

Effect of Designing Dietary and Physical Activity Guidelines on Quality of Life among Rheumatoid Arthritis Patients

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Abstract:

Background: Dietary and physical activity guidelines help improve rheumatoid arthritis patients' quality of life. **Aim:** To evaluate the effect of dietary and physical activity guidelines on quality of life among rheumatoid arthritis patients. **Research design:** A quasi experimental (pre-posttest) research design was utilized. **Sample:** A purposeful sample of (60) patients of both sexes with rheumatoid arthritis with an age range from 20 to 65 years old. **Setting:** The study was conducted in the Department of Rheumatology, Rehabilitation and Physical Medicine at Main Assiut University Hospital. **Tools:** **Tool (I)** Patient's health needs assessment sheet. **Tool (II)** Disease Activity Scores. **Tool (III)** Rheumatoid Arthritis Quality of Life Questionnaire. **Results:** There was a statistically significant difference between total scores of Disease Activity Scores & Rheumatoid Arthritis Quality of Life Questionnaire in pre and post (3 months) after implementing the dietary and physical activity guidelines as the following (P value = 0.023*, 0.008**) respectively. **Conclusion:** Dietary and physical activity guidelines were effective in improving quality of life among rheumatoid arthritis patients. **Recommendation:** Concise illustration booklet should be available for patients with rheumatoid arthritis about dietary and physical activity guidelines.

Keywords: *Dietary and Physical Activity, Guidelines, Quality of life & Rheumatoid arthritis.*

Introduction:

Rheumatoid arthritis (RA) is a chronic inflammatory condition that mainly impacts the joints. Usually, it causes warm, swollen, and aching joints. After resting, pain and soreness frequently become worse. The wrist and hands are usually involved, and the same joints are frequently involved on both sides of the body. The condition may also impact the skin, eyes, lungs, heart, nerves, and blood, among other bodily organs (Nygaard & Firestein, 2020).

Although the exact etiology of rheumatoid arthritis is unknown, it is thought to be the result of both hereditary and environmental factors. The joints are attacked by the body's immune system, which is the underlying mechanism. The joint capsule becomes inflamed and thickened as a result. Moreover, the underlying bone and cartilage are affected. The majority of the time, a person's signs and symptoms are used to make the diagnosis. X-rays and laboratory tests can help confirm a diagnosis or rule out other conditions that present with similar symptoms (Rausch et al., 2018).

Reducing pain and inflammation and improving a person's general functioning are the objectives of treatment. By balancing rest and exercise, using splints and braces, or using assistive technologies,

this may be able to help. Non-Steroidal Anti-Inflammatory Drugs, steroids, and painkillers are routinely used to treat symptoms. It may be possible to employ disease-modifying anti-rheumatic medications (DMARDs), such as methotrexate and hydroxychloroquine, to attempt to reduce the disease's progression. When the disease does not respond to other treatments, biological DMARDs may be employed. They might, however, experience more negative effects. In some cases, joint replacement, repair, or fusion surgery may be beneficial (Hammond & Prior, 2021).

About 1% of the world's population and 0.6% of Americans suffer from RA. A 40 per 100,000 yearly incidence of RA has been calculated. Thus, there will be 40 new cases of RA diagnosed annually for every 100,000 people. RA frequently affects people between the ages of 30 and 50 when it first appears, although it can also affect a large number of children and elderly people. Women make up about 75 percent of RA patients (Ghorban et al., 2019).

The main determinant of the diet-arthritis relationship is weight. When a patient is overweight, some specialized anti-rheumatic medications, such as biologics, may not function as well. It could worsen the condition and delay remission. Patients who are

carrying more body weight, they should be able to lose the extra weight and maintain a healthy weight by combining healthy eating with regular exercise (Lu et al. 2014).

Rheumatoid arthritis may be made worse by inappropriate nutrition and physical inactivity. Actually, recent research has focused on the connection between RA and physical activity and nutrition. While medications are often necessary, also implementing these dietary and physical activity guidelines is equally important (Chehade et al., 2019).

