

## Effect of Reflexology on the Severity of Foot Pain and Quality of Life on Patients with Rheumatoid Arthritis

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### Abstract

Patients with rheumatoid arthritis face considerable physical, social and emotional disabilities. In this chronic disease, for which a cure is not yet available, improving patients' quality of life and reduce foot pain is of the best concern. The loss of function due to the disease also leads to poor quality of life. **The aim of this study** was to evaluate the effect of reflexology on the severity of foot pain and quality of life on patients with rheumatoid arthritis. **Design:** a quasi experimental research design was utilized in this study. **Subjects:** a purposive sample of 60 adult patients of both genders diagnosed with rheumatoid arthritis were included in this study. **Setting:** data were collected from the Rheumatology department and outpatient clinics at Al Qasr Al Aini Hospital, affiliated to Cairo University. **Data collection tools:** three tools were used for data collection (1) A structured interview questionnaire sheet, which included (a) demographic data, (b) patients medical history, (2) Patient's Rheumatoid Arthritis Quality of Life questionnaire and (3) The Foot Pain Disability Questionnaire. **Results:** there was a highly statistical significant differences between pre, immediate post and three months follow up after implementation of foot reflexology intervention among the studied patients' regarding severity of foot pain and quality of life. **Conclusion:** Foot reflexology applied to rheumatoid arthritis patients has a positive effect on reducing their foot pain and improving their quality of life as a complementary and alternative therapy, and these positive effects are not affected by patient's age and duration of illness. **Recommendation:** Foot reflexology should be taken into consideration as a complementary modality beside rheumatoid arthritis drugs prescribed for subgroup of patients.

**Keywords:** Reflexology, Rheumatoid arthritis, Quality of life, Foot pain.

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### I. Introduction

Rheumatoid arthritis (RA) is a chronic, idiopathic, systemic, inflammatory, autoimmune disease characterized by pain in the joints and swelling, loss of function in the joints, morning stiffness and sleep deprivation as well as fatigue accompanying these states. The loss of function due to the disease also leads to poor quality of life. Depending on the prognosis, physical deformities and unbearable pain may become prominent over time. Pain causes poor quality sleep; furthermore, patients complain about fatigue not only because of their disease but also because of sleep deprivation (Bakir, Baglama, & Gursoy, 2018).

The physical disability caused by RA is usually detected clinically; however, the psychological and social morbidities can be easily missed by the clinician. Patients with RA report reduced QOL in several aspects, such as level of independence, physical health, environment, and personal beliefs, compared with the healthy population (Intriago, Maldonado, Cárdenas, & Rios, 2019).

Quality of life (QOL) has become an important issue in health care, especially in the studies of chronic diseases. It is a concept incorporating all the factors that might impact on an individual's life. WHO defines health as 'a state of complete physical, mental and social well-being, and not merely the absence of disease and infirmity'? Quality of life is very often referred to in these terms. It is defined as individuals' perceptions 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 (Dar, Maqbool, & Javed, 2019).

The dissatisfaction with medical treatment methods, invasive procedures and the necessity of using daily analgesics as well as the toxic and harmful effects of drugs push patients to different quests for symptom management. Non-pharmacological methods such as reflexology, massage, hydrotherapy, therapeutic touch, acupuncture, music therapy have been used for symptom control and functional improvement in these patients (Cramp, 2019).

Complementary therapies and non-pharmacological interventions are noninvasive, simple and less expensive, and have less or no adverse effects compared with pharmacological remedies. Foot reflexology massage is one of the non-pharmacological techniques used in management of chronic conditions. Reflexology is defined as a systematic practice that focuses upon stimulating feet's reflex points that correspond to a specific body part (Shahdadi, Mansouri, & Bandani, 2017).

According to the hemodynamic theory, reflexology stimulation increases blood flow to the related organ or body part. The nerve impulse theory argues that reflexology stimulation enhances nervous connection to the corresponding body parts. According to the energy theory; organs and body parts are linked through electromagnetic fields and that these pathways are blocked in states of disease. Lactic acid theory defends that lactic acid accumulates on the soles of the feet in the form of crystals and reduces regular flow. Reflexology shows that the fusion of crystals promotes free circulation. With these features, reflexology becomes an appropriate alternative method for RA patients (Koraş & Karabulut, 2018).

The effectiveness of foot reflexology on anxiety, pain, stress, fatigue, physiological indices, QOL, shortening the length of mechanical ventilation weaning time and sleep quality has been extensively investigated by previous studies in different countries (El-Abd, 2018). However, researches which investigated the effect of this intervention on severity of foot pain and QOL in patients with RA are scarce. Therefore, this study was carried out to address this issue.

### **Significance of the Study:**

Rheumatoid Arthritis (RA) is an ongoing, progressive auto-immune disease that affects about 1% of the general population. The prevalence rate of RA in Egypt is not well documented. However, by extrapolation using the world wide reported prevalence of 1%, about 1% Egyptians may be affected. Moreover, about 15% of people with the disease become severely disabled. In addition, their life expectancy may be shortened due to possible life threatening complications. Therefore, the magnitude and severity of the disease are high. Since there is no cure for RA, early recognition and treatment are important to minimize joint damage and complications of the disease. The use of non pharmacological treatment modalities as reflexology may help in reduce pain and improve the quality of life of these patients.

