Effect of Foot Reflexology and Meditation on Physical and Psychological Outcomes among Patients with Rheumatoid Arthritis

**Marwa Mosaad Ali [(1)], Soha Kamel Mosbah[(2)] , Hala Abd El-Salam Sheta [(1)],
Asmaa Mohamed Ali [3,] Mona Mohamed Abdel Aziz [(3)]**

(1) Assistant Professor of Medical-Surgical Nursing, Faculty of Nursing, Benha University, Egypt)
(2) Assistant Professor of community health Nursing, Faculty of Nursing, Benha University, Egypt)
(3) Assistant Professor of psychiatric and mental health Nursing, Faculty of Nursing, Benha University, Egypt)

Abstract

Background: Rheumatoid arthritis is a major public health problem affecting millions of people all around the world. Which can lead to considerable physical disability and is associated with an increased risk of psychological distress, evidence revealed that reflexology as well as meditation techniques may help to decrease pain and psychological distress in patients with rheumatoid arthritis **Aim:** to evaluate the effect of foot reflexology and meditation on physical, and psychological outcomes among participant with rheumatoid arthritis. **Research design:** A quasi-experimental research design was used to achieve the purpose of the present research using a pre-/post-test approach. **Setting:** The current research was conducted in; the rheumatology department, and outpatient clinic of university Hospital in Benha, Qalyubia Governorate, Egypt. **Subject** A purposive sample of 90 patients with rheumatoid arthritis who are hospitalized in the Orthopedic department at the previously mentioned setting. Samples were randomly selected and divided into three groups of 30: Group A (foot reflexology massage), group B (meditation), and group C (control group). **Tools:** Three tools were utilized to collect data: (I) a structured questionnaire for patients, (II) patients' physical outcomes involving Rheumatoid Arthritis Pain Scale and Health Assessment Questionnaire (HAQ) disability index, (III) patients' psychological outcomes involving psychological distress and coping self efficacy scales. **Results:** Total patients' knowledge level showed significant increase among reflexology and meditation groups than control group after program implementation. There was a marked improvement in patients' outcomes reflexology and meditation groups than control group after program implementation (P= <0.001). **Conclusion:** Implementing reflexology and meditation program had a positive and better impact on patients' outcomes evidenced by increased knowledge level, and improved physical and psychological outcomes mean scores among intervention groups than in control group. **Recommendations:** Designing Illustrated self-administered Reflexology massage and meditation intervention booklets to be distributed to patients with rheumatoid arthritis. As well as performing training program for nurses and caregivers should be considered.

Keywords: Foot reflexology, meditation, physical outcomes, psychological outcomes, rheumatoid arthritis

Introduction

A chronic autoimmune disease known as rheumatoid arthritis (RA) is characterized by arthritis and extra-joint injury **(Chauhan et al., 2023).** Smaller joints—the skin, eyes, heart, kidneys, and lungs - are all affected by RA as it advances to larger joints. Tendon and ligament degradation is common, as is damage to joint bone and cartilage. If the symptoms have persisted for more than six months, they are regarded as established. It is an illness that worsens with time and causes a rising death rate if left untreated **(Bullock et al., 2019).**

Usually striking among 20 and 40 years , RA strikes during the most productive years of adulthood **(Chaurasia et al., 2020)**. The frequency ranges from 0.3% to 1%, is higher in industrialized nations and among women than in men. The condition first manifests in wealthy nations, and at least 50% of patients are unable to work a full-time job ten years later **(WHO, 2018**). The two main categories of risk factors for developing RA are host- and environment-related risk factors as; Diet, socioeconomic variables, microbiota and infectious agents, smoking, and other airborne exposures. Also risk factors may be hereditary, epigenetic, neuroendocrine, hormonal, reproductive, and concomitant host variables **(Romão and Fonseca, 2021).**

Joint warmth, edema, and soreness, are a common symptoms of RA besides, discomfort in the joint both during rest and activity, stiffness lasting more than half an hour, having unusually low energy or tiredness, as well as occasional minor fever and appetite loss. Any joint can develop rheumatoid arthritis, although the wrists, hands, and feet are the most common locations. Both sides of the body typically experience symptoms **(National institution of arthritis and musculoskeletal and skin disease, 2022).**

The risk of cardiovascular disease is increased by persistent RA inflammation. Inflammation can lead to plaque accumulation in the arteries and the damage of blood vessels. A heart attack or stroke may occur as a finding of blood vessels narrowing due to plaque buildup in the arteries **(Fletcher, 2022).** In addition, RA increases the chance of developing osteoporosis, rheumatoid nodules, transmission of disease, altered carpal tunnel syndrome ,body composition, heart problems, lung diseases, and cancer **(Mayo Clinic Staff, 2023).**

A patient's psychological state may be negatively impacted by long-term medical suffering, or RA may be associated with major psychiatric disorders such as depression and anxiety, either through a mechanism involving cytokines and biology or another **(Lwin et al., 2020).** The quality of life of the patient is greatly impacted by symptoms including fatigue, early morning stiffness (EMS), and simple physical pain **(Intriago et al., 2019).** Illnesses that cause persistent inflammation can affect the central nervous system and cause psychological stress to compromise immunity **(Straub & Cutolo, 2018).**

Symptoms of anxiety and sadness are more prevalent among individuals with RA than in the general population **(Marrie et al., 2018).** Studies show that anxiety symptoms are experienced by 26-46% of RA patients and depressive symptoms are experienced by 14.8-34% of patients. Comorbidities that affect RA patients negatively impact their quality of life, increase medical costs, lead to greater death rates, and impair drug commitment and response to treatment **(Uda et al., 2021).**

One essential aspect of living with RA is learning how to protect joints from further damage. Honor the discomfort and irritation you feel. The body is trying to tell to calm down with these indications. Utilizing the major joints (hips, knees, shoulders, and elbows) as often as feasible is a great way to reduce effort and protect joints **(Indalecio, 2018).** Numerous **coping strategies** are helpful in certain circumstances. Certain research suggests that the most effective approach is one that is problem-focused; yet, other research indicates that specific coping strategies are associated with less favorable results. The term "maladaptive coping" refers to coping strategies that are linked to increased levels of psychopathology and worse mental health outcomes. These entail the suppression of emotions and the prevention of unhappiness **(Algorani & Gupta, 2023).**

Prevention of joint destruction and control of synovitis are the main goals of treatment for people with RA. Treatment strategies include disease-modifying anti-rheumatic drug (DMARD) therapy early in the illness phase in an effort to achieve and maintain remission or low disease activity. A growing, if insufficient, understanding of the condition and the outcomes of randomized trials and other studies have led to the development of common management options **(Moreland & Cannella, 2023).** Moreover, the American College of Rheumatology (ACR) has designated that targeted synthetic DMARDs and biologic DMARDs are non-biologic DMARDs **(Radu & Bungau, 2021).** Supplemental therapy using glucocorticoids (GCs) and nonsteroidal anti-inflammatory drugs (NSAIDs) is necessary to improve symptom control and reduce inflammation in people with RA **(Moura et al., 2018).**

A comprehensive program for the management of RA includes not only medication therapy but also non-pharmacologic interventions, such as psychosocial interventions, patient education, physical and occupational therapy, physical activity ,appropriate rest and exercise, and nutritional and dietary counseling **(Schur & Gibofsky, 2023).**

Although there are many pharmaceutical strategies for managing pain and psychological distress, due to the short-term effects and adverse effects of pharmaceutical treatments, a number of studies on non-pharmacological pain management strategies have been carried out recently. **Reflexology** is a type of massage therapy in which various parts of the hands, feet, and ears are massaged with varying pressure. Numerous health advantages, including as pain alleviation, stress reduction, and digestive support, are attributed to the practice. It is an ancient practice with global cultural roots that is currently used as an adjunctive treatment for a range of illnesses **(Welch, 2023).**

Medical therapies are applied in tandem with reflexology. Reflexologists do not diagnose or treat illnesses; rather, their use can be combined with routine treatment, not as a substitute for it. It might help you feel energized, calmer, and less worried. The advantages might be higher, though, if you have certain medical issues. Reflexology may be able to help those who suffer from medical conditions experience less pain and suffering by lowering their stress levels. Researchers discovered that participants' psychological well-being improved and that their ailments were easier to manage after reviewing 17 studies on the therapy's psychological benefits *(Davis, 2021).*

The touch of a reflexologist, like massage therapy in general, may have the effect of calming the central nervous system, which can lead to relaxation and other benefits. Some believe that the brain creates pain as a subjective experience. The brain may react if there is physical suffering. In contrast, it might hurt in other circumstances as a reaction to mental or emotional distress. Reflexology is thought by some to provide pain relief through soothing touch, which can also help elevate mood and lower stress levels *(Cirino, 2018).*

Non-pharmacological therapy include physical activity, relaxation, and meditation in addition to patient education **(Osthoff et al., 2018).** Mind-body therapies (MBTs) employ techniques such as mindfulness, yoga, and meditation to establish a connection among mental and physiological processes, thereby promoting improving overall well-being and relaxation. It has been shown that all three of these MBTs have several health advantages **(Zhou et al., 2020; Ganesan et al., 2020).**

Indicators of disease activity as well as patient-reported outcomes including energy, functioning, and mental health were all affected differently by each MBT. Rather than reducing objective disease activity indicators such as swollen joints and C-reactive protein (CRP), mindfulness-based interventions reduced subjective disease activity parameters such as pain, stiffness in the morning, and joint discomfort. These non-pharmacological therapies may provide more benefits to RA patients with recurring depression than to those without recurrent depression **(Slagter et al., 2022).**

Soul-healthy meditation is beneficial. The study also suggests that it could help reduce pain from any kind of arthritis, such as osteoarthritis (OA), psoriatic arthritis (PsA), and RA .It is a time-tested method for promoting mental clarity and spiritual serenity **(Gower, 2023).** The care of people with arthritis is greatly aided by nurses. During clinic sessions, they are often the ones that assist patients. Nurse roles have changed in today's clinics. Nurses may now handle certain tasks that were previously handled by physicians. Trained nurse specialists in rheumatology are capable of assessing joints, offering patient care and information, giving injections, and suggesting and writing prescription drugs **(Bench et al., 2020).**

Significance of the study:

The World Health Organization (2023) estimates that 18 million people globally have RA in 2019. RA affects about 70% of women and 55% of adults over 55. Rehabilitation could be beneficial for the 13 million people who suffer from moderate to severe rheumatoid arthritis.