Patients are advised to maintain a healthy weight by eating a diet that is balanced and healthy. Eating a variety of foods, balancing physical activity with food, maintaining weight, choosing a diet high in grains, vegetables and fruits, choosing a diet low in saturated fat and cholesterol, avoid processed foods, which frequently have high preservative and choosing a diet moderate in sugars are all advised. The more patients are in control of what they are eating, the better the overall benefits for health and arthritis. Suitable physical activity recommendations based on a physical active lifestyle, aerobic exercise, and resistance training are also encouraged (Philippou et al., 2021)

Diet described as "Mediterranean-style" includes poultry, fish, and small amounts of lean red meat, as well as a lot of fresh fruit and vegetables, a lot of olive oil, whole-grain cereals, peas, beans, nuts, and seeds. As a result, unsaturated fats like omega-3 fats are increased and saturated fats are decreased. Fish with darker flesh, including sardines, mackerel, herring, fresh tuna, salmon, and snapper, are higher in omega-3 polyunsaturated fatty acids. In addition to being good for the heart, fish oils have been shown to help reduce joint pain, stiffness and general inflammation. The duration of morning stiffness, the number of swollen and tender joints and joint pain has all been shown to be reduced by high-dose fish oil supplements (Forsyth et al., 2018).

Rheumatoid arthritis patients report a lower quality of life than the general population in a number of areas, including physical health, level of independence, surroundings, and personal views. In clinical and medical interventions, the quality of life is becoming more and more important. Few studies have looked at how each patient defines quality of life. Therefore, there is a need for a greater understanding of patients' experiences with quality of life in relation to having a chronic illness like rheumatoid arthritis (Giannini et al., 2022).

Operational definitions:

Quality of life: The World Health Organization defines quality of life as "an individual's perception of their position in life in the context of the culture and

value systems in which they live and in relation to their goals, expectations, standards and concerns (WHO, 2020).

Quality of life of rheumatoid arthritis:

Is a multidimensional concept that is used to describe how people perceive, feel about, and rate various aspects of their own lives, including their bodily health and functioning, mental and emotional health, social roles, and relationships (Heinimann et al., 2018).

Dietary guidelines: are modifications made to the way food is prepared, processed, and consumed in order to improve the bioavailability of micronutrients and decrease micronutrient deficiencies in it at the individual or household level (Gioia et al., 2020).

Dietary guidelines in rheumatoid arthritis; This diet includes less saturated fat, more omega-3 and monounsaturated fats (like olive oil), enough iron, calcium, and vitamin D, Mediterranean diet and eats a diet high in fruits, vegetables, whole grains and nuts. Avoid sugar-sweetened beverages, red and processed meat, trans fats and reduces salt (sodium chloride) in the diet (Philippou et al., 2021).

Physical activity guidelines:

Physical activity guidelines are actually a four-step process that involves challenging the patient to examine their lifestyle and find ways to take fewer steps and spend less time standing each day, determining ways to reduce the force that gets through their feet with each step (for example, by modifying their footwear or walking surfaces), identifying and avoiding activities that make their symptoms worse, and maintaining an active lifestyle.

Activity guidelines in rheumatoid arthritis based on an active daily lifestyle, aerobic exercise includes walking, swimming, riding bike, playing yoga and hand exercises (Leland, 2019).

Significance of the study:

In 2021, there were 240 cases of rheumatoid arthritis reported by the Department of Rheumatology, Rehabilitation, and Physical Medicine at Main Assiut University Hospital. A lack of exercise and poor nutrition may make rheumatoid arthritis worse. Guidelines for diet and exercise help rheumatoid arthritis patients live better. A change in diet that prioritizes lean proteins like fish and vegetables, fruits, whole grains, beans, and nuts is most important. Physical activity: Being active can really help patients feel better, have less pain and stiffness, have better joint flexibility and range of motion, and stay mobile. It consists of hand exercises, yoga, biking, swimming, and walking. So, this study was carried out to provide patients these informational dietary and physical activity guidelines.