### **Aim of the study:**

The aim of the study was to evaluate the effect of reflexology on the severity of foot pain and quality of life (QOL) for patients with rheumatoid arthritis through:

1. Assess the studied patients' clinical data
2. Implementing foot reflexology sessions for studied patients to improve quality of life and decrease foot pain sensation for patients with rheumatoid arthritis.
3. Evaluate the effect of implementing foot reflexology sessions on the severity of foot pain and quality of life for patients with rheumatoid arthritis.

### **Research Hypotheses:**

The researcher hypothesized that the QOL for patients with RA will demonstrate statistically significant improvement and decreased in foot pain sensation after application foot reflexology sessions as measured by tool (II&III).

## **II. Subjects and Methods**

- **Research design:** A quasi experimental research design was utilized in this study.

- **Setting:** This research study was carried out at the Rheumatology department and outpatient clinics at Al Qasr Al Aini University Hospital, affiliated to Cairo University. It is one of the largest educational University Hospitals in Egypt in this field, and it receives patients from all governorates of Egypt and other countries.

- **Subjects:** A purposive sample of 60 adult patients of both genders diagnosed with rheumatoid arthritis for at least 1 year without deformity of bones or destruction of joints was involved in this study from the above mentioned setting. They were selected according to the sensitivity analysis in relation to the number of patients exposed to RA within the year 2018 at the Al Qasr Al Aini University Hospital, affiliated to Cairo University according to the statistics department which affiliated to the setting with the following criteria.

### **Inclusion criteria:**

- Adult Patients of both genders diagnosed with rheumatoid arthritis for at least 1 year without deformity of bones or destruction of joints, who agree to participate in the study.
- Have severe foot pain as a result of rheumatoid arthritis.

**Exclusion criteria:**

- Patients with knee and foot wounds or surgery, cancer, osteoarthritis in late stage, and blood coagulation disorders such as hemophilia will be excluded from the study.
- In addition, those who are pregnant, severe anemia and any other chronic illness that may affect patient's QOL as diabetes, ischemic heart disease, chronic obstructive pulmonary disease, and stroke.
- Have mild or moderate foot pain as a result of rheumatoid arthritis.

**Tools of data collection:** Three tools were used:

**I. Tool (I): Structured Interviewing Questionnaire:** This tool was developed by the researcher in a simple Arabic language. It was developed after reviewing the most recent and relevant literature and included the following parts (Smeltzer, et al., 2019):

**I.1- The first part concerning with patient's demographic data:** which includes age, sex, level of education, marital status, occupation, place of residence, monthly income, and patient's habits as smoking. It composed of (8) closed ended question.

**I.2- The second part concerning with Patient's past and present medical history:** to identify past and present history of disease, duration of illness, current medications, investigation, diagnostic criteria, follow up visit, previous surgery, hospitalization, family history of the same disease and co-morbidity.

**II. Tool (II): Patient's Rheumatoid Arthritis Quality of Life (RAQOL) questionnaire:** which was adapted from Linde (2009); Maska, Anderson, & Michaud, (2011). It was modified in simple Arabic language. It is a disease specific measure relating only to participants with RA. This tool consists of 30 items with a yes/no response format, comprising statements concerning unfulfilled needs relating to social interaction (7 items), emotional well-being (8 items) and activities of daily living (15 items) relevant to participants with RA. The overall score is the sum of the individual item scores, with a lower score indicating better quality of life (range 0–30).

**Scoring system for tool II:** Rheumatoid arthritis quality of life (RAQOL) questionnaire was scored as the following: Yes = 1 grade and No = zero. The general patient's quality of life was classified into: good ( $\geq 60\%$  or  $\geq$  score 15-30) and poor ( $<60\%$  or a score 0 -  $< 29$ ) according to statistical analysis.

**III. Tool III: The Foot Pain Disability Questionnaire (FPDQ):** which was adapted from Garrow, et al., (2000); Muller, & Roddy, (2009). It was modified in simple Arabic language. This tool consists of 19 items, each with a three point Likert scale format. Within the FPDQ are four components, representing three constructs that reflect disabilities associated with foot pain: functional limitation (10 items), pain intensity (7 items) and a component concerned with personal appearance (2 items). The overall score is the sum of the individual item scores. A lower score indicates a lesser degree of pain felt by the patient.

**Scoring system for tool III:** Foot pain disability (FPDQ) questionnaire was scored as the following: None of the time = zero, On some days = 1 grade and On most / every days = 2 grades. The general patient's foot pain score (0-38).

**Administrative design:** An official permission was obtained from the director of Cairo University Hospital and Head of the rheumatology department at Al Qasr Al Aini University Hospital in which the study was conducted. A letter was issued to them from the faculty of nursing; Helwan University explains the aim of the study for obtaining the permission for data collection.

**Ethical consideration:** An approval was obtained from the study subjects individually and scientific ethical committee of the faculty of nursing at Helwan University using a written oral informed consent obtained from each participant prior to data collection. They will be assured that anonymity and confidentiality would be guaranteed and the right to withdraw from the study at any time. Ethics, values, culture and beliefs will be respected.

**Testing Validity and reliability:**

Content and face validity was conducted to determine whether the tool covers the aim. The tools were revised by a jury of 5 experts: professors of medical surgical nursing from faculty of nursing, Helwan University and professors of rheumatology from faculty of medicine, Cairo University. Modifications were made accordingly. To assess reliability, the study tool was tested by the pilot subjects at first session for calculating Cronbach's Alpha which was 0.927 for rheumatoid arthritis quality of life questionnaire and 0.985 for foot pain disability questionnaire.

