in a sample of Latin American adults with rheumatoid arthritis	Colombia	cross-sectional comparative study	Adult Patients with RA	1(103)	SF-36 Questionnaire PHQ-9	Patients with RA had visible lower scores on the scales of assessment

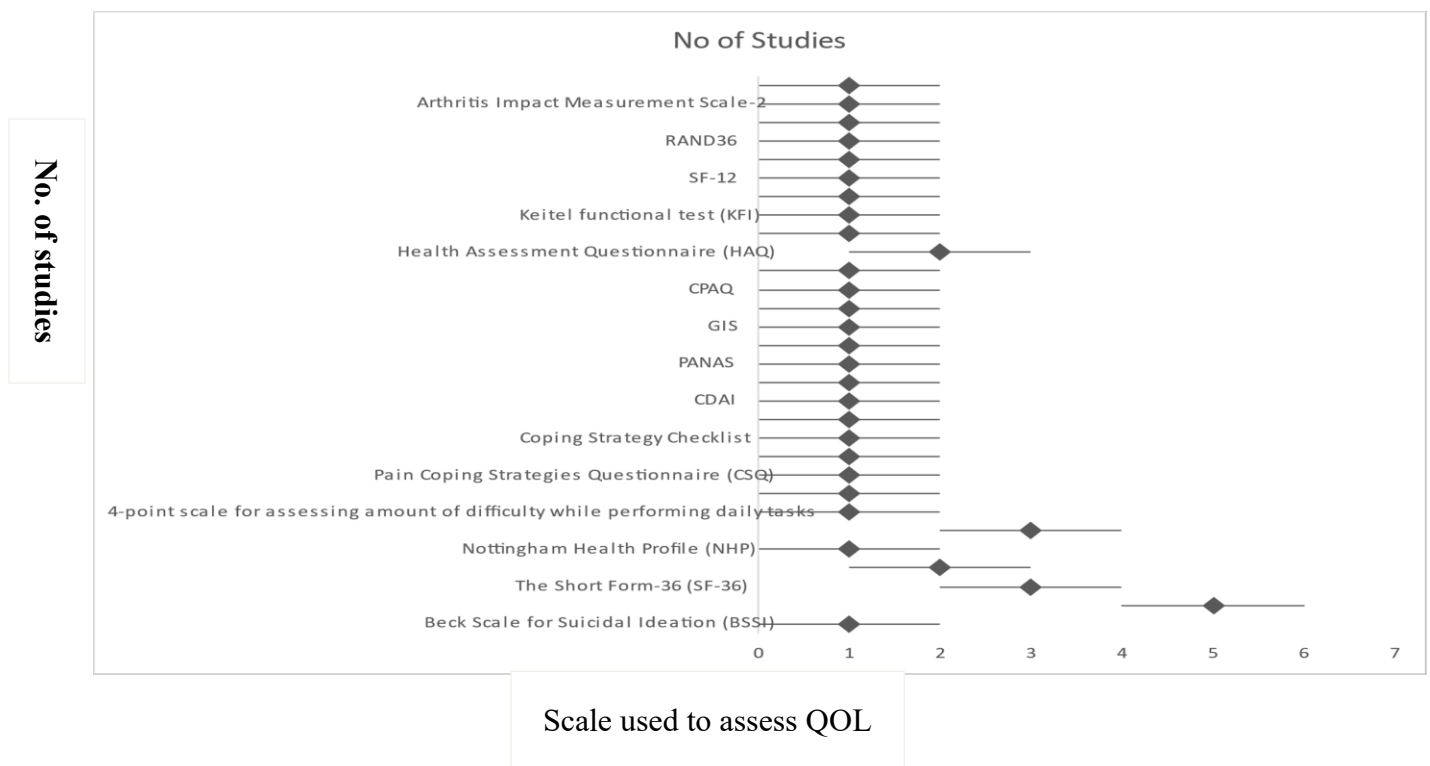
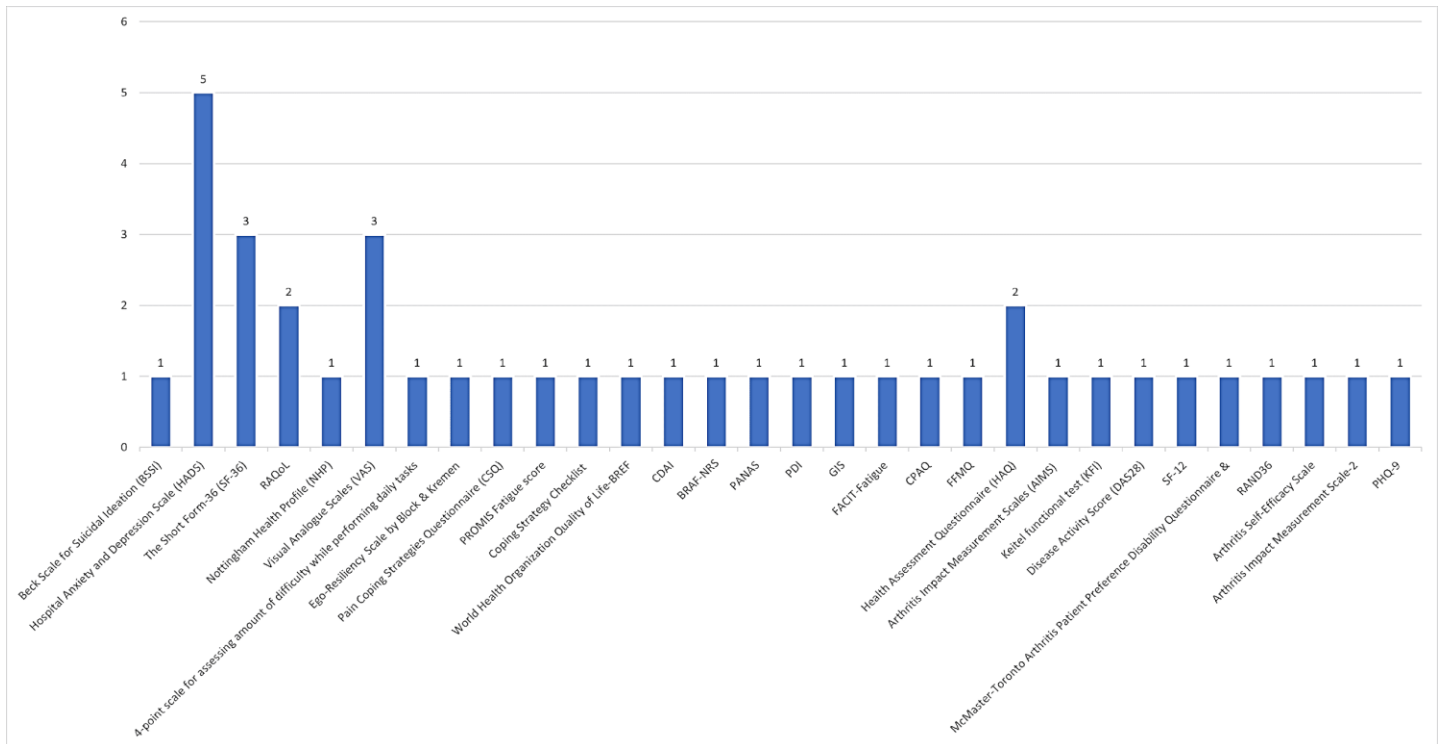