Aim of the study was to: Evaluate the effect of dietary and physical activity guidelines on quality of life among rheumatoid arthritis patients.

Specific objectives;

- 1- Design dietary and physical activity guidelines.
- 2- Implement dietary and physical activity guidelines.
- 3- Evaluate the effect of dietary and physical activity guidelines on quality of life among rheumatoid arthritis patients.

Hypothesis:

The following research hypotheses were formulated to achieve the aims of this study:

Quality of life will be significantly improved among rheumatoid arthritis patients post implementation of the dietary and physical activity guidelines.

Methods:

Research design: A quasi-experimental research design (pre- and posttest) was used in this study. In this type of quasi-experiment, the researcher uses pre- and post-tests to pinpoint changes over time. In addition, a pre- and post-research study makes a number of observations over time for one participant group. The participants in this study were tested before the experimental manipulation, and then they were tested again three months later after the manipulation to assess any changes that had happened as a result of the application of the dietary and physical activity modification guidelines (Lauren, 2022).

Setting:

The study was conducted in the Department of Rheumatology, Rehabilitation and Physical Medicine at Main Assiut University Hospital. The Rheumatology unit consists of one floor, it consists of five rooms each room has five beds and there was the nursing room in this floor.

Sample:

The study recruited 60 patients with rheumatoid arthritis. The inclusion criteria were: adult patients of both sexes with rheumatoid arthritis, age range of 20 to 65 years, and admission to the Department of Rheumatology, Rehabilitation, and Physical Medicine at Main Assiut University Hospital.

The sample was 60 patients was selected by using the following equation according to (Steven, 2012)

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

N=total patient population size of 240 who admitted in Department of Rheumatology, Rehabilitation and Physical Medicine, Assiut University Hospital. During January 2021 to December 2021 by n=60 Z= confidence levels is 0.95.

Hence, a minimum of 60 measurements or surveys are required to have a 95% confidence level that the real value is within 5% of the measured or surveyed value.

Tools:

To accomplish the goals of this study, the researchers employed three tools to collect data:

Tool (I): Patient's health needs assessment sheet:

It was developed by the researchers based on the current national and international literature, with the following parts:

1st part: Demographic data: To assess the demographic data of patients with rheumatoid arthritis, it covered (6) items which are; age group, gender, residence, education level, occupation and length of hospital stay.

2nd part: Assessment of medical history & disease characteristics: it included (5) items which are; body mass index, surgical history, family history of arthritis, previous history of any autoimmune disease (Systemic lupus erythematosus, gout, psoriasis, herpes zoster) and time since diagnosis.

Tool (II): Disease Activity Scores (DAS28): It was developed by (Heijde et al., 1990) to indicate the severity of rheumatoid arthritis disease activity at a given moment in time. DAS28 is a simplified version of DAS44 that evaluates just 28 joints. It does not include the ankles or joints in the feet. It is calculated based on several different factors, including lab results, patient feedback, and joint swelling and tenderness.

The DAS28 score is calculated using:

1. The number of swollen joints (out of the 28),
2. The number of tender joints (out of the 28),
3. The C reactive protein (CRP) or erythrocyte sedimentation rate (ESR) lab test results.
4. Answers to a patient's health assessment questionnaire.

A mathematical formula is used to calculate the overall score. DAS28 can range from 0 to 9.4.

Equations used:

$$\text{DAS28} = (0.56 * \text{sqr}(\text{TJC})) + (0.28 * \text{sqr}(\text{SJC})) + (0.7 * \ln(\text{ESR})) + (0.014 * \text{GH})$$

Scoring system of DAS 28:

| | |
|--------------------------|---------------------------|
| DAS28 < 2.6: | Remission |
| DAS28 >= 2.6 and <= 3.2: | Low Disease Activity |
| DAS28 > 3.2 and <= 5.1: | Moderate Disease Activity |
| DAS28 > 5.1: | High Disease Activity |

Tool: (III): The Rheumatoid Arthritis Quality of Life Questionnaire (RAQoL) was used to assess quality of life for patients with rheumatoid arthritis; it was developed by (Whalley et al., 1997). This scale contains 30 items that can only be answered with a yes or no. The RAQoL scores range from 0 to 30 and are the sum of all the individual item values; a lower number denotes a better quality of life.