**Pilot study:** A Pilot study was carried out with 10% (6 patients) of the study subjects under study to test the applicability, clarity and efficiency of the tools. The modifications were done for used tool, then final form was developed. Patients in the pilot study were replaced by another patients.

**Field work:**

- A written and oral informed consent was obtained from each participant prior to data collection after explanation aim of the study.

- An approval was obtained from a scientific ethical committee of the faculty of nursing at Helwan University.
- Data collection was started and completed within thirteen months from November (2018) until the end of December (2019).
- Testing the validity of the proposed tools using content and face validity added for testing the reliability.
- Purpose of the study was simply explained to the studied patients who agree to participate in the study prior to any data collection.
- The researcher was started to collect data from the studied patients before, immediate post six sessions of foot reflexology and 3 months follow up post implementation of foot reflexology.
- Two reflexology sessions were applied for each patient per week for three weeks.
- Data collection was done 2 days/week by the researcher in the morning and afternoon shifts.
- Patients' medical records were used to obtain sociodemographic characteristics, the past and present medical history.
- The study tools were filled in and completed by the researcher throughout three stages:
  - **First stage:** Assessment or preparatory phase (pre implementation of foot reflexology intervention) during this phase Structured interviewing questionnaire, Rheumatoid Arthritis Quality of Life (RAQOL) questionnaire and The Foot Pain Disability Questionnaire (FPDQ) were filled.
  - **Second stage:** Immediate post assessment stage (immediate post implementation of six foot reflexology intervention) during this phase Rheumatoid Arthritis Quality of Life (RAQOL) questionnaire and The Foot Pain Disability Questionnaire (FPDQ) were filled.
  - **Third stage:** follow up stage (follow up 3 months post implementation of foot reflexology intervention) during this phase Rheumatoid Arthritis Quality of Life (RAQOL) questionnaire and The Foot Pain Disability Questionnaire (FPDQ) were filled.
- The patients were filled the Structured interviewing questionnaire, Rheumatoid Arthritis Quality of Life (RAQOL) questionnaire and The Foot Pain Disability Questionnaire (FPDQ) in the presence of the researcher or it was filled by the researcher for illiterate patients.

#### **Procedure**

- The current study was conducted on three phases; preparatory, implementation and evaluation phases.

##### **1- Preparatory Phase:**

It involved construction and preparation of tool and testing its validity. Approvals were obtained from the administrative authorities of Cairo University Hospital. Before commencing the study, the researcher received practical training on how to apply foot reflexology by a reflexology specialist from 'The International Egyptian Center of Complementary Medicine (30 hours workshop) in Cairo' at April 2018 then participated in another workshop at April - 2018 (30 hours) for follow-up that the researcher master the technique.

The Rheumatology Department and Out Patients Clinics were informed about the protocol of care, obtaining a list of patients who admitted to the Rheumatology department, diagnosed with rheumatoid arthritis, and met the inclusion criteria. Patients who were agree to participate in the study were interviewed individually by the researcher to explain the nature and purpose of the current study.

A written and oral consent were obtained. The baseline data was collected from patient's file, which include data related to demographic characteristics, medical history. It took around 10 - 15 minutes to be completed for each participant. Then, it was ended by conduction of the pilot study.

##### **Implementation phase:**

Actual implementation was done to the study group who was agree to participate in the study. The study group constituted (60) patients, who was received foot reflexology sessions. The reflexology procedure was performed by the researcher. The steps of foot reflexology technique were adopted from (**Kunz & Kunz, 2007**).

A step-by-step procedure was followed uniformly to stimulate the most common reflexology areas as in reflexology maps. The patient was assisted to lie down in supine position with raising the head of the bed from 30 to 45 degrees. First, the researcher was removed any metal object (e.g. ring), washed and warmed his hands, and lubricated them with non-therapeutic baby oil or lavender oil or olive oil or orange oil to facilitate massage. Then, he administered general foot massage and reflexology massage to the participant. The researcher put four fingers on the dorsal aspect of the patient's foot and utilized the thumb to make rotational pressure on shoulder, neck, elbow, hip, knee, ankle, wrist and spinal column areas of the foot.

Regarding to the study group who received the reflexology sessions, the session was done within 45 - 60 minutes in specified reflex point on feet for six sessions, with continuous monitoring and close observation by the researcher. A foot reflexology therapy application protocol was developed to treat the patients

holistically. The conventional therapy for the study group of pharmacological management was followed during the research period.

### **3- Evaluation Phase:**

The researcher documented the Rheumatoid Arthritis Quality of Life (RAQOL) questionnaire and The Foot Pain Disability Questionnaire (FPDQ) pre, immediate post implementation of six foot reflexology sessions and 3 months follow up post implementation of foot reflexology intervention. Finally after six sessions of foot reflexology the mean of the data compared with pre, immediate post and 3 months follow up post implementation of foot reflexology intervention.

**Statistical analysis:** The collected data were organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 32, SPSS Inc. Chicago, IL, USA). For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, which describe a categorical set of data by frequency, percentage or proportion of each category, comparison between two groups and more was done using Chi-square test ( $\chi^2$ ). For comparison between means of two groups of parametric data of independent samples, student t-test was used. For comparison between means of two related groups (pre and post reflexology intervention) of parametric data, paired t-test was used. For comparison between more than two means of parametric data, F value of ANOVA test was calculated. Correlation between variables was evaluated using Pearson's correlation coefficient (r). Significance was adopted at  $p < 0.05$  for interpretation of results of tests of significance (Dawson, & Trapp, 2004).