The age-standardized point prevalence of RA in the Middle East and North Africa was 120.6 per 100,000 people (107.0-135.7) in 2019, with an annual incidence rate of 5.9 (5.2-6.6). These figures showed a 28.3% and 25.2% increase, respectively. Males aged 45–49 and females aged 50–54 exhibited the highest point prevalence. The 50–54 age group exhibited the highest number of disability-adjusted life years **(Mousavi et al., 2022).**

In addition to reduced mobility and physical weakness, RA is characterized by joint pain and

swelling. Exhaustion, trouble falling asleep, and general fatigue are some typical symptoms. Each of these signs and symptoms may significantly affect your day-to-day activities and overall health. RA management is not always simple. The fact that symptoms are frequently unpredictable - it's hard to anticipate if they will become better or worse the next day - is one reason. Some people find that a "bad" day has left them feeling as though they have fallen into a deep and black pit. This can be made worse by worrying about the future because it is hard to predict how each person's sickness will progress. Nonetheless, a number of therapies can stop or slow the illness's course (**National Library of Medicine, 2023).**

Enhancing a person's quality of life - which includes traits like elevated self-efficacy, general mood, emotional and cognitive state, adaptive coping style, active lifestyle, and work competency - is the main objective of psychological treatments for RA these days. In contrast, the objective of these psychological therapies is to reduce tension, learned helplessness, catastrophizing, fatigue, physical and mental impairment, as well as psychological anguish and interference with daily activities (**Nagy et al., 2023).**

Aim of the research:

The purpose of the present research was to evaluate the effect of reflexology and meditation on physical and psychological outcomes among patients with rheumatoid arthritis

Hypotheses:

The following research hypotheses were developed to achieve the purpose of this research:

H1: Knowledge score among participants with rheumatoid arthritis who exposed to reflexology and meditation may be significantly higher than in control group.

H2: Physical outcomes among patients with rheumatoid arthritis who exposed to reflexology and meditation may be significantly improved in term of lower degree than in control group.

H3: Psychological outcomes among patients with rheumatoid arthritis who exposed to reflexology and meditation may be significantly improved in term of lower degree than in control group.

H4: There may be significant correlation among physical, and psychological outcomes among patients with rheumatoid arthritis

Operational definition

Outcomes: Is the effects that program have, these effects are interconnected, and may be physical outcomes detected through pain severity & functional status, either psychological outcomes that can be detected through psychological distress &coping behavior in the light of acquired knowledge.

Subjects and method

Research design:

A quasi-experimental design was utilized to achieve the purpose of research.

Research setting:

The research was conducted at rheumatology department in Benha university hospital Qalyubia governorate, Egypt, to be continued in outpatient clinics for follow up.

Research subject:

Type: Purposive sample of patients with rheumatoid arthritis.

Size: The sample size of participants was determined by utilizing the census report of admissions to the rheumatology department from the Benha University Hospital Census, 2022, from the previous year. The sample size was determined using the subsequent formula: **Stephen Thampsons equation (Fearon et al., 2017):**

$$n = \frac{N \times p\,(1-p)}{\left(\left(N-1 \times \left(d^2 \div z^2\right)\right) + p\,(1-p)\right)} = 90$$

N = Population size is 250
p = Ratio provides a neutral property is equal to 0.12
d = the error rate is equal to 0.05
z = Class standard responding to the level of significance equal to 1.96

A total 90 patients with RA who are hospitalized in the rheumatology department at the previously mentioned setting. Samples were randomly selected and separated into three

groups of 30: Group A(foot reflexology massage), group B (meditation), and group C (control group, without intervention). The sample recruited in the study according to:

Inclusion criteria:

▪ Patients who have been diagnosed with RA and are experiencing foot pain.
▪ Both female and male patients, age group 21-60 years.
▪ Patients have full consciousness and orientation; did not have any communication problems.

Exclusion criteria:

▪ Patients who are severely ill and have lesions, edema in their foot, an open foot wound, a suspicious fracture, a burn, deep vein thrombosis, and peripheral neuropathy.
▪ Having psychiatric disorder or physical disability in legs.
▪ Patient with brain disorders (such as stroke, Alzheimer's, or transient ischemic attack).
▪ Patients who were not willing to participate in research.

Tools of data collection:

The following tools were utilized for data collection:

Tool (I): Structured interviewing questionnaire:

On the basis of pertinent literature, researchers developed this instrument. It is comprised of three components:

Part 1: Concerned with the demographic characteristics of patients, including sex ,age, residence ,marital status, education, and occupation.

Part 2: Patients' illness-related data, such as the presence of co-morbidities, the onset of illnesses, and previous hospitalizations, were included.

Part 3: The Structured Knowledge Questionnaire (pre/post-test) was developed by researchers after reviewing the pertinent literature, based on **the National Health Service (2023), Arthritis Foundation (2022), Koller-Smith et al. (2022), and Conforti et al. (2021)**. A panel of experts agreed on the questionnaire, which consists of

multiple-choice questions and closed-ended questions, to evaluate the knowledge needs of study participants. It was divided into three primary sections:

Section (a): It comprises knowledge questions regarding the overview of RA. It was composed of eight multiple-choice questions that focused on the following topics: the definition of rheumatoid arthritis, types, risk factors, symptoms and signs, complications, prevention and control, diagnosis, and treatment.

Section (b): Consists of 11 knowledge questions (8 closed-ended and 3 multiple-choice) that pertain to exercise, diet, physical activity, stress management, smoking cessation, and bathing and dressing. The questions are designed to gather data on the knowledge of patients regarding lifestyle changes among RA patients.

Section (c): Contains 13 knowledge questions (13 multiple-choice questions) that pertain to the definition, types, preparations, and advantages of reflexology and meditation. These questions were designed to gather data on patients' understanding of complementary therapy for RA patients.

Knowledge scoring system: The following is the weighting of all knowledge variables: The comprehensive knowledge questionnaire yielded a total score of 32, with the incorrect response receiving a score of "0" and the correct response receiving a score of "1." A score of less than 60% (<19) is considered unsatisfactory, while a score of at least 60% (≥ 19) is considered satisfactory. This data is subsequently converted to a percentage.

Tool (II): Rheumatoid arthritis patients' physical outcomes

Part (1) Rheumatoid Arthritis Pain Scale (RAPS):

Anderson (2001) developed the Rheumatoid Arthritis Pain Scale (RAPS), a self-report questionnaire. The RAPS was developed to quantify pain in patients with rheumatoid arthritis. RAPS comprises 24 items that evaluate descriptions of pain. The RAPS scale is comprised of these items. The RAPS items consist of four subscales: the physiologic component (5 items), sensory-discriminative component (8 items), affective component (4 items), and cognitive component (6 items).

Items are assessed on a seven-point Likert-type scale, with a threshold of 0 (always) and a threshold of 6 (never). The RAPS questionnaire utilizes an inverse scoring system. Scores can vary from 0 to 144; the patient's pain level decreases as the score increases, and vice versa. Additionally, there is a single numerical rating scale for pain severity perception. The Numerical Rating Scale is a 0–10 point scale that is anchored by 0 (no pain) and 10 (extreme pain).

Part (2): Health assessment Questionnaire Disability Index (HAQ):

Fries et al. (1980) developed the HAQ. The HAQ comprises 41 items in total to evaluate the functional status of adults with arthritis. 20 questions evaluate specific "activities of daily living," 13 additional questions evaluate "use of assistive devices," and 8 additional questions evaluate "assistance received from another." Eight categories, which evaluate patient difficulty with activities of daily living over the past week, review a total of 20 specific functions. Dressing and grooming, arising, eating, walking, hygiene, reaching, gripping, and errands and chores are among the categories. Also identified are specific aids or devices that are used for assistance, as well as the assistance that is required from another individual (aids/help). The 20 activities are categorized into 8 functional categories, with each category receiving a single score that is equivalent to the maximum value of its component activities. The scale was evaluated on a four-point Likert scale, with a score of 0 indicating no difficulty, 1 indicating some difficulty, 2 indicating significant difficulty, and 3 indicating inability to complete.

Tool (III): Psychological outcomes among patients with rheumatoid arthritis

Part (1): Kessler Psychological Distress Scale (K10):

Kessler et al. (2003) developed the K10 as a straightforward assessment of the likelihood of experiencing psychological distress or a mental disorder. The K10 scale consists of ten questions that pertain to emotional states, each of which is accompanied by a five-point response scale. If the response to the preceding question was "none of the time," questions three and six are unnecessary. In such instances, questions three and six should be assigned an automatic score of one. Each item is assigned a score ranging from one (indicating "none of the time") to five (indicating "all of the time"). The sum of the scores of the 10 items results in a minimum score of 10 and a maximum score of 50. High scores indicate high levels of psychological distress, while low scores indicate low levels of psychological distress.

Scoring system:

• It is probable that individuals among the range of 10 and 19 are in good health.
• Mild distress level is more prevalent among range of 20 to 24.
• Moderate distress level is more prevalent among range of 25 to 29.
• The likelihood of a severe distress level is higher among individuals among the range of 30 and 50.

Part (2): Coping Self-Efficacy (CSE) Scale:

The scale items were developed by a number of the authors, including Chesney et al. (2006). A 26-item assessment of an individual's self-assurance in executing coping strategies in response to life's obstacles. A three-factor CSE, 1. Seek support from friends and family (5 items), 2. Stop unpleasant emotions and thoughts (9 items), and 3. Employ problem-focused coping strategies (12 items). The participants were asked the following question: "To what extent do you feel confident or certain that you can complete the following in the event of unfavorable circumstances?" Subsequently, they were asked to assess the extent to which they believed they could engage in behaviors that are essential for adaptive coping, such as "identifying what can be altered and what cannot," "dividing an upsetting issue into smaller components," "identifying a positive aspect in a negative circumstance," and "requesting emotional support from friends and family." The scale was composed of eleven points. The anchor points on the scale were 10 ('certain can do'), 5 ('moderately certain can do'), and 0 ('cannot do at all') respectively. An overall CSE score was calculated by adding the item ratings.

Methods

Validity of the tools:

A content validity assessment was conducted by a jury of five experts (1 assistant professor) in the fields of immunology in medicine faculty, benha university and (2 professors) in medical- surgical nursing specialty as well as (2 assistant professors) in psychiatric health nursing, benha university to determine their comprehensiveness and relevance. The instruments were validated.

Reliability of the tools:

The researcher implemented reliability by administering the same tools to the same subjects under similar conditions on one or more separate occasions in order to evaluate the internal consistency of the tool. The test-retest reliability was evaluated by comparing the responses obtained from repeated testing. The internal consistency reliability coefficient of 0.92, as determined by Cronbach's coefficient alpha, is a robust indicator of reliability for RAPS. The reliability assessments of the four subscales also indicate reliability, with Cronbach's coefficients ranging from 0.65 to 0.86. The Cronbach's alpha coefficient of the total RAPS was 0.83, while the Cronbach's alpha coefficient of the HAQ was 0.95. These are the Spearman's rank correlations for the eight subcategories: dressing 0.60, arising 0.82, eating 0.85, walking 0.83, hygiene 0.56, reach 0.80, grip 0.64, and index 0.88. Moreover, the CSE scale was 0.95, and the K10 was 0.88.

Ethical considerations:

Primary approval for the conduct of this study was granted by the Ethics Committee of the Faculty of Nursing at Benha University (code REC-MSN-P7). Subsequently, the head of the orthopedic departments at Benha University Hospital provided official authorization. Participants were informed of the study's objective and were also notified that they could withdraw from research at any time before its conclusion. Upon consenting to participate in the study, the participants were required to sign a consent form. Furthermore, participants were guaranteed that the information they submitted would be kept confidential and utilized exclusively for the purposes of the investigation.

Pilot study:

A pilot study was conducted on 10% of the subjects, which consisted of nine patients, to evaluate the applicability of the assessment tool that was developed. The research was conducted to ascertain the time required to complete the sheets and to identify any obstacles or issues that may have arisen during the data collection process. Subsequently, the necessary modifications were executed. Subjects who participated in the pilot study were excluded from the main subjects.