Operational Design:

Technique for data collection: this study was carried out on three phases:

Phase(1): Preparatory phase:

The researchers reviewed the associated literatures of the current study, local and international, employing textbooks, papers, and scientific periodicals {Proudman et al., (2015), Khanna et al. (2017), Cutolo & Nikiphorou (2018), Goma et al., (2019), Philippou et al., (2021)}. The suggested study setting was examined for the flow rate of rheumatoid patients; this phase finished with the pilot study.

Content validity and reliability:

The validity of the content of the study tools was checked by 5 experts (3 professors in the field of Medical-Surgical Nursing and 2 professors in Rheumatology Medicine); they reviewed the tools for clarity, relevance, comprehensiveness, understanding, applicability, and ease of administration.

Pilot study:

A pilot study was conducted in July 2022 on 10 percent of the sample to evaluate the viability and applicability of the study methods in six patients. It also provided an estimate of the time needed to fill out the tools, and those patients were included in the main study as there was no modification.

Phase (2): Implementation phase:

- 1.Data were collected from the Department of Rheumatology, Rehabilitation, and Physical Medicine at Main Assiut University Hospital for 6 months during the period from July 2022 to December 2022.
- 2.The study was carried out during morning and afternoon shifts. The majority of patients were followed up at the outpatient clinic; some of them were followed up by telephone.
- 3.The researchers established a line of communication by introducing themselves, explaining the study's nature and goals to the selected patients who were willing to participate in the study, and having them complete an assessment sheet (tool I) to gather data about their demographics and medical history.
- 4.After this, the researchers assessed the severity of rheumatoid arthritis disease activity and quality of life by using the Disease Activity Score and the Rheumatoid Arthritis Quality of Life Questionnaire (tools II and III) (pretest).
- 5.Dietary and physical activity guidelines were developed and implemented based on patients' needs and their levels of understanding.
- 6.Patients were instructed to implement it for a period of three months, and a hard copy of dietary and physical activity guidelines was given to them.

Guidelines for dietary and physical activity:

Two interviews were conducted in order to deliver the guidelines. Each session took between 30 and 45 minutes, depending on the topic and the patient's

needs.

Planning of action:

- 1.Using straightforward Arabic language, the second interview began with a quick review of the previous one's discussions.
- 2.The objectives of the new interview were outlined at the end of each interview, along with a summary of the knowledge gained during the previous interview.
- 3.The patient's needs were taken into account when providing feedback and reinforcing the recommendations for changing one's diet and level of physical activity.
- 4.During the teaching, praising the interested patients was stressed to keep them motivated. Each patient received a copy of the booklet containing the guidelines for dietary and physical activity.

Dietary and physical activity guidelines:

- The researchers informed the patient about dietary guidelines, emphasizing the non-restrictive and anti-inflammatory properties of foods like vegetables, fruits, whole grains, beans, legumes, nuts, and lean proteins like fish. Additionally, researchers stressed the significance of foods to avoid (red meat, fried foods, fast foods, processed foods, salt, and sugar, fried or grilled foods).
- The patients received the following physical activity guidelines from the researchers: Walking, swimming, biking, playing yoga, and hand exercises are all examples of aerobic exercise used in physical activity guidelines for rheumatoid arthritis. Being active can actually help a patient maintain their mobility and lessen their pain and stiffness. For joints to remain as mobile as possible, physical activity is essential. Sports and exercise also have additional benefits. They improve the circulatory system, bones, and muscles (the heart and blood vessels).

Education techniques: patient characteristics and the content of the guidelines were taken into account when choosing the teaching techniques.

Teaching aids: videos, power point presentations, and booklet handouts were used as teaching tools during the targeted dietary and physical activity guidelines. Additionally, the researchers used images and diagrams to aid patients with learning difficulties in remembering the information they had learned.