Reliability of the questionnaire was assessed using Cronbach's alpha reliability coefficient. Cronbach's alpha reliability coefficient normally ranges between 0 and 1. Higher values of Cronbach's alpha (More than 0.7) denote acceptable reliability.

### **III. Results**

**Regarding sociodemographic characteristics of the studied patients, Table (1)** shows that, 86.7% of the studied patients were females, 13.3% were males. The mean  $\pm$  standard deviation values of age were  $48.68 \pm 5.59$  years old. 46.7% were illiterate, 28.3% had primary education while 25% had secondary level of education. 21.7% of the studied patients were employees, 13.3% were workers, 3.3% were technicians while 61.7% were not work (house wife). As regards marital status; 85% were married, 5.0% were divorced while 10% were widowed. Majority of the studied patients (86.7%) were from rural areas while 13.3% were from urban areas. Only 13.3% of the studied patients had sufficient income while 86.7% had insufficient income. Majority the studied patients (93.3%) were non smokers.

**Regarding Mean Rheumatoid Arthritis Quality of Life Scores among Studied Patients, Table (2)** shows that, mean rheumatoid arthritis quality of life scores among studied patients pre, immediate post, and three months follow up post implementation of foot reflexology intervention and the table demonstrate that, there is a highly statistically improvement in all quality of life sub items as physical / activities of daily living, emotional / psychological and social domains with P value (0.000) in comparison to the baseline by using F value and partial eta-squared test.

**Regarding Mean Disability Associated with Foot Pain Scores among Studied Patients, Table (3)** reveals that, mean disability associated with foot pain scores among studied patients pre, immediate post, and three months follow up post implementation of foot reflexology intervention and the table demonstrate that, there is a highly statistically improvement in all foot pain sub items as functional limitation, pain intensity and personal appearance with P value (0.000) in comparison to the baseline by using F value and partial eta-squared test.

**Regarding Correlation between Studied Patients Total Quality of Life Scores and Foot Pain Scores, Table (4)** indicated that, there was no statistically significant difference among studied patients regarding correlation between total scores of rheumatoid arthritis quality of life and total scores of foot pain disability pre, immediate post and 3 months follow up post implementation of foot reflexology intervention.

**Regarding Relations between Mean Rheumatoid Arthritis Quality of Life Score Levels of the Studied Patients and Their Socio-Demographic Data, Table (5)** indicated that, there was no statistically significant difference among studied patients regarding correlation between mean rheumatoid arthritis quality of life score levels and their socio-demographic data as gender, level of education and occupation pre, immediate post and 3 months follow up post implementation of foot reflexology intervention. But there was statistically significant difference among studied patients regarding correlation between mean rheumatoid arthritis quality of life score levels and age with P value (0.000\*) pre, immediate post and 3 months follow up post implementation of foot reflexology intervention.

**Table 1: Frequency Distribution of Socio-Demographic Characteristics of the Studied Patients (n=60)**

Items	The studied Patients (n=60)	
	N	%
<b>Gender:</b>		
Male	8	13.3
Female	52	86.7
<b>Age/yr:</b>		
40 - <50	41	68.3
≥50 - <60	17	28.3
≥ 60 -	2	3.3
<b>Mean ± SD</b>	<b>48.68± 5.59</b>	
<b>Level of education:</b>		
Illiterate	28	46.7
Primary	17	28.3
Secondary	15	25
<b>Occupation:</b>		
Employee	13	21.7
Worker	8	13.3
Technician	2	3.3
Not work	37	61.7
<b>Marital status:</b>		
Married	51	85
Divorce	3	5
Widow	6	10
<b>Residence:</b>		
Rural	52	86.7
Urban	8	13.3
<b>Income:</b>		
Sufficient	8	13.3
Insufficient	52	86.7
<b>Smoking:</b>		
Smoker	4	6.7
Non smoker	56	93.3
<b>Smoking amount:</b>		
One packet	4	6.7

**Table (2): Mean Rheumatoid Arthritis Quality of Life Scores among Studied Patients Pre, Immediate Post, and Three Months Follow up Post Implementation of Reflexology (n=60)**

Items/Variables	The studied Patients				
	Pre	Immediate post	3 months post	Test of significance	
	Range Mean ± SD	Range Mean ± SD	Range Mean ± SD	F value	P& ( $\eta_p^2$ )
Physical / activates of daily life domain	12.75±1.39	1.66±1.50	5.63±3.13	455.46	0.885 0.000*
Emotional/psychological domain	9.95±1.29	0.40±0.49	2.08±1.18	233.30	0.845 0.000*
Social domain	5.93±0.607	2.10±1.26	4.00±1.28	232.28	0.791 0.000*
Total quality of life	23.63±2.26	4.17±2.53	11.72±4.15	770.22	0.929 0.000*

(\*) Statistically significant at  $p \leq 0.05$ , F: repeated measure ANOVA,  $\bar{X}$ : mean, SD: standard deviation, ( $\eta_p^2$ ): partial eta-squared

**Table (3): Mean Disability Associated with Foot Pain Scores among Studied Patients Pre, Post, and Three Months Follow up Post Implementation of Reflexology (n=60)**