Field of work

Data were collected in the following sequence:

Official permission to conduct the research was obtained after the purpose was explained to the appropriate authorities. Structured interviews were conducted individually with patients who were eligible for the research and met the inclusion and exclusion criteria in order to ensure confidentiality, clarify the study's purpose, and obtain informed written consent. The collection of data commenced in January 2023 and persisted for nine months until October 2023.

Procedure:

The following phases comprised the foot reflexology massage and meditation program:

A- Assessment phase:

The baseline data of patients with RA was collected by conducting individual interview in patient room, prior to the application of foot reflexology massage and meditation, utilizing all research tools. The duration of this interview was approximately 30 to 45 minutes.

B- Implementation phase:

Thirty patients enrolled in the "group A" received foot reflexology massage, while thirty patients enrolled in the "group B" received meditation. The "group C" was composed of 30 patients who received routine care (conventional treatment) in the a fore mentioned setting. The criteria that were met, as well as the designated assessment times prior to and following the

program, were used to select patients for each group. The program was executed over the course of eight sessions, with two sessions being theoretical and six being practical that were implemented in a physiotherapy room adjacent to rheumatology department. The initial session of the assessment phase involved the introduction of the participants, the presentation of the procedure's objectives, and the listening to of the participants' emotions and concerns. The second session provided a comprehensive examination of rheumatoid arthritis, which encompassed its physical and psychological aspects. Foot reflexology massage and meditation training were implemented during the third through eighth sessions. The patients were subsequently divided into small groups, following the scheduling of the teaching sessions by the researchers. Each session lasted among 20 and 30 minutes.

As follows was the content of the intervention program sessions:

It was developed by researchers who incorporated their own experience, the perspectives of medical and nursing professionals, and literature reviews to meet the assessment requirements of patients. The overall objective of this instructional booklet is divided into sessions, each of which includes a distinct set of objectives. The teaching booklet was revised and modified in response to the feedback provided by the experts. It was distributed to patients during the initial session and was written in Arabic using simple language and illustrations.

This was achieved through the implementation of a diverse array of instructional strategies, including brainstorming, lectures, discussions, and the provision of examples. Pictures, role-playing, and video were implemented as media. Each session concluded with a summary, feedback, and additional clarifications for any matters that were unclear. The teaching booklet addressed the following topics: knowledge and practice.

The 1st session: Participants are introduced to one another, the objectives of the procedure are presented, and an overview of the nature of RA, its signs and symptoms, disease consequences, and treatments is provided.

The 2nd session: It entails Physical and psychological aspects from rheumatoid arthritis, life style that should be followed and basic knowledge about complementary therapy.

3rd to the 8th session (Practical sessions):

Training about foot reflexology massage (group A); and meditation (group B).

1- Foot reflexology (Group A).

- Each foot reflexology session lasted approximately 30 minutes, and they were conducted in a patient room. The reflexology was conducted by a researcher, and patients were required to attend sessions individually at the designated time and date. For a period of four weeks, each session commenced with the right foot for fifteen minutes and progressed to the left foot for fifteen minutes. Initially, relaxation techniques were implemented on both feet.

- The researcher washed her hands with an antibacterial soap before cleansing the patient's feet. According to the patient's preference, the feet were cleansed using either a disposable wet cloth or water. The patients' joint points were supported by lying in a supine position on the patient stretcher in the room. The reflexology was conducted by the researcher, who remained at the patient's end of the bed. The practice was initiated on the right foot of a patient.

- The foot was primarily relaxed through the application of effleurage, shaking, rotation, and stretching techniques (Holey, 1997). The reflexology was resumed after the pressure was applied to the solar plexus region. The reflexology was administered to the reflex areas that correspond to each organ. The fingers of the other hand were employed, while one hand and foot were supported during the practice. The thumb was primarily employed in a caterpillar-like technique during the practice. The index and other fingers were employed in other practices. The practice concluded with the application of solar plexus pressure to both feet. During the practice, the patients were permitted to take a break.

2- Meditation training (Group B).

- Participants were provided with 15-20 minutes of in-person meditation training immediately following the baseline assessment. The participants were instructed in a straightforward, fundamental form of mantra meditation. Written

instructions were provided to participants, which included a list of mantras (i.e., sounds and words). Each participant was permitted to choose a mantra to use. The participants were directed to choose a mantra based on its sound or vibrational quality and to refrain from selecting any mantras that they believed might elicit emotional responses or thought trains. The 15-minute version of the program was recommended for all participants, who were encouraged to progress to the 20-minute version once they felt up to it. The following instructions were given to them:

- Choose a quiet environment with no interruptions for a period of 20 minutes, and if easible, turn off the phone.
- Sit with your spine straight, close your eyes, and allow yourself to relax.
- To alleviate stress or tension, take a few deep breaths and exhale.
- Repeat the selected mantra silently for 15–20 minutes after settling down. Gently let go of all other thoughts.
- Emphasis was placed on the practice's ease and effortlessness. The participants were instructed to cease reciting their mantras after 15–20 minutes, sit quietly for 2 minutes, and finally open their eyes. They were to take the necessary time to gradually return to full alertness before standing up and resuming their regular activities. This practice was to be completed twice daily for a period of four weeks, and participants were required to document each meditation session, as well as any comments. The meditation logs that were provided to the participants may have contained information regarding their practice sessions.

Evaluation phase:

The researcher evaluated the effectiveness of the reflexology and meditation program for RA patients by assessing their outcomes immediately and three months later using the "Structured Knowledge Questionnaire," "RA Pain Scale," " HAQ Disability Index," "Kessler Psychological Distress Scale," and "Coping Self-Efficacy (CSE) Scale."

Data Analysis:

The SPSS software (version 25) was employed to conduct the data analysis. The Kolmogorov-Smirnov test was employed to ascertain the normal distribution of quantitative variables. Qualitative data was represented as a percentage and a numerical value. Additionally, quantitative data was delineated as the mean or standard deviation, as appropriate. In order to examine the relationship and distinctions among qualitative variables across a variety of time periods, the chi-square test was implemented. Kruskal-Wallis was employed to compare the mean scores of more than two groups. The Spearman Correlation Method was implemented to evaluate the correlation among numerical variables. A p-value of less than 0.05 was considered significant, while a p-value of less than 0.001 was considered highly significant.

Results

Table 1 shows the demographic characteristics of patients in the three research groups (reflexology, meditation and control group), where, there was non statistically significant differences among the three groups in any of these characteristics, showing that around 70.0% of them were 50 years old or more, with close mean age in the early fifties, with a higher preponderance of females in the three reseach groups. With (80.0%, 80.0% & 76.7%, respectively) were married, living in urban area about (66.7%, 70.0% & 63.3%, respectively), and round half of them were not qualified and their occupation status requires moderate effort among (46.7%, 46,7%, & 43.2%, respectively).

Table 2 Reveals illness related data among patients in the three groups (reflexology, meditation and control group), where, there was non statistically significant differences among the three groups in any of their illness data, showing that (70.0%, 66.7% & 73.3%, respectively) of them had comorbid disease, with (63.3%, 70.0% & 53.3%, respectively) had been diagnosed with disease for ≥ 5 years. Besides, (70.0%, 83.3% & 66.7%, respectively) weren't previously hospitalized, but (86.7%, 73.3% & 83.3%, respectively) had positive rheumatoid factor. Moreover (63.3%, 80.0% & 86.7%, respectively) were overweight with a mean BMI of (29.40 ±2.43, 29.07±2.50 & 28.88±2.24).

Table 3 compares mean knowledge scores among patients in the three trail groups. The table indicates that the three groups were similar prior to the program, with no statistically significant difference. Nevertheless, the reflexology and meditation groups had knowledge scores of (26.10±3.51 & 24.60±3.02, respectively) at the immediate post, which did not indicate a significant difference among the two groups (P= 0.111 [n.s]). In contrast, the control group had a knowledge score of 10.27±2.78, which indicated

a statistically significant difference among the two groups (P=<0.001**). The reflexology and meditation groups did not exhibit a significant difference in the follow-up period (three months post-program), with values of 21.87±3.54 and 20.37±3.19, respectively. However, the control group did, with a value of 9.00±1.93. This difference was statistically significant (P=<0.001**).

Figure 1. Illustrates the difference in total knowledge levels among the studied groups (reflexology, meditation and control groups), where there was non significant statistical difference among the studied groups pre program with (p= 0.355 n.s) to be highly significantly different during the immediate post and post 3 months of program with (p= <0.001**).

Table 4 compares mean scores of physical outcomes (physical disability and pain) among patients in the three research groups. Displaying that, the three groups were similar pre program with no significant statistical differences. However, at the immediate post, pain and physical disability scores among the reflexology and meditation groups were (97.00±10.77 & 91.56±11.37, respectively) as well as (8.90±2.26 & 10.33±3.75, respectively) reflecting no significant difference among both groups (P= 0.396 & 0.455 n.s), while in comparing with 72.37±6.97 and 15.90±2.07 among control group it shows a statistically significant differences among them (P=<0.001**). To be during follow up period (3 months post program) (100.03±9.17 & 95.93±9.13, respectively) for pain as well as (8.30±1.39 & 9.76±3.40, respectively) for physical disability among the reflexology and meditation groups with no significant difference, while compared with 72.86±7.19 and 15.53±2.11 among control group, there was statistically significant difference among them (P=<0.001**).

Figure 2. Illustrates the difference in the mean scores of the components of pain among the three studied groups (reflexology, meditation and control groups), where there was non significant statistical difference among the studied groups pre program with (p= > 0.05 n.s) to be highly significantly different during the immediate post and post 3 months of program with (p= <0.001**).

Figure 3. Illustrates the difference in the mean scores of the categories of daily living activities among the three studied groups (reflexology, meditation and control groups), where there was

non significant statistical difference among the studied groups pre program with (p= > 0.05 n.s) to be highly significantly different during the immediate post and post 3 months of program with (p= <0.001**).

Table 5 compares mean scores of psychological outcomes (coping abilities and psychological distress) among patients in the three trail groups. clarifying that, the three groups were similar pre program with no significant statistical differences. However, at the immediate post, coping abilities and psychological distress scores among the reflexology and meditation groups were (213.433±12.85& 196.33±23.05, respectively) as well as (20.57±2.97& 23.66±4.93, respectively) reflecting no significant difference among both groups (P= 0.335 & 0.345 n.s), while in comparing with and 40.17±3.79 among control group it shows a statistically significant differences among them (P=<0.001**). To be during follow up period (3 months post program) (216.50±11.08 & 202.60±17.60, respectively) for coping ability as well as (19.50±3.10 & 21.43±4.53, respectively) for psychological distress among the reflexology and meditation groups with no significant difference, while compared with 108.43±8.145 and 40.60±3.36 among control group, there was statistically significant difference among them (P=<0.001**).

Figure 4. Illustrates the difference in total level of psychological distress among the three studied groups (reflexology, meditation and control groups), where there was non significant statistical difference among the studied groups pre program with (p= 0.095 n.s) to be highly significantly different during the immediate post and post 3 months of program with (p= <0.001**) in term of improvement in psychological distress among reflexology and meditation groups.