Phase (3): Evaluation phase:

This was carried out in the outpatient rheumatology clinic three months after the initial patient meeting to determine the effectiveness of dietary and physical activity guidelines on the severity of disease and quality of life using tools II and III. Patients were instructed to maintain regular follow up for evaluation.

Administrative Design:

The Rheumatology, Rehabilitation, and Physical Medicine department at the Main Assiut University Hospital granted official permission for the study to be conducted.

Ethics approval:

The research proposal has received ethical approval from the nursing faculty's ethical committee. The study participants were not at risk while the research was being conducted. The investigation adhered to accepted ethical standards for clinical research. Oral consent was obtained from participants who were either study patients or guides after explaining the investigation's scope and objectives. There was

assurance of confidentiality and anonymity. Choosing not to participate or leaving the study without providing a reason was always an option for the study subject. The privacy of study participants was considered when gathering data.

Statistical design:

The data was revised, made ready for computer entry, coded, analyzed, and tabulated. The descriptive and correlation statistics (frequencies & percentages, mean & standard deviation, Pearson correlation, f-test, and one-way ANOVA test) between (pre and post) group were performed using a computer programme (SPSS version 26.0).

Results:

Table (1): Frequency & percentage distribution of the studied sample regarding demographic data (n= 60).

| Items | Study Group | |
|---------------------------------|--------------------|------|
| | No. (n=60) | % |
| Age group: | | |
| 20 to < 40 years | 16 | 26.7 |
| 40 to < 60 years | 35 | 58.3 |
| > 60 years | 9 | 15.0 |
| Mean ± SD | 46.1 ± 10.3 | |
| Gender: | | |
| Male | 3 | 5.0 |
| Female | 57 | 95.0 |
| Residence: | | |
| Urban | 5 | 8.3 |
| Rural | 55 | 91.7 |
| Level of education: | | |
| High education | 3 | 5.0 |
| Secondary school | 15 | 25.0 |
| Read and write | 30 | 50.0 |
| Illiterate | 12 | 20.0 |
| Occupation: | | |
| Working | 5 | 8.3 |
| Not working | 55 | 91.7 |
| Length of hospital stay: | | |
| 1 to 5 days | 43 | 71.7 |
| > 5 days | 17 | 28.3 |
| Mean ± SD | 4.6±1.4 | |
| Range | 3 – 7 | |

Table (2): Frequency & percentage distribution of the studied sample regarding medical data (n= 60).

| Items | Study Group | |
|---|--------------------|------|
| | (n=60) | % |
| Body Mass Index: | | |
| Under weight | 7 | 11.7 |
| Health weight | 37 | 61.7 |
| Overweight | 11 | 18.3 |
| Obese | 5 | 8.3 |
| Mean ± SD | 25.2 ± 4.1 | |
| Range | 17.9 – 35.0 | |
| Body Mass Index after 3 months: | | |
| Mean ± SD | 21.1 ± 3.7 | |
| Range | 17.1 – 30.1 | |
| Surgical history: | | |
| Yes | 12 | 20.0 |
| No | 48 | 80.0 |
| Family history of arthritis: | | |
| Yes | 15 | 25.0 |
| No | 45 | 75.0 |
| If Yes: | | |
| Parent | 1 | 1.7 |
| Sibling | 5 | 5.3 |
| Grand Parent | 9 | 15.0 |
| Child | 0 | 0.0 |
| No | 45 | 75.0 |
| Previous history of any autoimmune disease | | |
| Systemic lupus erythematosus | 0 | 0.0 |
| Gout | 2 | 3.3 |
| Psoriasis | 2 | 3.3 |
| Herpes zoster | 7 | 11.7 |
| No | 49 | 81.7 |
| Time since diagnosis: | | |
| 1 to 10 years | 37 | 61.7 |
| > 10 years | 23 | 38.3 |
| Mean ± SD | 8.6 ± 4.2 | |
| Range | 1 – 20 | |