Items / Variables	The studied Patients			
	Functional limitation	Pain intensity	Personal appearance	Total pain scores
	Range Mean ± SD	Range Mean ± SD	Range Mean ± SD	Range Mean ± SD
Pre	18.50±2.62	11.65±1.83	4.22±0.61	35.95±4.76
Immediate post	12.97±1.31	8.20±0.94	2.82±0.72	23.98±2.13
Three months follow up	13.77±1.57	9.65±1.13	2.82±0.72	26.23±2.27

F value	203.33	104.19	149.53	281.35
P& ( $\eta_p^2$ )	0.775 0.000*	0.638 0.000*	0.717 0.000*	827 0.000*

(\*) Statistically significant at  $p \leq 0.05$ , F: repeated measure ANOVA, ( $\eta_p^2$ ): partial eta-squared

**Table (4): Correlation between Studied Patients Total Quality of Life Scores and Foot Pain Scores Pre, Immediate Post and 3 Months Follow up Post Implementation of reflexology (n= 60)**

Variables	Total score foot pain of the studied patients					
	Pre		Immediate post		3 months follow up	
	r	P	r	P	r	P
Total quality of life scores						
Pre	0.050	0.703				
post			0.117	0.374		
3 months					0.162	0.712

\*Significant (P<0.05)

**Table (5): Relations between Mean Rheumatoid Arthritis Quality of Life Score Levels of the Studied Patients and Their Socio-Demographic Data (n= 60)**

Items / Variables	Reported quality of life score levels of the studied patients (n=60)		
	Pre	Immediate post	3 months follow up
	Mean ±SD	Mean ±SD	Mean ±SD
<b>Gender:</b>			
Male	23.38±3.62	3.63±1.06	11.75±5.65
Female	23.67±2.03	4.25±2.69	11.71±3.94
F value	0.119	0.418	0.001
P value	0.732	0.520	.981
<b>Age/yrs:</b>			
40 - <50	23.19±2.19	3.93±2.34	10.46±3.89
≥50 - <60	24.53±2.27	3.94±1.95	14.12±.28
≥ 60 -	25.00±1.41	11.00±1.41	17.00±4.24
F value	2.602	9.774	7.794
P value	0.083	0.000	0.001*
<b>Level of education:</b>			
Illiterate	23.42±2.27	4.57±2.87	12.96±4.19
Primary	24.12±1.93	3.29±1.10	11.12±4.19
Secondary	23.45±2.64	4.40±2.89	10.07±3.47
F value	0.536	1.453	2.787
P value	0.588	0.243	0.070
<b>Occupation:</b>			
Employee	23.38±2.81	4.54±3.099	10.08±3.15
Worker	22.75±3.24	3.50±1.07	11.63±5.04
Technician	24.00±1.41	3.50±0.71	10.00±0.07
Not work	23.82±1.84	4.22±2.63	12.40±4.12
F value	0.625	0.318	1.140
P value	0.602	.812	0.341

\*Significant (P<0.05)

#### IV. Discussion

Rheumatoid arthritis (RA) is a chronic, inflammatory disease characterized by chronic inflammation of the synovial joints leading to progressive joint destruction. It has multi factorial etiology and progression, including a range of immune, neuroendocrine, and psychosocial variables. It is partially known how these variables interact with one another and how they ultimately influence the disease process (Sunar, et al., 2015).

RA is also associated with morbidity, chronic disability, and poor quality of life and the cost of care is huge. Non-pharmacologic and alternative lifestyle based treatments have become a common part of holistic health care. RA is one of the conditions purported to be improved by complementary therapies such as foot reflexology (Chou & Chu, 2018). Patients with RA require meticulous nursing interventions and a great deal of

learning needs.

**Sociodemographic characteristics of the studied patients:**

As regard to gender, the current study revealed that majority of the studied patients were females. This findings explained by the researcher's experience may be due to that as a result of the biological factors include sex hormones as estrogen and progesterone that are protective against chronic and inflammatory diseases such as RA in women during adolescence and persist through adulthood until women reach menopause. During this period the women become at higher risk for RA. This findings are also similar to **Svenda, et al., (2017)**, their study titled "Adaptation and validation of the Rheumatoid Arthritis Quality of Life (RAQOL) questionnaire for use in Serbia" reported that majority of their studied subjects were females.

As regards to age of the studied patients, the present study showed that, two thirds of the studied patients were aged between 40 to <50 years old. This findings could be due to that RA is more common during the fourth and fifth decades of life **Thomas, (2018)** entitled "Medical-Surgical Nursing". This findings supported by **Martinec, Pinjatela, & Balen, (2019)** which about "Quality of Life in Patients with Rheumatoid Arthritis- A Preliminary Study" found that, more than half of the studied patients were aged between 40 to 60 years old.

In relation to studied patients` educational level, results indicated that, the highest percentage (nearly half) of the studied patients were illiterate, while secondary education represent the lowest percentage. This results supported by **Dar, Maqbool, & Javed, (2019)** in India entitled as "Assessing Health Related Quality of Life (QOL) in Rheumatoid Arthritis" revealed that about half of studied patients were illiterate. However, this findings are disagreed with **Gok Metin & ozdemir, (2016)** in Turkey which investigated "The Effects of Aromatherapy Massage and Reflexology on Pain and Fatigue in Patients with Rheumatoid Arthritis: A Randomized Controlled Trial" stated that more than half of studied patients had College or university education.