Table 6 reveals correlation coefficient among patients' total knowledge, physical and psychological outcomes post three months of program implementation, where there is a significant and positive correlation among knowledge with pain, psychological distress and coping ability, also among psychological distress and physical disability within each group. While there was a significant and negative correlation among each of pain and coping ability with physical ability and psychological distress, also among knowledge and physical disability.

Table 1: Distribution of the studied subjects in the three studied groups according to their demographic characteristics {reflexology group (n=30), Meditation group (n=30), & control group (n=30)}

Demographic characteristics	Study Groups			χ^2	p-value
	Reflexology Group A (n=30)	Meditation Group B (n=30)	Control Group C (n=30)		
Age(years)					
<50	9(30.0)	9(30.0)	8(26.7)	0.108	0.947 [n.s]
≥50	21(70.0)	21(70.0)	22(73.3)		
Mean ±SD	50.17 ±7.56	50.00±7.31	50.30±7.49	0.099	0.906 [n.s]
Sex					
Male	10(33.3)	13(43.3)	11(36.7)	0.662	0.718 [n.s]
Female	20(66.7)	17(56.7)	19(63.3)		
Marital status					
Not married	6(20.0)	6(20.0)	7(23.3)	0.133	0.935 [n.s]
Married	24(80.0)	24(80.0)	23(76.7)		
Residence					
Rural	10(33.3)	9(30.0)	11(36.7)	0.300	0.861 [n.s]
Urban	20(66.7	21(70.0)	19(63.3)		
Educational attainment					0.779 [n.s]
Not qualified	14(46.7)	17(56.7)	14(46.7)		
School	12(40.0	11(36.7)	14(46.7)	1.778	
Universities	4(13.3)	2(6.6)	2(6.6)		
Occupational status					
Sedentary (simple work)	11(36.7)	9(30.0)	10(33.3)	0.670	0.955 [n.s]
Moderate work	14(46.7)	14(46.7)	13(43.2)		
Heavy work	5(16.6)	7(23.3)	7(23.3)		

(n.s) Not Significant (P>0.05)

Table 2: Distribution of the studied subjects in the three studied groups according to their illness related data {reflexology group (n=30), Meditation group (n=30), & control group (n=30)}

| Illness related data	Study Groups			χ^2	p-value
	Reflexology Group A (n=30)	Meditation Group B (n=30)	Control Group C (n=30)		
Presence of comorbid disease					
No	9(30.0)	10(33.3)	8(26.7)	0.317	0.853 [n.s]
Yes	21(70.0)	20(66.7)	22(73.3)		
Duration of disease					
< 5 years	11(36.7)	9(30.0)	14(46.7)	1.796	0.407 [n.s]
≥ 5 years	19 (63.3)	21(70.0)	16(53.3)		
Mean ±SD	6.37 ±2.62	6.20±2.61	6.70±2.68	**Kruskal Wallis H =0.546**	0.761 [n.s]
Previous hospitalization					
Yes	9(30.0)	5(16.7)	10(33.3)	2.386	0.303 [n.s]
No	21(70.0)	25(83.3)	20(66.7)		
Rheumatoid factor status					
Positive	26(86.7)	22(73.3)	25(83.3)	1.886	0.390 [n.s]
Negative	4(13.3)	8(26.7)	5(16.7)		
Body mass index					
Overweight (25–29.9) (kg/cm²)	19(63.3)	24(80.0)	26(86.7)	4.845	0.089 [n.s]
Obese calss I (30 -34.9) (kg/cm²)	11(36.7)	6(20.0)	4(13.3)		
Mean ±SD	29.40 ±2.43	29.07±2.50	28.88±2.24	**Kruskal Wallis H =1.263**	0.532 [n.s]

(n.s) Not Significant (P>0.05)

Table 3: Comparison of mean knowledge score among patients in the three study groups throughout study periods (pre program, immediate post, and post 3month{reflexology group (n=30), Meditation group (n=30), & control group (n=30)}

Items of knowledge		Study Groups			Kruskal Wallis H	p-value
		Reflexology Group A (n=30)	Meditation Group B (n=30)	Control Group C (n=30)		
Rheumatoid overview	Pre program	3.40±1.83	3.47±1.85	3.27±1.86	0.230	0.892 n.s
Life style		1.63±0.72	1.60±0.72	1.67±0.71	0.188	0.910 n.s
Complementary therapy		0.13±0.35	0.13±0.35	0.13±0.35	0.000	1.000 n.s
Total		**5.17±2.17**	**5.20±2.17**	**5.07±2.20**	**0.130**	**0.937 n.s**
Rheumatoid overview	Immediate post program	6.73±1.23	5.97±1.27	3.30±1.21	62.615	<0.001**
Life style		6.10±1.27	5.53±1.20	2.90±1.27	61.675	<0.001**
Complementary therapy		13.27±1.55	13.10±0.92	4.07±1.14	61.515	<0.001**
Total		**26.10±3.51**	**24.60±3.02**	**10.27±2.78**	**61.016**	**<0.001****
Rheumatoid overview	3 months post program	5.43±0.90	4.60±1.00	3.23±1.25	64.634	<0.001**
Life style		4.77±0.87	4.20±1.21	2.10±0.40	62.259	<0.001**
Complementary therapy		11.67±2.11	11.57±1.33	3.67±0.88	60.192	<0.001**
Total		**21.87±3.45**	**20.37±3.19**	**9.00±1.93**	**60.380**	**<0.001****
Pair wise comparison		**Immediate post**		**Post 3 months**		
		Test statistics	P value	Test statistics	P value	
Reflexology and meditation		1.500	0.111 n.s	1.500	0.125 n.s	
Reflexology and control		41.800	<0.001**	36.700	<0.001**	
Meditation and control		40.300	<0.001**	35.200	0.001**	

[*Not significant (p > 0.05)*   *** Highly significant (p ≤ 0.001)*]

Figure 1. Comparison of total knowledge level regarding reflexology and meditation techniques among the three study groups, during different study periods {reflexology group (n=30), Meditation group (n=30), & control group (n=30)}
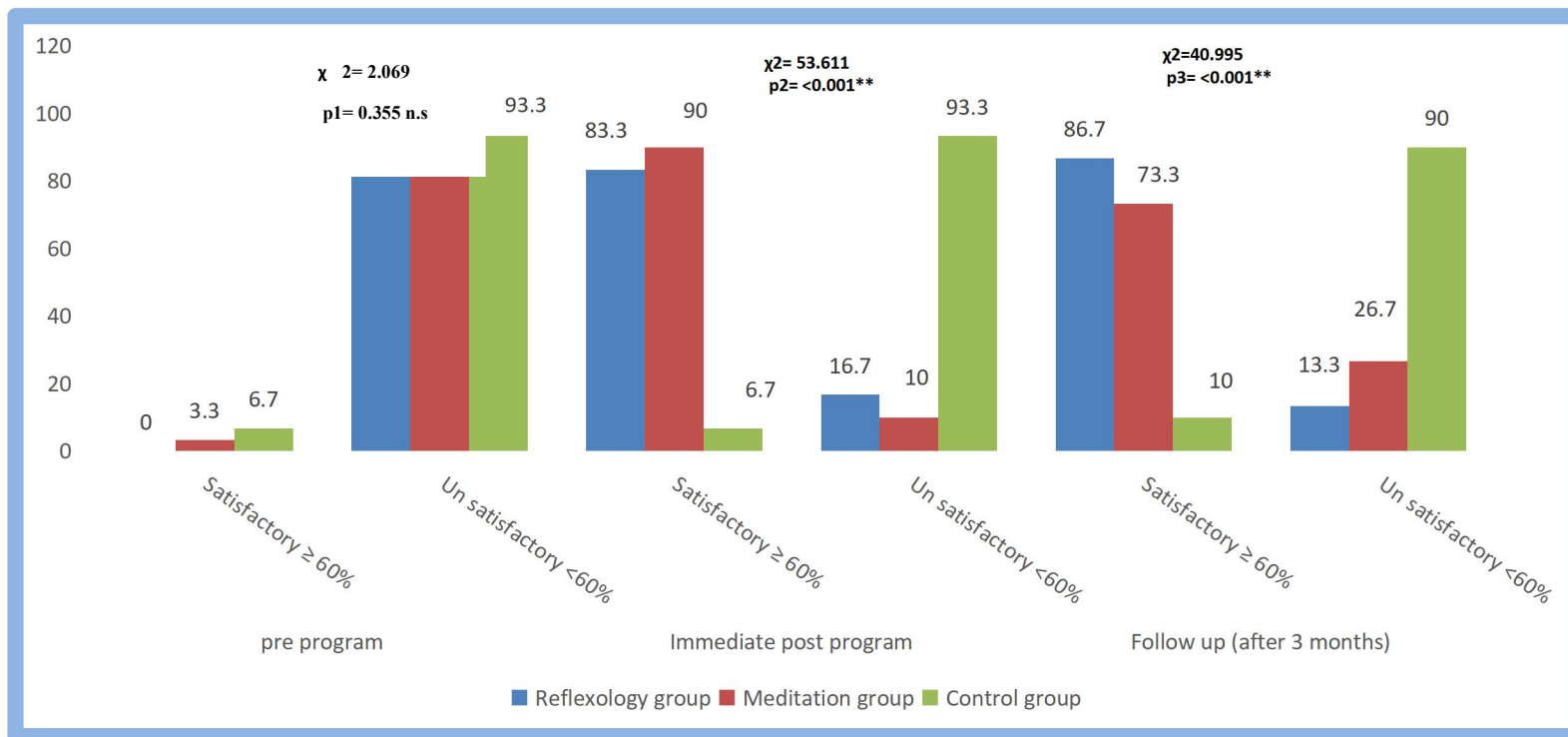
Not significant (p > 0.05)   ** Highly significant (p ≤ 0.001)

(1) Difference between the studied groups (preprogram)
(2) Difference between the studied groups (immediately post program)
(3) Difference between the studied groups (post 3 months of program)

Table 4: Comparison of physical outcomes (pain and physical disability) among patients in the three study groups throughout study periods (pre, immediate post, and post 3 month) {reflexology group (n=30), Meditation group (n=30), & control group (n=30)}

Physical outcomes		Study groups			Kruskal Wallis H	p-value
		Reflexology Group A (n=30)	Meditation Group B (n=30)	Control Group C (n=30)		
Pain	Pre program	74.83±7.61	75.00±7.65	73.27±6.84	0.952	0.606 [n.s]
	Immediate Post program	97.00±10.77	91.56±11.37	72.37±6.97	55.133	<0.001[**]
	3 months post program	100.03±9.17	95.93±9.13	72.86±7.19	59.262	<0.001[**]
Pair wise comparison	Immediate post		Post 3 months			
	Test statistics	P value	Test statistics	P value		
Reflexology and meditation	10.133	0.396 [n.s]	8.683	0.591 [n.s]		
Reflexology and control	47.417	<0.001[**]	48.567	<0.001[**]		
Meditation and control	37.283	<0.001[**]	39.883	<0.001[**]		
Physical disability	Pre program	16.17±2.21	16.13±2.22	16.33±2.31	0.215	0.898 [n.s]
	Immediate Post program	8.90±2.26	10.33±3.75	15.90±2.07	45.157	<0.001[**]
	3 months post program	8.30±1.39	9.76±3.40	15.53±2.11	48.112	<0.001[**]
Pair wise comparison	Immediate post		Post 3 months			
	Test statistics	P value	Test statistics	P value		
Reflexology and meditation	-9.533	0.455 [n.s]	-8.950	0.535 [n.s]		
Reflexology and control	-42.567	<0.001[**]	-43.650	<0.001[**]		
Meditation and control	-33. 033	<0.001[**]	-34.700	<0.001[**]		