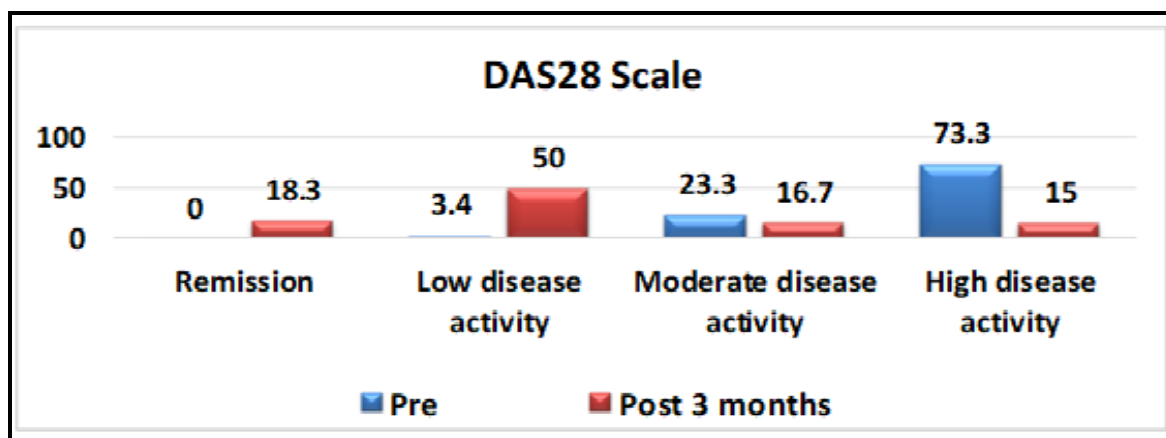


Figure (1): Study participants disease activity scores throughout study period n=60

Table (3): Comparison between quality of life scores before and after 3 month of guidelines implementation among study participants n= 60

| Items | Study Group | | F-test | P-value |
|-----------|-------------|---------------|---------|---------|
| | Pre | Post 3 months | | |
| Mean ± SD | 24.1±2.5 | 15.1 ± 4.5 | 178.171 | 0.008** |
| Range | 18 – 30 | 3 – 24 | | |

* $P < 0.05$ ** $P < 0.01$ *** $P < 0.001$ One way ANOVA

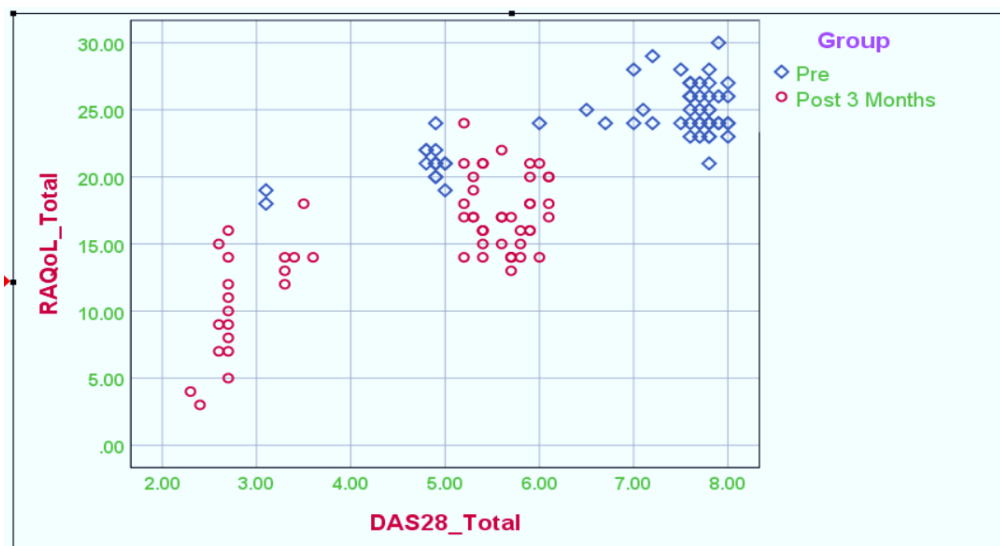


Figure (2): Relation between patients’ Disease Activity Score and Rheumatoid Arthritis Quality of Life Questionnaire