In relation to marital status, the study findings showed that, majority of the studied patients were married. It is a well-known fact that marriage adds more responsibilities toward families and children as well as work which increase stressors and consequently the risk of RA. This findings could be due to majority of the studied patients were aged between 40-60 years old. This findings are consistent with the finding of **Goma, Abdel Razek, & Abdelbary, (2020)** in Egypt at Assuit University entitled as "Impact of rheumatoid arthritis on the quality of life and its relation to disease activity" which assess the QOL in RA and its association with disease activity, reported that the two thirds of their studied patients were married.

As regard to the occupation of the studied patients, the present study demonstrated that more than of the studied patients were housewives. This findings could be due to the physical in activity, this increases the risk for overweight which plays a significant role in the incidence of RA and mean age of studied patients were 49 years old. This findings are consistent with the findings of **Cramp, (2019)** in England who conducted study titled "The role of non-pharmacological interventions in the management of rheumatoid-arthritis-related fatigue" reported that the half of their studied patients were retired.

Regarding the residence, the present study finding revealed that majority of the studied patients were from urban areas. This findings explained by the researcher's experience may be attributed to as a result of living in areas with higher levels of particle air pollution and more stressors is associated with high risk for RA. This findings in the same line with **El-Abd, (2018)** in a master thesis entitled as "Effect of Foot Reflexology on Blood Pressure and Quality of Life among Patients with Essential Hypertension" at Banha University hospitals, who reported that two thirds of the studied patients and more than half of control group came from rural areas. As well as this results in accordance with **Goma, Abdel Razek, & Abdelbary, (2020)** in Egypt at Assuit University entitled as "Impact of rheumatoid arthritis on the quality of life and its relation to disease activity" which assess the QOL in RA and its association with disease activity, revealed that about two thirds of the studied patients came from urban areas.

In the present study majority of the studied patients reported that they had insufficient income monthly. This findings "from my point of view" may be due to there is no health insurance for the studied patients, majority of them are not working, low socioeconomic status and increasing the burdens and necessities of daily living. The findings are in harmony with **Goma, Abdel Razek, & Abdelbary, (2020)** found that more than half of the patients under study were in average economic status.

However, this findings are disagreed with **Bakir, Baglama, & Gursoy, (2018)** in Turkey who conducted study about "The effects of reflexology on pain and sleep deprivation in patients with rheumatoid arthritis: A randomized controlled trial" reported that majority of studied patients and control group had sufficient income monthly, health insurance system and stated that cost is a crucial issue in patient's compliance especially for patients with chronic disease as the treatment period could be lifelong. Healthcare expenditure could be a large portion of living expenses for patients suffering from chronic disease. Cost and income are two interrelated factors.

Regarding to habits like smoking, the result of the study revealed that majority of the studied patients were non smokers. This findings could be due to majority of the studied patients were females and smoking habit is not considered from familiar habits of the Egyptians females. This findings are consistent with the findings of **Rinke, et al., (2019)** in Norway, their study titled "Patient-reported fatigue in patients with rheumatoid arthritis



who commence biologic therapy: a longitudinal study" reported that less than one quarter of their studied patients were non smokers.

#### **Effect of reflexology on quality of life for the studied patients:**

The study findings lead to accepting this research hypothesis since they point to statistically significant increases in mean QOL scores and decreases mean foot pain scores after implementation of foot reflexology intervention. The improvements were also sustained during the follow-up phase.

The present study clarified that there were a highly statistically significant differences improvement between the three periods of follow up (pre, immediate post and 3 months follow up post implementation of foot reflexology) in all quality of life sub items as physical / activities of daily living, emotional / psychological and social domains with P value (0.000) in comparison to the baseline by using F value and partial eta-squared test.

According to the present study findings, the application of foot reflexology had a positive impact on the studied patient's QOL, and foot pain scores throughout intervention phases. These improvements may be attributed to the process of reflexology as it has been claimed that local finger pressure on reflex points on the feet can influence the function of corresponding target organs to promote homeostasis, relaxation, and sense of human touch. Moreover, the reduction of pain intensity by reflexology may improve patients' independent involvement in personal and self-care, as well as social functioning, with further positive impact on self-esteem and QOL. Therefore, it has been recommended as a promising complementary therapy which can improve quality of life in persons with rheumatoid arthritis, and other conditions (Lynn, 2010).

This study finding is also congruent with Taha & Ali, (2011), who revealed in their study that there was a significant in reducing their pain, improving their QOL and their total health status of RA patients after application of foot reflexology intervention. These positive impacts are not affected by patient's age and duration of illness. Therefore, reflexology must be considered as a complementary treatment modality in rheumatoid arthritis. It should be introduced to nursing and medical students, and in postgraduate staff development programs.

Similarly, the study result is in agreement with that of the Khan, Otter, & Springett, (2006) in United Kingdom who conducted their study to investigate the effect of reflexology on foot pain and QOL in a patient with rheumatoid arthritis. This study supported that foot reflexology can reduce foot pain score and improve QOL in patients with RA.

The study result is also in congruent with Sajadi & Ebrhimi-monfared, (2020), in Iran who investigated the effect of foot reflexology on constipation and QOL in patients with multiple sclerosis. In this study, participants were selected randomly divided into intervention (n=33) and control (n=30) groups. In the intervention group, foot reflexology was applied twice a week for six weeks (each session lasted about 30-40 min). The results of this study showed that severity of constipation and QOL sore were not significant between the two groups before intervention but after intervention, severity of constipation significantly decreased in the reflexology group. Nevertheless, QOL was improved in the reflexology group compared to the control group but was not significant.