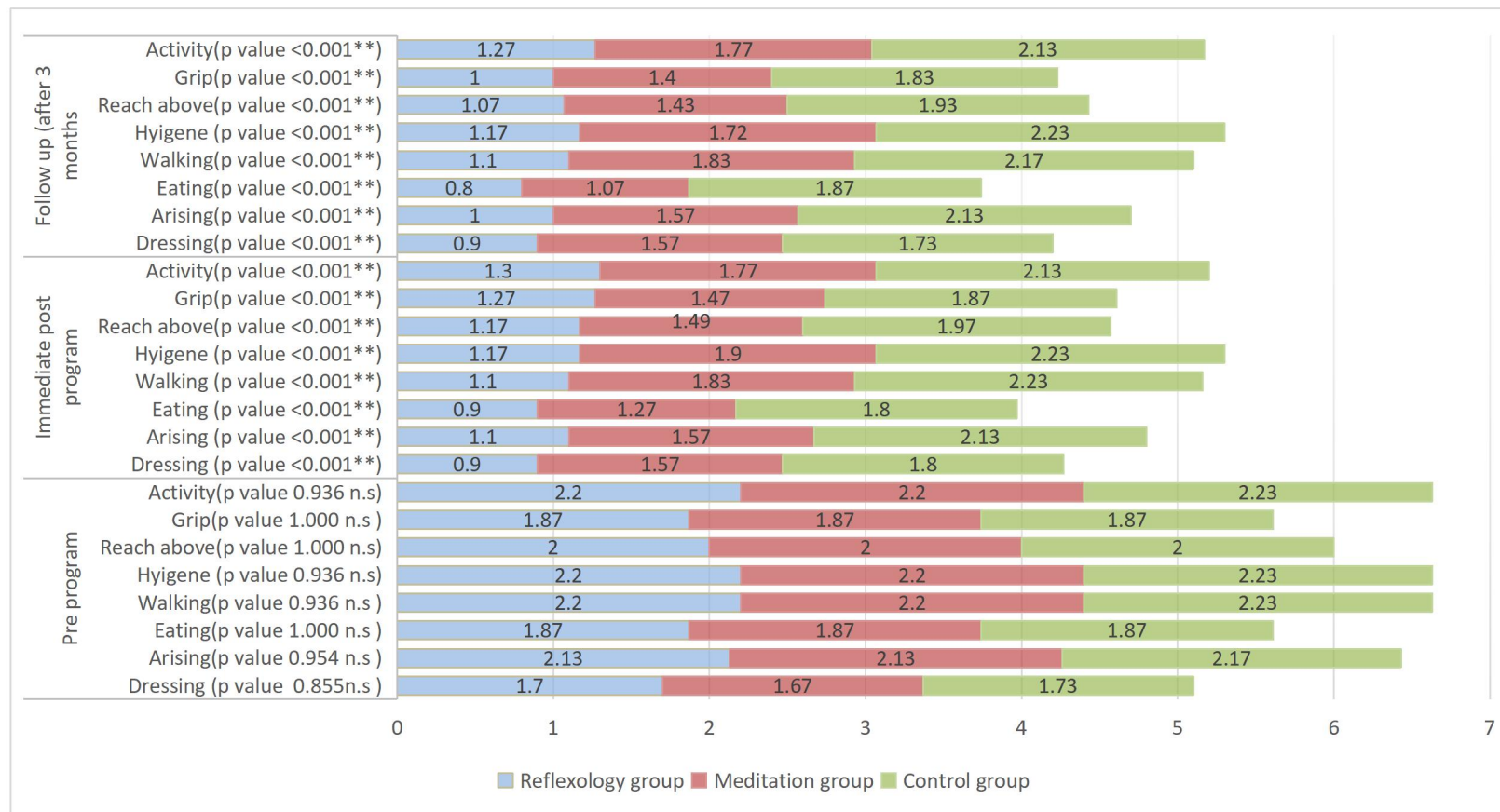*Not significant (p > 0.05)   ** Highly significant (p ≤ 0.001)*

Figure 2. Comparison in the mean scores of pain components among the three study groups, during different study periods{reflexology group (n=30), Meditation group (n=30), & control group (n=30)}
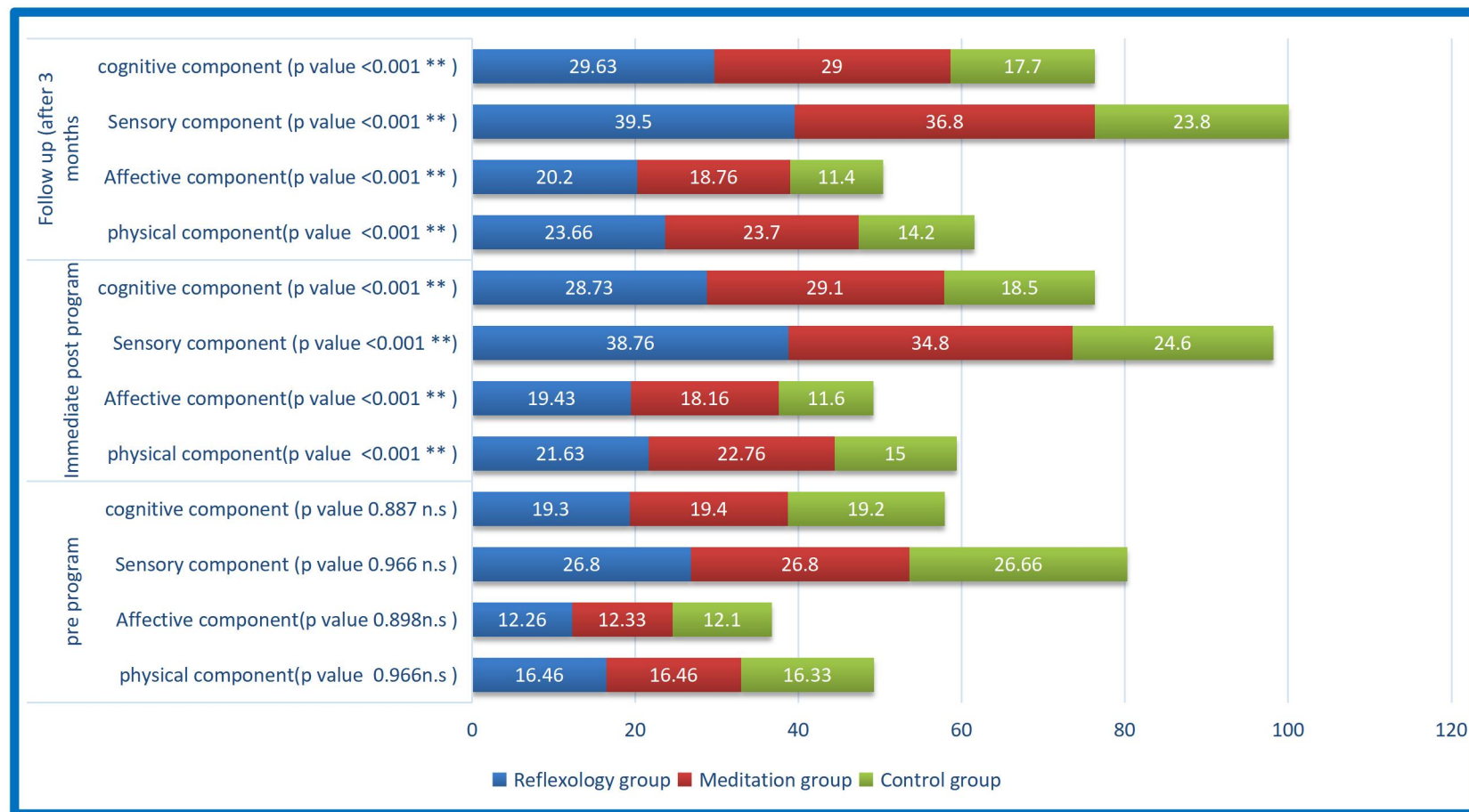
Not significant (p > 0.05)   *** Highly significant (p ≤ 0.001)*

Figure 3. Comparison in the mean scores of categories of daily living activities respectively among the three study groups, during different study periods{reflexology group (n=30), Meditation group (n=30), & control group (n=30)}

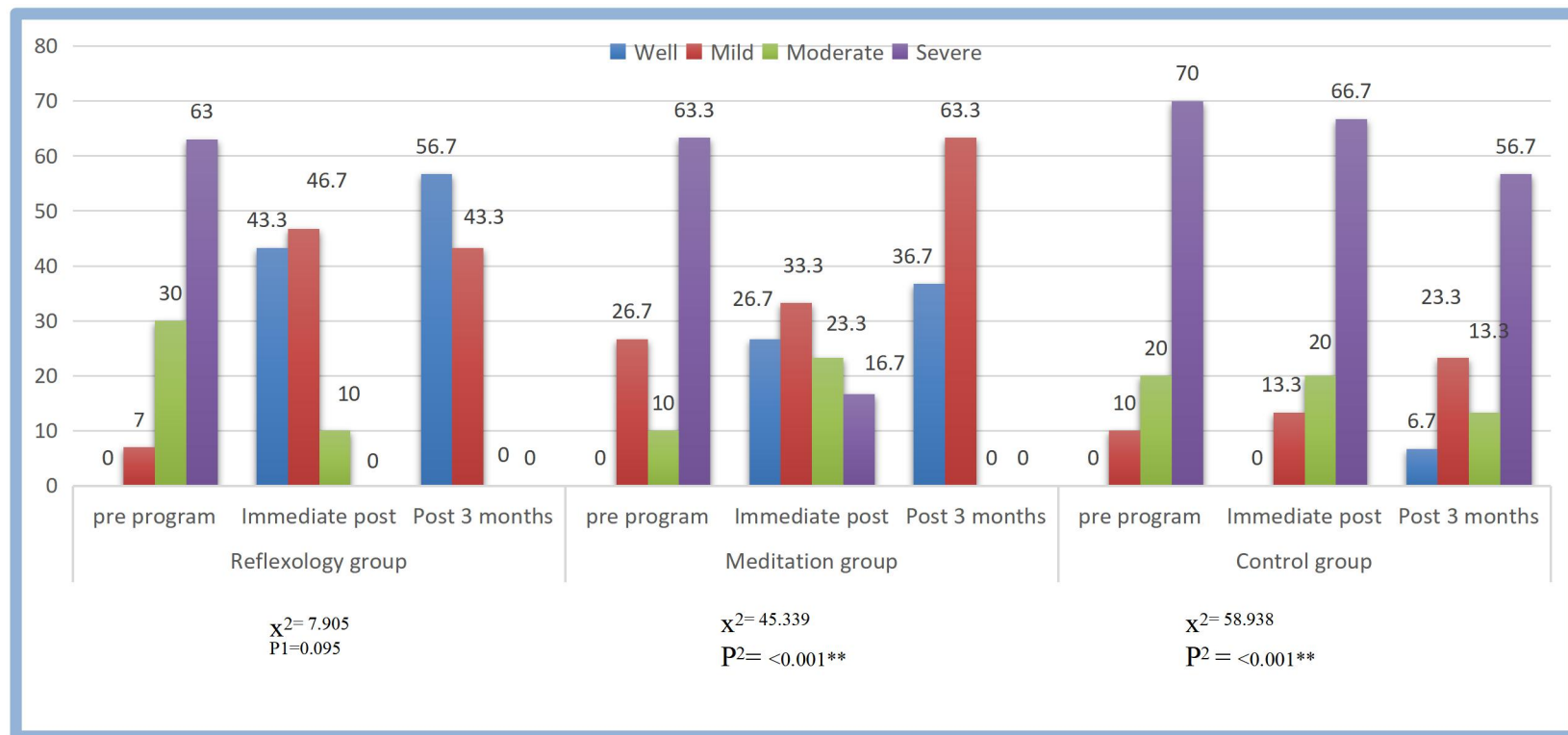*Not significant (p > 0.05)*   *** Highly significant (p ≤ 0.001)*