Table (4): Relationship between patients’ Disease Activity Scores and demographic characteristics of patients:

| Demographic data | Disease Activity Scores | | | |
|--------------------|-------------------------|-----------|---------------|-----------|
| | Pre | | Post 3 months | |
| | F-test | P-value | F-test | P-value |
| Age | 1.832 | 0.078 | 0.813 | 0.534 |
| Gender | 2.189 | 0.017* | 1.894 | 0.031* |
| Residence | 16.824 | 0.001*** | 2.791 | 0.037* |
| Level of education | 1.547 | 0.073 | 1.213 | 0.124 |
| Occupation | 5.483 | 0.001 *** | 4.984 | 0.001 *** |
| Hospital residence | 0.803 | 0.349 | 0.627 | 0.634 |

* $P < 0.05$ ** $P < 0.01$ *** $P < 0.001$ One way ANOVA

Table (5): Relationship between patients’ Rheumatoid Arthritis Quality of Life Questionnaire Scale and demographic characteristics:

| Demographic data | Rheumatoid Arthritis Quality of Life Questionnaire Scale | | | |
|--------------------|--|-----------|---------------|-----------|
| | Pre | | Post 3 months | |
| | F-test | P-value | F-test | P-value |
| Age | 0.894 | 0.516 | 1.114 | 0.314 |
| Gender | 0.365 | 0.970 | 1.511 | 0.134 |
| Residence | 7.274 | 0.001 *** | 2.368 | 0.011* |
| Level of education | 1.201 | 0.310 | 2.050 | 0.028* |
| Occupation | 1.861 | 0.065 | 3.711 | 0.001 *** |
| Hospital residence | 0.767 | 0.680 | 0.962 | 0.520 |

* $P < 0.05$ ** $P < 0.01$ *** $P < 0.001$ One way ANOVA

Table (1): Reveals that the highest percentage of the studied sample (95 %) were females, aged between 40 and less than 60 years (58.3%), (91.7%) were not working, (50%) could read and write, and (91.7%) were living in rural areas.

Table (2): Shows that the majority of the studied sample had a healthy weight (61.7%), no surgical history (80%), no family history of arthritis (75%), and no prior history of any autoimmune disease (81.7%). In addition, 61.7 percent of the sample's disease had begun between one and ten years prior.

Figure (1): Shows that there was a statistically significant difference between patients' Disease Activity Scores pre-post-application of the dietary and physical activity guidelines (pre & after 3 months) P value = 0.023*.

Table (3): Illustrates that there was a highly statistically significant difference between patient's Rheumatoid Arthritis Quality of Life Questionnaire pre-post-application of the dietary and physical activity guidelines (pre & after 3 months) P value = 0.008**.

Figure (2): Illustrates that there is positive Pearson correlation coefficient (r) between patients' Disease Activity Scores and Rheumatoid Arthritis Quality of Life Questionnaire (P value = 0.001 ***, r= 0.843**).

Table (4): Shows that gender & residence and occupation were an effective factor at the patients' Disease Activity Scale scores.

Table (5): Shows that residence and occupation were an effective factor at the patients' Rheumatoid Arthritis Quality of Life Questionnaire Scale scores.

Discussion:

The current study investigated the effect of designing dietary and physical activity guidelines on quality of life among patients with rheumatoid arthritis.

The findings of the current study's analysis of the demographic characteristics of the studied patients showed that the majority of them were between the ages of forty and less than sixty. This outcome could be explained by the fact that rheumatoid arthritis symptoms typically appear between the ages of 40 and 60. This finding is consistent with that of **Innala et al. (2014)**, who found that the majority of the studied patients were under the age of fifty-eight.

The present study conducted that; the majority of the studied patients were females. This result could be explained by the fact that women are two to three times more likely than men to develop rheumatoid arthritis. According to **Strait et al. (2019)**, the majority of the study group was male, which is contrary to the study's findings.