Also, the study result is in agreement with Özdelikara & Tan, (2017) who conducted study entitled "The effect of reflexology on the quality of life with breast cancer patients ". The population of the study conducted comprised of 60 patients; 30 forming the control and 30 the experimental groups (30 experimental, 30 control). The results of the experiment demonstrated that the within-group symptom total score average of the patients in the experiment/treatment group decreased after the reflexology treatment; while the general health and functional total score averages in the treatment group increased; and the difference between pretest and posttest measurements was statistically significant (p = 0.000). Once symptom, functional, and general health total score averages from the posttest measurement are compared across treatment and control groups, symptom total score average of the patients in the treatment group turned out to be significantly lower than that of the patients in the control group (p = 0.001). In terms of functional and general health score averages, patients in the treatment group scored significantly higher than those in the control group (p = 0.000).

This findings also in the same line with El-Abd, (2018) in a master thesis entitled as "Effect of Foot Reflexology on Blood Pressure and Quality of Life among Patients with Essential Hypertension" at Banha University hospitals, who reported that There was no significant difference between the patients in both groups pre-interventional period regarding complaints, HR, BP & QOL to become highly significant difference throughout the (2<sup>nd</sup> & 3<sup>rd</sup> months). Foot reflexology had statistically significant positive effect on the complaints, HR, BP & QOL among the patients with essential HTN.

This findings are inconsistent with Poole, Gelan, & Murphy, (2007) who conducted an observational study to identify the effect of reflexology on knee joint pain and quality of life (QOL) in a patient with rheumatoid arthritis (RA). Using an observational case report, a 6-week course of reflexology treatments were given to a patient who had Rheumatoid Arthritis. Perceived pain and QOL were assessed, by using the knee

joint pain disability questionnaire (KJPDQ) and the Rheumatoid arthritis quality of life questionnaire (RAQOL). The RAQOL scores demonstrated no significant change throughout the duration of the investigation, suggested that the patient's QOL did not change during or at the end of the 6-week course of reflexology. Scores from the KJPDQ indicated reflexology was associated with a reduction in knee joint pain described by the subject. The result showed that reflexology had a valuable addition in the management of knee joint pain with Rheumatoid arthritis.

#### **Effect of reflexology on foot pain for the studied patients.**

The current study revealed that, disability associated with foot pain sub items as functional limitation, pain intensity and appearance, was dramatically improved after implementation of foot reflexology intervention with highly statistically significant differences (0.000) in comparison to the baseline by using f value and partial eta-squared. This finding may be attributed to the idea that massaging foot reflexology areas of the shoulder, neck, elbow, hip, knee, ankle, wrist and spinal column on the foot has a positive effect on reducing foot pain and improving QOL in patients with rheumatoid arthritis due to release of endorphins by brain cells.

This finding is in agreement with the results of **Berhe & Visvanath, (2014)**, who conducted a study entitled "A study to evaluate the effectiveness of foot massage therapy to reduce pain among selected rheumatoid arthritis patients in selected hospital at Bangalore" in India who reported that there was reduction in pain and physical disability after foot massage therapy among rheumatoid arthritis patients.

Also this findings are supported by **Khan, Otter, & Springett, (2006)** in United Kingdom who conducted their study entitled "The effects of reflexology on foot pain and quality of life in a patient with rheumatoid arthritis: A case report" reported that foot pain was reduced following reflexology treatments. Furthermore, **Taha & Ali, (2011)**, who revealed in their study that there was a significant in reducing their pain, improving their QOL and their total health status of RA patients after application of foot reflexology intervention.

On the other hand, this findings are consistent with **Gok Metin & ozdemir, (2016)** in Turkey which investigated "The Effects of Aromatherapy Massage and Reflexology on Pain and Fatigue in Patients with Rheumatoid Arthritis: A Randomized Controlled Trial" concluded that This study was intended to demonstrate the effectiveness of aromatherapy massage and reflexology as pain and fatigue relief in a real-world setting such as a rheumatology clinic, and to justify their introduction in the field of rheumatology. In this study, aromatherapy massage and reflexology significantly decreased pain and fatigue symptoms in patients with RA in the short term. Thus, the study confirms that aromatherapy massage and reflexology can be applied as non pharmacologic methods for managing pain and fatigue in subjects with RA. Based on the study results, aromatherapy massage and reflexology may be beneficial for RA patients.

Supporting our findings, **Supraja, (2013)**, Medical University in Chennai, India a master thesis entitled as "Effectiveness of Reflexology upon Joint Pain in Arthralgia Patients at Selected Old Age Homes" at Apollo College of Nursing, who revealed that the reflexology among joint pain was effective in treating the pain as a complementary and alternative therapy. This therapy can be given by the trained personnel in reflexology among arthralgia patients. By giving pressure at the reflex points on the foot it is effective in release of endorphins and blocks the pain pathways which cause effective pain relief in arthralgia patients.