Table 5: Comparison of psychological outcomes (psychological distress, and coping ability) among patients in the three study groups throughout study periods (pre, immediate post, and post 3 month) {reflexology group (n=30), Meditation group (n=30), & control group (n=30)}

Psychological outcomes		Study groups			Kruskal Wallis H	p-value
		Reflexology Group A (n=30)	Meditation Group B (n=30)	Control Group C (n=30)		
Coping ability	Pre program	107.00±8.04	107.40±8.14	106.20±8.21	0.321	0.852 [n.s]
	Immediate Post program	213.433±12.85	196.33±23.05	107.33±5.50	67.919	<0.001[**]
	3 months post program	216.50±11.08	202.60±17.60	108.43±8.145	63.582	<0.001[**]
Pair wise comparison		Immediate post		Post 3 months		
		Test statistics	P value	Test statistics	P value	
Reflexology and meditation		10.700	0.335 [n.s]	13.265	0.146 [n.s]	
Reflexology and control		50.350	<0.001[**]	51.633	<0.001[**]	
Meditation and control		39.650	<0.001[**]	38.367	<0.001[**]	
Psychological distress	Pre program	41.13±2.62	40.97±2.66	41.37±2.62	0.433	0.805 [n.s]
	Immediate Post program	20.57±2.97	23.66±4.93	40.17±3.79	61.578	<0.001[**]
	3 months post program	19.50±3.10	21.43±4.53	40.60±3.36	60.704	<0.001[**]
Pair wise comparison		Immediate post		Post 3 months		
		Test statistics	P value	Test statistics	P value	
Reflexology and meditation		-10.617	0.345	-7.133	0.868	
Reflexology and control		-50.133	<0.001[**]	-48.567	<0.001[**]	
Meditation and control		-39.517	<0.001[**]	-41.433	<0.001[**]	

*Not significant (p > 0.05)   ** Highly significant (p ≤ 0.001)*

Figure 4. Comparison of total level of psychological distress among the three study groups, during different study periods{reflexology group (n=30), Meditation group (n=30), & control group (n=30)}

Not significant (p > 0.05)   *** Highly significant (p ≤ 0.001)*

(1) Difference between the studied groups (preprogram)
(2) Difference between the studied groups (immediately post program)
(3) Difference between the studied groups (post 3 months of program)

Table (6): Correlation coefficient between patients' total knowledge, physical and psychological outcomes post three months of program implementation, {reflexology group (n=30), Meditation group (n=30), & control group (n=30)}

Variables	Study groups	Pain	Physical disability	Psychological distress	Coping ability
Knowledge	Reflexology group	0.491 (0.006*)	-0.383 (0.037*)	0.340 (0.014*)	0.988 0.003*
Pain		-	-	-	0.0430 (0.018*)
Physical disability		-0.452 (0.012*)	-	-	-0.940 (0.014*)
Psychological distress		-0.440 (0.015*)	0.395 (0.031*)	-	-0.406 (0.026*)
Knowledge	Meditation group	0.917 (0.020*)	-0.979 (0.005*)	0.914 (0.021*)	0.362 (0.013*)
Pain		-	-	-	0.326 (0.019*)
Physical disability		-0.430 (0.018*)	-	-	-0.421 (0.021*)
Psychological distress		-0.406 (0.026*)	0.876 (0.030*)	-	-0.395 (0.031*)
Knowledge	Control group	0.314 (0.028*)	-0.381 (0.010*)	0.367 (0.012*)	0.256 (0.071 n.s)
Pain		-	-	-	0.342 (0.014*)
Physical disability		-0.689 (<0.001**)	-	-	-0.357 (0.013*)
Psychological distress		-0.234 (0.101n.s)	0.552 (<0.001**)	-	-0.297 (0.035*)

* Statistically significant p ≤ 0.05   ** Highly Statistically significant p ≤ 0.001

Discussion

Rheumatoid arthritis is the most common form of chronic inflammatory arthritis worldwide. Conventional treatment has focused on alleviating the symptoms of RA and containment of disease progression **(WHO, 2023)**. Therefore the research results aimed to evaluate the effect of reflexology and meditation on physical and psychological outcomes among patients with rheumatoid arthritis.

Regarding demographic characteristics. The present results describes the personal characteristics of patients in the three trail groups, indicating that more than two thirds of them were 50 years old or more, with close mean age in the early fifties. This may be due to that RA mainly develop in late age. From review of literature, RA prevalence and incidence increase with age **(Yu et al., 2023).** This finding was similar to the trail finding by **Al-Jabi et al., (2021)** who founded that the

mean age of the patients was 49. This finding comes in disagreement with **Kielar et al., (2017)** who showed that the stage of the trail sample was 41-76 (mean age 60.9 ± 10.06).   Also, **Hamed et al., (2017)** showed in their study that, the mean age of the studied group is 35.05±8.31years old, with a range from 18 to 49 years old.

Concerning to sex a higher preponderance of female in the three trail groups present in the study. This may be due to that this disease occurs in a higher percentage among in female more than male. Similar to previous trail by **Mir et al., (2022)** who founded that more women than men suffer from RA. This finding also consistent with **Yahya et al., (2022)** who founded that women with RA had a greater percentage ratio (60%) than males with RA (40%). Moreover, this finding agreed with that of **Almoallim et al., (2020)** who stated that slightly less than three quarters were females.

The finding also reveals that around more than three quarters were married. This may be

due to the fact that the majority of the sample was female and more than 50 years old, the age after marriage in Egypt. This finding is in agreement with the findings of **Bogale & Feleke, (2022) and Rahim & Cheng, (2018)**, who both reported that the major of the participants were married.

Regarding residence, the finding showed that around more than two thirds were living in urban area, which disagreed with *Senara et al., (2019); Alian et al., (2017) & El Doushy, (2017)* who stated that the majority of the participants live in rural areas.

Also the finding revealed that nearly half of them were not qualified, which are may be related to cultural and economic background. This finding agrees with *Bakir et al., (2018)* who stated that the majority of the participants were not well-educated. This finding disagrees with *Bogale & Feleke, (2022)* who found that over half had completed their elementary and secondary school.

Concerning to mean knowledge scores among patients in the three study groups. Findings from repeated measures showed that there was a significantly higher increase in knowledge scores in the reflexology and meditation groups immediately and at three months after intervention when compared with control group, but there were non significant differences among reflexology and meditation groups, **which supports research hypothesis (1)** This implies that the educational program implemented by the researchers had a beneficial impact on the patients through its use of effective teaching methods. This discovery is consistent with the findings of **Baraka et al. (2022)**, who demonstrated that the control group and all elderly trail participants possessed low overall knowledge scores prior to the commencement of the educational program. The implementation of the instructional program resulted in a statistically significant increase in their knowledge. Additionally, **Ndosi and Adebajo (2019)** asserted that patient education is of paramount importance for individuals afflicted with chronic diseases, including RA, as it enables them to adjust and manage the consequences of the disease and its treatments. Although research has identified a wide variety of

benefits, including improved disease knowledge, self-efficacy, concordance with treatment, and physical and psychological health status (**Zangi et al., 2015**).

Furthermore, **Moghadam et al. (2018)** concluded that training programs are an effective method for enhancing the self-efficacy of patients with chronic diseases, such as RA, by increasing their awareness of their condition.

Concerning to comparison of the mean scores of physical outcomes (pain and physical disability) in different groups. The current findings shows that there was a significantly improvement in physical outcomes (pain and physical disability) in term of (increased pain improvement scores and lowered physical disability scores) among the reflexology and meditation groups at immediate post and three months periods after intervention when compared with control group. **which supports research hypothesis (2),** This may be due to positive effect of reflexology and meditation technique among group A and group B. **Regarding reflexology,** this finding is consistent with *Yakout et al., (2022),* who stated that following the second, third-, and fourth-foot reflexology sessions, the trail group experienced a substantial improvement in the mean difference for the pain, stiffness, and function subscales, with an effect size of intervention 93%. Also, this finding aligns consistent with **Baraka et al., (2022) & Bakir et al., (2018)**, Who found that foot reflexology is a kind of nursing care that can lessen RA patients' symptoms of pain and insomnia. Also, **Taha and Ali (2011)** discovered that the application of feet reflexology to RA patients is effective in reducing their pain, improving their quality of life, and enhancing their overall health status. **Concerning to mind-body techniques such as meditation**, In conjunction with conventional treatments, research on individuals with RA has demonstrated that the majority of techniques are somewhat beneficial in terms of reducing pain and disability, as well as enhancing their overall psychological well-being, capacity to cope, and confidence in their ability to manage challenging situations *(Zhou et al ., 2020). Furthermore, Oliveira et al., (2021)* concluded that there were significant changes in outcomes that impact

biopsychosocial aspects in RA patients due to the beneficial effects of mindfulness.

Comparison in the mean scores of physical disability regarding 8 categories of daily living activities respectively among the three study groups, during different study periods. It is noticed that the mean scores of physical disability regarding 8 categories of daily living activities among the three studied groups were not statistically different during pre- program to be statistically significant during immediate post program and follow up period in term of improvement in physical outcomes among reflexology and meditation group. Coincided with *Abdelaziz et al., (2019)*, who demonstrated that lowering functional disabilities was achieved with all of the interventions. This finding is consistent with **Kielar et al. (2017)**, who reported that the respondents reported an improvement in functionality and a decrease in pain intensity. The surveyed individuals' consumption of pain medications was significantly diminished by the treatment that was implemented. The quality of sleep was also reported to have improved by the respondents. **Metin (2016)** posits that RA diminishes the quality of life by inducing pain, fatigue, morning stiffness, disability, movement restriction, difficulties in daily life, deterioration in social relations, and depression. Patients with RA are currently exploring complementary and alternative medicine as a finding of the treatment's side effects, chronic pain and fatigue, and incomplete treatment. Reflexology, which is frequently employed and preferred by healthcare professionals and patients with RA, has a positive effect on the management of patients' pain and fatigue, as well as on the improvement of patient quality of life.