In the present study, it was found that the majority of the studied patients could read and write, were not

workers, and lived in rural areas, which was in line with **Bajraktari et al. (2014)** who reported that the largest number of them had completed secondary education, most of them originated from rural areas, were farmers by vocation, and were housewives.

Regarding hospital length of stay, it was found that the highest percentages of the studied patients stayed for less than 5 days, which was contrary to the findings of **Iyer et al. (2020)**, who reported that most of the patients in the study stayed in the hospital for 17.1 days on average.

Regarding the assessment of patient medical data, the findings of the current study showed that more than half of the studied patients (37 out of 60 cases) were of a healthy weight, which was contrary to the findings of **Qin et al. (2015)**, who claimed that the majority of the studied patients were obese.

The majority of the patients in the current study had no history of surgery, no family history of arthritis, and no prior history of an autoimmune disease, which contradicted **Deane & Holers' (2019)** explanation that there could be environmental or genetic risk factors for RA even in the absence of detectable systemic autoimmunity in the blood.

The results of the present study illustrated that more than half of the studied patients were diagnosed with rheumatoid arthritis less than ten years ago, which was contradictory to **Ziade et al. (2021)**, which revealed that the average time since diagnosis was 1.9 years.

As regards to the Disease Activity Score in 28 Joints (DAS28) pre-post application of the dietary and physical activity guidelines, the current study demonstrated that there was a reduction of high disease activity, achieving remission, and low disease activity among patients with rheumatoid arthritis (pre and after 3 months). This was comparable to the findings of the study by **Smolen & Aletaha (2018)**, who claimed to have achieved remission or low disease activity within six months and a reduction in disease activity of at least fifty percent within three months.

According to the study findings, there was a statistically significant difference between patients' DAS28 scores pre- and post-application of the dietary and physical activity guidelines (pre- and post-3 months). This is similar to the study conducted by **Romao et al. (2015)**, who reported a statistically significant difference between patients' DAS28 scores after 6 months.

The results of the present study illustrated that there was a highly statistically significant difference between patients' RAQoL scores pre- and post-application of the dietary and physical activity guidelines (pre- and post-3 months). This result

coincides with that of Goma et al. (2019), which revealed that there was a highly statistically significant difference between patients' RAQoL.

The results of the present study revealed that there is a positive Pearson correlation coefficient (r) between patients' DAS28 Scale and RAQoL Scale pre- and post-application of the dietary and physical activity guidelines (pre- and post-3 months). **This result may be due to the fact** that the DAS28 scale, which measures the severity of rheumatoid arthritis disease activity, has an effect on the RAQoL scale, which determines the effect rheumatoid arthritis has on a patient's quality of life. Decreasing the severity of rheumatoid arthritis disease makes the quality of life better. This result agrees with Garip et al. (2011), which revealed that RAQoL had linear relations at high levels with DAS28.

The present study revealed a relationship between gender, residence, occupation, and total score on the DAS28 Scale. **This could be due to the fact** that, despite the fact that most patients lived in rural areas, nowadays there is good network availability, and they have good access to new technology from which they can gain a lot of information regarding dietary and physical activity guidelines and what should be done to improve their quality of life. This result disagrees with Duarte et al.'s (2019) study, Interpretation of DAS28 and its components in the assessment of inflammatory and non-inflammatory aspects of rheumatoid arthritis, which found an association between DAS28 and all participant groups.

The present study revealed a relation between residence, educational level, occupation, and patients' RAQoL scale after implementation of dietary and physical activity guidelines. **This may be due to** the fact that people's alertness about the importance of being knowledgeable and what should be done to maintain or enhance their health increases with their educational level and occupation. This result disagrees with Williams et al. (2018), which found an association between the RAQoL and all patient characteristics.

Conclusion:

Based on the results of the present study, it can be concluded that the DAS score and quality of life have improved significantly after application of the dietary and physical activity guidelines.

Recommendations:

The following recommendation was made in light of the study's findings: -

Patients with rheumatoid arthritis should have access to a concise illustration booklet for dietary and physical activity guidelines.

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