Fig. 2: Forest plot for scales used to assess QOL and number of studies in which it is used



**Fig. 3: Pie chart for scales used to assess quality of life**

## DISCUSSION:

The study demonstrates a correlation between mental health and its negative findings in patients of rheumatoid arthritis along with its physical manifestations, also aiming at various rehabilitation programs and their efficacy. This systematic review supports the theory that rheumatoid arthritis detracts the mental health of a patient, significantly associating with anxiety and depression, etc., and suggests that the rehabilitation programs and coping strategies provide safety and efficacy for the affected population.

In accordance with our results, many authors have identified the link between depressive symptoms, and related mental issues even leading to suicidal ideation, and rheumatoid arthritis. The data collected earlier also demonstrates the rehabilitation strategies including pain management especially the knee, Kinesiotherapy, tai chi and yoga efficacies, balneotherapy, and other web-based strategies, and how the likelihood of fatigue enhances the psychiatric problems.

Furthermore, to corroborate our research and establish the severity of arthritic problems such as pain, lethargy, and disability in patients, a cross-sectional study was undertaken in Karachi, which revealed that tiredness is connected with sleep disruption, disability, and pain in osteoarthritis (OA) and RA Group persons<sup>25</sup>. In a comparable examination led by Stebbing et al, exha-

ustion was assessed in their patients using MAF-GFI and the outcomes showed a significant correlation between fatigue and both OA and RA<sup>26</sup>. In addition, our research showed that individuals with RA experienced inadequate sleep due to the correlation between discomfort, exhaustion, and the intensity of the ailment. These findings align with the research conducted by Ullus and colleagues, which indicated that RA patients had poor sleep quality when measured similarly<sup>27</sup>. Ruppert and colleagues carried out a study to assess how fatigue affects the quality of life of patients with rheumatoid arthritis (RA). Their findings indicated that various dimensions of fatigue have an impact on Health-Related Quality of Life (HRQoL) among RA patients<sup>28</sup>. A study conducted on female patients demonstrated that rheumatoid arthritis has adverse effects on their lives, negatively impacting all aspects of their quality of life<sup>29</sup>. A study conducted in Thailand found that active rheumatoid arthritis patients experienced a significant decrease in all health domains compared to those with inactive disease<sup>30</sup>. According to a study by Gamel et al, the quality of life of Egyptian rheumatoid arthritis patients is greatly impacted by their disease activity, affecting both their physical and mental well-being.

The results build on existing evidence of the quality of

life of a rheumatoid arthritis patient affected mentally and physically and the psychiatric issues leading to an enhancement of existing pain in the patients especially in the women. The data contributes to a clear understanding of how to improve the life quality in the affected population by compiling all the therapies and how the treatment improves the outcomes in the patients.

Despite the effective recollection of the data, the heterogeneity reported in terms of selected population features, the sample size, and the studies involving data from single-sex limit the accurate required results. Varying scales of assessment and intervention protocols also limit the accuracy.

Although many studies have been providing a quantitative and qualitative dataset regarding the associated psychiatric problems and rehabilitation programs, further research is needed to avoid the protraction of the disease and measures needed to establish the early prognosis with early treatment beginning.

Despite the promising findings, the included studies had several limitations. There was considerable heterogeneity among the studies. This heterogeneity was mainly in terms of population characteristics, intervention protocols, and outcome measures assessed. Some studies had small sample sizes and some involved studies of only one sex. The intervention protocols also varied across the studies with no establishment of a standard. Scales of assessment also varied across the studies. The follow-up durations in some studies were relatively short, which may raise questions about the long-term effects and safety of the intervention. Also, the risk of a bias cannot be eliminated due to limitations in study design, and sample characteristics.

## CONCLUSION:

In conclusion, based on the systematic review of the included studies, the disease shows a positive correlation with mental health problems. Interventions show promising efficacy and safety for the targeted population. Nevertheless, it is important to exercise caution when interpreting the evidence as the studies included have limitations. Further research with larger, well-

designed trials and longer follow-up durations is warranted to confirm the findings and provide more robust evidence. These findings highlight the need for evidence-based decision-making in the management of the targeted population.