Concerning psychological outcomes among patients in the three study groups: there was a significant improvement in psychological outcomes (psychological distress and coping) in term of (increased coping scores and lowered psychological distress scores) among the reflexology and meditation groups at immediate post and three months periods after intervention when compared with control group, **which supports research hypothesis (3).** This may reflect the effectiveness of intervention on physical outcomes which

positively affected psychological outcomes. **Concerning reflexology,** this finding is congruent with **Pharm, (2023)** who said in his review that numerous studies have indicated that patients used reflexology may feel less stressed and anxious. Also this finding agreement with *Lee & Yeun, (2017)* his finding reveals that foot massage led to reductions in depression, stress. As well, *Jothi & Cesar, (2014),* presented that foot reflexology training significantly reduced RA patients stress and depression.

Manual pressure is applied to specific areas or zones of the feet (and occasionally the hands or ears) that are believed to correspond to other body areas or organs, as evidenced by the review of the previews. In order to alleviate stress and induce physiological changes, special hand and finger techniques are employed to apply pressure to these reflex points, which leads to a reduction in pain perception *(Singh & Chaturvedi, 2015)*.

Concerning to meditation, this result similar to result by **Slagter et al., 2022 and Panush, 2019)** who stated that RA patients appear to benefit greatly from Mind–body therapies (MBTs) particularly those who also suffer from anxiety and depression. Furthermore, this finding is in accordance with the results of **Innes et al. (2018),** who hypothesize that a simple MM may be effective in improving the quality of life, mood, sleep, and knee pain and dysfunction in adults with knee OA, as well as in reducing stress.

Imagine that something as simple as taking a few minutes each day to pause, breathe, and concentrate can alleviate your chronic joint pain. Numerous specialists assert that these procedures are highly effective in combating chronic pain and the depression that frequently accompanies it. Meditation is a mind-body practice that is employed to improve psychological balance, alleviate depression, cope with illness, achieve overall health and well-being, and increase physical relaxation and calmness. Meditation assists individuals with arthritis in managing their symptoms more effectively **(The Arthritis Foundation, 2017).**

The general or nonspecific stress-reducing effects of mindfulness meditation strategies, such as mindfulness-based stress reduction, have been observed to be beneficial for both healthy subjects and those living with emotional disorders, chronic pain, and heart disease **(Chiesa, & Serretti, 2010).** Mindfulness meditation /mindfulness-based stress reduction interventions have been shown to significantly reduce pain, sleep disturbances, anxiety, and depression, while simultaneously increasing mindfulness and quality of life, according to randomized studies **(Ledesma, & Kumano, 2009).** Where there was association between physical and psychological outcomes as revealed by the current research findings, **supporting H4**, which agreed upon by the results of **Pradhan et al. (2007)** which was clarified that significant improvements in well-being in patients with RA and psychological distress were observed following mindfulness meditation.

Conclusion:

Implementing reflexology and meditation program had a positive and better impact on patients' outcomes evidenced by increased knowledge score, and improved physical and psychological outcomes mean scores among intervention groups than in control group.

Recommendations:

The following recommendations are proposed in accordance with the research findings:

1. Designing Illustrated self-administered Reflexology massage and meditation intervention booklets to be distributed to patients with rheumatoid arthritis.

2. Adhering to in order to evaluate the patient's condition and identify any complications, it is crucial to conduct follow-up visits to the clinic.

3. Establishment of patient training centers in hospitals that are equipped with appropriate materials, media, and audiovisual aids for all patients with rheumatoid arthritis.

4. Performing training program for nurses and caregivers should be considered.

5. In the future, the research should be extended to other arthritis or chronic musculoskeletal diseases to explore further its effect.

References

Abdelaziz, K., Botla, A., Ebrahim, H., & Gab, A. (2019). Effect of Reflexology on Knee Osteoarthritis Patients: A Randomized Clinical Trial. World Journal of Sport Sciences 14(1): 21-27. DOI: 10.5829/ idosi .wjss. 2019 .21.27.

Alian, S., Zaghlol, R., Khalil, S., El-Shafei, D., Sheta, S., and Awad, A. (2017): Rheumatoid arthritis severity index and its relation to comorbidity in Egyptian rheumatoid arthritis patients. J. Adv. Res. 5(3), 1443-1451.

Algorani, E.B. & Gupta, V. (2023). Coping mechanism, NIH, available at https://www.ncbi.nlm.nih.gov/books/NBK559031. Accessed in May 22, 2023, at 6:45 pm.

Al-Jabi, S., Seleit. D., Badran, A., Koni, A., and Zyoud, S. (2021). Impact of socio-demographic and clinical characteristics on functional disability and health-related quality of life in patients with rheumatoid arthritis: a cross-sectional study from Palestine. Health and Quality of Life Outcomes volume 19: 241. https://doi.org/10.1186/s12955-021-01874-x.

Almoallim, H., Hassan, R., Cheikh, M., Faruqui, H., Alquraa, R., Eissa, A., Alhazmi, A., Alsolaimani, R., and Janoudi, N. (2020). Rheumatoid Arthritis Saudi Database (RASD): Disease Characteristics and Remission Rates in a Tertiary Care Center. Open Access Rheumatology: Research and Reviews. 12:139-145.
doi: 10.2147/OARRR.S260426.

Anderson.,D.L. (2001): Development of an instrument to measure pain in rheumatoid arthritis: rheumatoid arthritis pain scale (RAPS). Arthritis Care Res, 45:317–23.

Arthritis foundation. (2022). causes, symptoms, treatments and more. Arthritis Foundation. https://www.arthritis.org/diseases/rheumatoid-arthritis. Accessed in February 12, 2022. At. 5:00 pm

Bakir, E., Baglama, S., & Gursoy, S. (2018): The effects of reflexology on pain and sleep deprivation in patients with rheumatoid arthritis: A randomized controlled trial. Complementary Therapies in Clinical Practice 31 (2018) 315e319.

Baraka, S., Elshafie, I., Al-saadaney, H., Elkazeh, E., and El- Mazayen, S. (2022). Effect of Foot Reflexology with Pharmacological Treatment on Pain and Quality of Life among Elderly Suffering from Osteoarthritis. Tanta Scientific Nursing Journal. Vol. 24 No. 1. (Print ISSN 2314 – 5595) (Online ISSN 2735 – 5519).

Bench, B., Primdahl, J., Tubergen, A.V., Voshaar, M. and et al., (2020). 2018 update of the EULAR recommendations for the role of the nurse in the management of chronic inflammatory arthritis, 79(1):61-68, doi: 10.1136/annrheumdis-2019-215458.

Bogale, Z. & Feleke, Y. (2022). Prevalence, Clinical Manifestations, and Treatment Pattern of Patients with Rheumatoid Arthritis Attending the Rheumatology Clinic at Tikur Anbessa Specialized Hospital, Ethiopia: A Cross-Sectional Study. Open Access Rheumatology Research and Reviews Volume 14:221-229. DOI:10.2147/OARRR.S383778

Bullock, J., Rizvi, S.A.A., Saleh, A.M., Ahmed, S.S., Do, D.P., Ansari, R.A. and Ahmed, J. (2019). Rheumatoid Arthritis: A Brief Overview of the Treatment, National library in Medicine, 27(6): 501–507. https:// doi. org/ 10. 1159/ 000493390

Chauhan, K., Jandu, J.s., Brent, L.H. and Al-Dhahir, M.A. (2023). Rheumatoid Arthritis, National library in Medicine, available at https:// www. ncbi. nlm. nih. gov/ books/ NBK441999. Accessed in May 22, 2023, at 6:45 pm.

Chaurasia, N., Singh, A., Singh, I.L., Singh, S. and Tiwari, T. (2020). Cognitive dysfunction in patients of rheumatoid arthritis, J Family Med Prim Care, 9(5): 2219–2225. doi: 10. 4103/ jfmpc. jfmpc_307_20

Chesney, M.A., Neilands, T.B., Chambers, D.B., Taylor, J.M., and Folkman, S. (2006): A validity and reliability study of the coping self-efficacy scale. Br J Health Psychol; 11(3): 421-37..

Chiesa, A., & Serretti, A. (2010): A systematic review of neurobiological and clinical features of mindfulness meditations. Psychol Med;40:1239–1252

Cirino, E. (2018). Reflexology 101, healthline, available at https:// www. healthline. com/health/what-is-reflexology Complications: Rheumatoid arthritis. The National Health Service. https:// www. nhs.uk/ conditions/ rheumatoid-arthritis/ complications/. Accessed 2023.

Conforti, A., Di Cola, I., and Pavlych, V. (2021). Beyond the joints, the extra-articular manifestations in rheumatoid arthritis. Autoimmunity Reviews. 20(2): 102735. https://pubmed.ncbi.nlm. nih. gov/33346115/. Published February 2021. Accessed February 12, 2022.

Davis, J. (2021). Reflexology, WebMD, available at www. webmd. com/ balance/ what- is-reflexology . Accessed in May 22, 2023, at 6:45 pm.

El Doushy, E.E. (2017): Efficacy of flexibility exercises on joints' pain, stiffness and physical dysfunction in patients with systemic lupus versus rheumatoid arthritis. IOSR Journal of Nursing and Health Science (IOSR-JNHS). Volume 7, Issue 5. PP 58-70

Fearon, E., Chabata,S. T., Thompson , J.A., Cowan, F.M and Hargreaves,J. R. (2017). Sample size calculations for population size estimation studies using multiplier methods with respondent-driven.

Fletcher. J. (2022). Rheumatoid Arthritis and Heart Health, Healthline, available at https://www.healthline.com/.../rheumatoid -arthritis-and-heart-health .Accessed on 23/6/2023.at 3:45pm.

Fries, J.F., Spitz, P., Kraines, R.G., & Holman, H.R. (1980): Measurement of patient outcome in arthritis. Arthritis Rheum; 23: 137– 45.

Ganesan, S.; Gaur, G.S.; Negi, V.S.; Sharma, V.K.; Pal, G.K. (2020). Effect of yoga therapy on disease activity, inflammatory markers, and heart rate variability in patients with rheumatoid arthritis. J. Altern. Complement. Med. 26, 501–507

Gower, T. (2023). Meditation for RA and PsA, Arthritis foundation, available at blog.arthritis.org/rheumatoid-arthritis/meditation-ra-psoriatic-arthritis/

Hamed, M., El badawy A., ELtokhy, H., Aboserea, M., & Seliem, H. (2017): Changes in Health Related Quality of Life in Rheumatoid Arthritis Patients, Zagazig University Hospital; An interventional study. J Am Sci;13(5):40-54.

Holey, E. C. (1997): Therapeutic massage. 1st (ed.).WB. Saunders Co. USA, P. 232.

Indalecio, J. (2018). Managing Daily Life with Rheumatoid Arthritis: Strategies, Skills and Tools, HSS, available at https://www.hss.edu/conditions_managin g-daily-life-rheumatoid-arthritis.asp. Accessed February 12, 2022.

Intriago M, Maldonado G, Cardenas J, Rios C. (2019). Quality of life in Ecuadorian patients with established rheumatoid arthritis. Open Access Rheumatol Res Rev, 11:199–205. doi: 10.2147/OARRR.S216975.

Innes, E., Selfe, T., Kandati,S., Wen, S., &Huysmans, Z. (2018): Effects of

Mantra Meditation versus Music Listening on Knee Pain, Function, and Related Outcomes in Older Adults with Knee Osteoarthritis: An Exploratory Randomized Clinical Trial (RCT). Evidence-Based Complementary and Alternative Medicine. P. 19.

Jothi, K., & Cesar, A, I. (2014): Effects of Tai Chi and Foot Reflexology on Selected Psychological Variables in Arthritis Patients. International Interdisciplinary Research Journal. Volume-IV, Issue-VI. P. 149

Kessler, RC., Barker, PR., Colpe, LJ., Epstein, J.F, Gfroerer, JC., and Hiripi, E.(2003): Screening for serious mental illness in the general population. Arch Gen Psychiatry. 60(2):184-9.

Kielar,K Drzał-Grabiec,J. Truszczyńska, A., and Twarowsk, N. (2017): The effects of reflexology on joint pain and disability in patients with osteoarthritis of the hip joints, Postępy Rehabilitacji (3), 29 – 40.

Koller-Smith L, Mehdi AM, March L, Tooth L, Mishra GD, Thomas R. (2022). Rheumatoid arthritis is a preventable disease: 11 ways to reduce your patients' risk. Internal Medicine Journal 2022;52:711–6.

Ledesma, D., & Kumano, H. (2009): Mindfulness-based stress reduction and cancer: a meta-analysis. Psychooncology;18:571–579.

Lee Y.M., & Yeun, Y.R. (2017): Effects of Combined Foot Massage and Cognitive Behavioral Therapy on the Stress Response in Middle-Aged Women. The Journal of Alternative and Complementary MedicineVol. 23, No. 6.

Lwin, M.N., Serhal, L., Holroyd, C. and Edwards, C.J. (2020). Rheumatoid Arthritis: The Impact of Mental Health on Disease: A Narrative Review, 7(3): 457–471. doi: 10. 1007/ s40744- 020-00217-4

Marrie RA, Hitchon CA, Walld R, Patten SB, Bolton JM, Sareen J, et al. (2018).

Increased burden of psychiatric disorders in rheumatoid arthritis. Arthritis Care Res., 70:970–8. https:// doi. org/ 10. 1002/ acr.23539

Mayo Clinic Staff (2023). Rheumatoid arthritis, Mayo Foundation for Medical Education and Research (MFMER), **available** at https:// www. Mayo clinic .org/diseases-conditions/rheumatoid-arthritis/. Accessed in February 12, 2022. At. 4:00 pm

Metin, Z.G. (2018): When Mindfulness Meditation Meets Rheumatoid Arthritis: A Modest Proposal. SF J Orthopedic **Rheumatol** 2:3.

Mir, S., Noor, M., Manzar, M., Alshehri, B., Alaidarous, M., Dukhyil, A., Banawas, S., Madkhali, Y., Jahan, S., Kashoo, F., Iqbal, D., Zia, Q., Alsagaby, A., and Aldosari, S. (2022). Prevalence of rheumatoid arthritis and diagnostic validity of a prediction score, in patients visiting orthopedic clinics in the Madinah region of Saudi Arabia: a retrospective cross-sectional study. Peer J. doi: 10.7717/peerj.14362.

Moghadam, M. H., Jahanbin, I., & Nazarinia, M.A. (2018): The Effect of Educational Program on Self-efficacy of Women with Rheumatoid Arthritis: A Randomized Controlled Clinical Tria. Int J Community Based Nurs Midwifery; 6(1): 12–20.

Moreland, L.W. & Cannella, A. (2023). General principles and overview of management of rheumatoid arthritis in adults, Wolters Kluwer, available at https://www.uptodate.com/contents/general-principles-and-overview-of-rhumatoid. Accessed in june 21, 2023. At. 3:00 pm

Moura M.D.G., Lopes L.C., Silva M.T., Barberato-Filho S., Motta R.H.L., Bergamaschi C.C (2018). Use of steroid and nonsteroidal anti-inflammatories in the treatment of rheumatoid arthritis: Systematic review protocol. Medicine. 97:e12658. doi: 10.1097/ MD. 0000000000012658

Mousavi, S.E., Nejadghaderi, S.A., Khabbazi, A., Alizadeh, M., et al., (2022). The burden of rheumatoid arthritis in the Middle East and North Africa region, 1990–2019, Scientifc Reports, 12:19297. https:// doi. org/ 10. 1038/ s41598- 022-22310-0

Nagy, Z., Szigedi, E., Takács, S. & Császár-Nagy, N. (2023). The Effectiveness of Psychological Interventions for Rheumatoid Arthritis (RA): A Systematic Review and Meta-Analysis, Life MDPI, 13(3), 849; https:// doi.org/10.3390 /life 13 030849

National institution of arthritis and musculoskeletal and skin disease, (2022). Rheumatoid arthritis, available at www.niams.nih.gov/health-topics/rheumatoid-arthritis/ basics/ symptoms-ca. Accessed in February 12, 2023. At. 5:00 pm

National Library of Medicine, (2023). Everyday life with rheumatoid arthritis, available at https:// www. ncbi. nlm. nih.gov/books/NBK384458. Accessed March 15, 2023.

Ndosi, M., & Adebajo A. (2015): Patient education in rheumatoid arthritis: is the needs-based approach the way forward? Clin Rheumatol 2015; 34:1827–1829.

Oliveira, L., Araújo, A., Branco, J., Claudio, J., Michel, J. and Machado, R. (2021). Mindfulness for patients with rheumatoid arthritis: systematic review. Research, Society and Development, v. 10, n. 2. DOI: http://dx.doi.org/10.33448/rsd-v10i2.12047.

Osthoff, A.-K.R., Niedermann, K., Braun, J., Adams, J., Brodin, N., Dagfinrud, H., Duruoz, T., Esbensen, B.A., Günther, K.P., and Hurkmans, E. (2018). EULAR recommendations for physical activity in people with inflammatory arthritis and osteoarthritis. Ann. Rheum. Dis. 77, 1251–1260.

Panush, R.S. (2019): Patient education: **Complementary** and alternative therapies for rheumatoid arthritis (Beyond the Basics). Avaliable at https:// www.uptodate.com/ contents/ complementary-and-alternative-therapies-for-rheumatoid-arthritis-beyond-the-basics. Accessed in july 26, 2023. At. 9:00 pm

Pradhan, E.K., Baumgarten, M., Langenberg, P., Handwerger, B., Gilpin, AK., Magyari, T., Hochberg, MC., & Berman, BM. (2007): Effect of Mindfulness-Based Stress Reduction in rheumatoid arthritis patients. Arthritis Rheum. 15;57(7):1134-42.

Pharm, R. (2023). Does Reflexology and Massage Help with Arthritis?. Available at. https://www.news-medical.net/health/Does-Reflexology-and-Massage-Help-with-Arthritis.aspx. Accessed on 15/3/2023.

Radu, A. & Bungau, S.G. (2021). Management of Rheumatoid Arthritis: An Overview, PubMed Central, NIH, 10(11): 2857**. doi: 10.3390/cells10112857**

Rahim, R.A., & Cheng, C.H. (2018): Self-reported symptoms of depression, anxiety and stress among patients with Rheumatoid Arthritis in a Malaysian rheumatology center - prevalence and correlates. Med J Malaysia Vol 73 No 4.PP. 226-232.

Romão, V.C. and Fonseca, J. E. (2021). Etiology and Risk Factors for Rheumatoid Arthritis: A State-of-the-Art Review, Front Med (Lausanne). 8: 689 69 8. doi: 10.3389/fmed.2021.689698

Schur, P.H & Gibofsky, A. (2023). Nonpharmacologic therapies for patients with rheumatoid arthritis, Wolters Kluwer, available at www.uptodate. com/ contents /nonpharmacologic-therapies-for-patients-with- rheumatoid -arthritis. Accessed in july 25, 2023. At. 7:00 pm

Senara, S.H., Wahed, W.Y., & Mabrouk, S.E. (2019): Importance of patient education in management of patients with rheumatoid arthritis: an intervention study. Egypt Rheumatol Rehabil;46:42-7.

Singh, P., & Chaturvedi, A. (2015): Complementary and alternative medicine in cancer pain management: A systematic review. Indian J Palliat Care ;21:105-15.

Slagter, L., Demyttenaere, K., Verschueren, P., and De Cock, D. (2022). The Effect of Meditation, Mindfulness, and Yoga in Patients with Rheumatoid Arthritis, J Pers Med., 12(11). doi: 10.3390/jpm12111905

Straub R., Cutolo M. (2018). Psychoneuroimmunology—developments in stress research. Wien Med Wochenschr. 168 (3–4):76–84. doi: 10.1007/s10354-017-0574-2.

Taha, N.M., & Ali, Z.H. (2011): Effect of Reflexology on Pain and Quality of Life in a Patient with Rheumatoid Arthritis. Life Science Journal. 2011; 8(2):357-365.

Uda, M., Hashimoto, M., Uozumi, R., and Torii, M. (2021). Factors associated with anxiety and depression in rheumatoid arthritis patients: a cross-sectional study, BMC, N.65. https:// doi. org/ 10. 1186/s42358-021-00231-2

Welch, A. (2023). What Is Reflexology? A Detailed Scientific Guide to This Type of Massage Therapy, available at https:// www. everydayhealth.com/integrative-health/reflexology/guide Accessed in july 25, 2023. At. 4:30 pm

WHO (2018). Chronic Rheumatic Conditions, availableonline: http://www.who.int/chp/topics/rheumatic/en/. Accessed in july 25, 2023. At. 5:00 pm

WHO (World Health Organization), (2023). Rheumatoid arthritis. Available at: https://www.who.int/news-room/fact-sheets/detail/rheumatoid-arthritis. Accessed on: 1/12/2023.

Yahya, M., Al-Jarash, R., and Omran, D. (2022). Determination The Relationships between Body Mass Index and Incidence of Rheumatoid Arthritis. HIV Nursing; 22(2): 1824-1832. doi.org/ 10.31838/ hiv 22.02.348. ISSN: 1474-7359.

Yakout, R., Seyam, N. and Eldesoky, H. (2022). Effect of Reflexology Foot Massage on Pain

intensity and Physical Functional Abilities Among Patients with Knee Osteoarthritis. Egyptian Journal of Nursing & Health Sciences (EJNHS). Vol.3, No.1. ISSN 2682-2563.

Yu, F., Chen, H., Li, Q., Tao, M., Jin, Z., Geng, L., and Sun, L. (2023). Secular trend of mortality and incidence of rheumatoid arthritis in global ,1990–2019: an age period cohort analysis and joinpoint analysis. BMC Pulmonary Medicine. https:// doi. org/ 10. 1186/ s12890-023-02594-2.

Zangi, H.A., Ndosi, M., Adams, J., Andersen, L., Bode, C., Boström, C., van Eijk-Hustings, Y., Gossec, L., Korandová, J., Mendes, G., Niedermann, K., Primdahl , J., Stoffer, M., Voshaar, M., and van Tubergen, A. (2015): EULAR recommendations for patient education for people with inflammatory arthritis. Ann Rheum Dis 74(6):954–962

Zhou, B. Wang, G., Hong, Y., Xu, S., Wang, J., Yu, H., Liu, Y., and Yu, L. (2020). Mindfulness interventions for rheumatoid arthritis: A systematic review and meta-analysis. Complementary therapies in clinical practice. Volume 39, https:// doi. org/10.1016/j.ctcp.2020.101088