## ACKNOWLEDGMENTS:

We would like to express our sincere gratitude and appreciation to Dr. Athar Ahmed Saeed, Prof. Dr. Saira Afzal for their unwavering support and assistance in this research work. Their valuable guidance and input have been instrumental in ensuring the success of our publication. We are truly grateful for their contributions.

## REFERENCES:

1. Jalil F, Arshad M, Bhatti A, Jamal M, Ahmed M, Malik, et al. Progression pattern of rheumatoid arthritis: A study of 500 Pakistani patients. *Pakistan journal of pharmaceutical sciences*. 2017;30(4):1219-23.
2. Alamanos Y, Drosos AA. Epidemiology of adult rheumatoid arthritis. *Autoimmunity reviews*. 2005;4(3):130-6.
3. Cai Y, Zhang J, Liang J, Xiao M, Zhang G, Jing Z, et al. The burden of rheumatoid arthritis: findings from the 2019 global burden of diseases study and forecasts for 2030 by Bayesian age-period-cohort analysis. *Journal of Clinical Medicine*. 2023;12(4):1291-96.
4. Ashiq K, Ashiq S, Shehzadi N, Hussain K, Khan MT. Prevalence and Control of the hypertension in patients suffering from rheumatoid arthritis. *Pak Heart J*. 2022;55(4):421-2
5. Houge IS, Hoff M, Thomas R, Videm V. Mortality is increased in patients with rheumatoid arthritis or diabetes compared to the general population—the Nord-Trøndelag Health Study. *Scientific reports*. 2020;10(1):3593-98.
6. Arnett FC, Edworthy SM, Bloch DA, Mcshane DJ, Fries JF, Cooper NS, et al. The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. *Arthritis & Rheumatism: Official Journal of the American College of Rheumatology*. 1988;31(3):315-24.



7. Derksen VF, Huizinga TW, Van Der Woude D. The role of autoantibodies in the pathophysiology of rheumatoid arthritis. In *Seminars in immunopathology*. 2017;39(1): 437-446.
8. Goma SH, Razek MR, Abdelbary NM. Impact of rheumatoid arthritis on the quality of life and its relation to disease activity. *Egyptian Rheumatology and Rehabilitation*. 2019;46(1):304-12.
9. Vallerand IA, Patten SB, Barnabe C. Depression and the risk of rheumatoid arthritis. *Current opinion in rheumatology*. 2019;31(3):279.
10. Hashmat M, Rasheed A, Mahmud TH, Aasim M, Akhtar AW, Asghar MA, et al. Frequency of Sexual Dysfunction in Relation to Disease Activity in Female Rheumatoid Arthritis Patients. *Ann King Edw Med Univ*. 2019;25(1):75-83.
11. Waheed A, Tayyab M, Fayyaz T, Fayyaz T, Farooq AAH, Tariq M, et al. Iron Status in Rheumatoid Arthritis. *Ann King Edw Med Univ*. 2017;6(1):11-17.
12. Srikesavan C, Bryer C, Ali U, Williamson E. Web-based rehabilitation interventions for people with rheumatoid arthritis: a systematic review. *Journal of telemedicine and telecare*. 2019 ;25(5):263-75.
13. Effectiveness of an Exercise Program and Education Through a Mobile Application for the Management of Patients With Hand Osteoarthritis and Rheumatoid Arthritis on Self-reported Functional Ability, Dexterity, Pinch and Grip Strength, Pain Intensity and Stiffness. NCT04263974 *Cochrane Central Register of Controlled Trials (CENTRAL)*. 2020;18(1):62-70.
14. Iqbal J, Rasheed A, Mahmud TH, Akhtar AW, Badar I, Malik AMA. Determinants of Adherence to cDMARDs in Patients of Rheumatoid Arthritis at a Tertiary Care Hospital of Lahore, Pakistan. *Ann King Edw Med Univ*. 2021 ;27(1):78-84.
15. Beşirli A, Alptekin JÖ, Kaymak D, Özer ÖA. The relationship between anxiety, depression, suicidal ideation and quality of life in patients with rheumatoid arthritis. *Psychiatric quarterly*. 2020;91(2):-53-64.
16. Nas K, Sarac AJ, Gur A. Psychological status is associated with health related quality of life in patients with rheumatoid arthritis. *J Back Musculoskelet Rehabil*. 2011;24(2):95-100.
17. Smith BW, Zautra AJ. The effects of anxiety and depression on weekly pain in women with arthritis. *Pain*. 2008;138(2):354-61.
18. Ziarko M, Siemiątkowska K, Sieński M, Samborski W, Samborska J, Mojs E. Mental health and rheumatoid arthritis: toward understanding the emotional status of people with chronic disease. *BioMed research international*. 2019;29(1):75-83.
19. Pope JE. Management of fatigue in rheumatoid arthritis. *RMD open*. 2020;6(1):001084.
20. Nebhinani N, Mattoo SK, Wanchu A. Quality of Life, Social Support, Coping Strategies, and Psychiatric Morbidity in Patients with Rheumatoid Arthritis. *J Neurosci Rural Pract*. 2022;13(1):119-122
21. Akyuz G, Kenis Coskun O. The efficacy of tai chi and yoga in rheumatoid arthritis and spondyloarthropathies: a narrative biomedical review. *Rheumatology international*. 2018;38(3):321-30.
22. Fernandez Gonzalez M, Fernandez Lao C, Martin Martin L, Gonzalez Santos A, Lope Garzon M, Ortiz Comino L, et al. Therapeutic benefits of balneotherapy on quality of life of patients with rheumatoid arthritis: a systematic review. *International Journal of Environmental Research and Public Health*. 2021;18(24):13216.
23. Senra H, Rogers H, Leibach G. Health-related quality of life and depression in a sample of Latin American adults with rheumatoid arthritis. *Int J Rheum Dis*. 2017;20(11):1684-1693
24. Khan ZA, Khan MS, Zahoor AW. Relationship of Fatigue Severity with Disability, pain and Sleep Disturbance in Patients with Rheumatoid Arthritis and Osteoarthritis: A Cross-Sectional Study. *Ann King Edw Med Univ*. 2022;27(4):570-5.
25. Stebbings S, Herbison P, Doyle TC, Treharne GJ, Highton J. A comparison of fatigue correlates in rheumatoid arthritis and osteoarthritis: disparity in associations with disability, anxiety and sleep disturbance. *Rheumatology*. 2010;49(2):361-7.

26. Belza BL, Henke CJ, Yelin EH, Epstein WV, Gilliss CL. Correlates of fatigue in older adults with rheumatoid arthritis. *Nursing research*. 1993;-42(2):93-9.
27. Ulus Y, Akyol Y, Tander B, Durmus D, Bilgici A, Kuru O. Sleep quality in fibromyalgia and rheumatoid arthritis: associations with pain, fatigue, depression, and disease activity. *Clinical and Experimental Rheumatology-Incl Supplements*. 2011;-29(6):S92.
28. Hashmat M, Munir H, Iftikhar S, Aasim M, Rasheed A, Mahmud TH. Association of Quality of Life and Disease Activity in Female Rheumatoid Arthritis Patients. *Ann King Edw Med Univ*. 2021;27(Special Issue):383-9.
29. Munchey R, Pongmesa T. Health-related quality of life and functional ability of patients with rheumatoid arthritis: a study from a tertiary care hospital in Thailand. *Value in health regional issues*. 2018;15(1):76-81.
30. Gamal RM, Mahran SA, El Fetoh NA, Janbi F. Quality of life assessment in Egyptian rheumatoid arthritis patients: Relation to clinical features and disease activity. *The Egyptian Rheumatologist*. 2016;38(2):65-70.