Moreover supporting our findings, **Nisha, (2014)**, Medical University in Chennai, India a master thesis entitled as "Effectiveness of foot reflexology on pain among patients with osteoarthritis in selected villages at Tiruneelveli" at Sri.K.Ramachandran Naidu College of Nursing, who revealed that there was a significant association on the level of pain after application of foot reflexology in the experimental group. On the basis of the study, the researcher concluded that application of foot reflexology has a significant effect on pain. Foot reflexology is an effective, easy to apply and potentially risk free intervention.

Similarly, **Jahani, et al., (2018)**, who conducted their study in Iran entitled "The Effect of Reflexology in Intensity of Pain and Anxiety among Patients Suffering from Metastatic Cancer in Adults' Hematology Ward" who concluded that reflexology has a positive effect on mitigating pain and anxiety of metastatic cancer patients. Furthermore, as this method is economical, does not require any special instrument, and also lacks any side effects unlike pharmacotherapy, the use of this method is recommended to mitigate pain and anxiety in patients. In addition, considering the high incidence of cancer in the society as well as the debilitating effects of pain and anxiety on quality of life of patients with cancer and the complications mentioned for chemical drugs, the necessity of developing complementary medicine, and especially, reflexology to control pain in this group of patients is strongly felt.

In addition, **Karrouf et al., (2015)** who conducted their study entitiled "Impact of Reflexology on Mechanical Low Back Pain" at King Abdulaziz University, Jeddah, Saudi Arabia and reported that a non-significant variance between the study group and control group before intervention ( $p= 0.43$ ). While after intervention, there was a significant decline of pain in the study group compared to that of the control group ( $p=0.000$ ). Moreover, there was a very highly significant decrease in pain within the study group after treatment

( $p= 0.005$ ). They indicated that the reflexology technique was effective and safe to be applied for cases of mechanical low back pain.

Also, the study result is in agreement with **Tarrasch, et al., (2017)** who conducted their study at Tel-Aviv University, Tel-Aviv, Israel to evaluate the effects of reflexology treatment on quality of life, sleep disturbances, and fatigue in breast cancer patients during radiation therapy and indicate that reflexology may have a positive effect on fatigue, quality of sleep, pain, and quality of life in breast cancer patients during radiation therapy. Reflexology prevented the decline in quality of life and significantly ameliorated the fatigue and quality of sleep of these patients. An encouraging trend was also noted in amelioration of pain levels.

#### **Relations and correlation between variables under study**

The findings of the current study demonstrated that, there was no statistically significant difference among studied patients regarding correlation between total scores of rheumatoid arthritis quality of life and total scores of foot pain disability pre, immediate post and 3 months follow up post implementation of reflexology. This findings are supported by **Khan, Otter, & Springett, (2006)** in United Kingdom who conducted their study entitled "The effects of reflexology on foot pain and quality of life in a patient with rheumatoid arthritis: A case report "reported that there is no relation between reduction of foot pain and improving QOL in patients with RA.

But **Taha & Ali, (2011)**, who revealed in their study that there was a significant in reducing their pain, improving their QOL and their total health status of RA patients after application of foot reflexology intervention. Moreover, the reduction of pain intensity by reflexology may improve patients' independent involvement in personal and self-care, as well as social functioning, with further positive impact on self-esteem and QOL.

The present study revealed that, there was statistically significant difference among studied patients regarding correlation between mean rheumatoid arthritis quality of life score levels and age with P value ( $0.000^*$ ) pre, immediate post and 3 months follow up post implementation of reflexology intervention.

Patient's age and duration of illness may also be confounding factors affecting the impact of reflexology on QOL, and health status, and pain. **Taha & Ali, (2011)**, revealed that there was no effect of age or duration of illness on pain throughout the intervention phases. As regards QOL, it had statistically negative significant correlations with the duration of illness in both its aspects, and with patient's age in its importance aspect. This means that patient's QOL declines with increased age and duration of illness. Similarly, the scores of poor health status increase with age and duration of illness. The findings are quite plausible given the added effects of aging, and the progress of the disease severity with increased duration as previously reported (**Schneider, Manabile, & Tikly, (2008)** who conducted their study about " Social aspects of living with rheumatoid arthritis: a qualitative descriptive study in Soweto, South Africa - a low resource context, Health and Quality of Life Outcomes" and (**Collins, Qc AM, & Allbon, (2009)** who conducted their study about "Australian Institute of Health and Welfare 2009 A picture of rheumatoid arthritis in Australia". However, all these correlations did not change throughout the study phases, which means that patient's age and duration of illness were not confounding factors, and consequently the observed positive impact of the intervention was true. In other words, the intervention was successful in alleviating foot pain and improving QOL regardless patient age and duration of illness.

#### **V. Conclusion**

Based on the findings of this study, the following can be concluded: Foot reflexology applied to rheumatoid arthritis patients has a positive effect on reducing their foot pain and improving their QOL as a complementary and alternative therapy, and these positive effects are not affected by patient's age and duration of illness. Furthermore, Foot reflexology is an effective, easy to apply, economical, does not require any special instrument and potentially risk free intervention. Foot reflexology can be given by the trained personnel by giving pressure at the reflex points on the foot it is effective in release of endorphins and blocks the pain pathways which cause effective pain relief in RA patients.

#### **RECOMMENDATIONS**

Based upon the results of the current study, the following recommendations are suggested:

- Foot reflexology should be taken into consideration as a complementary modality beside rheumatoid arthritis drugs prescribed for subgroup of patients.
- The need for continuous educational programs for RA patients, health caregivers and their families about the disease, management, complications and complementary/ alternative therapies to alleviate from their complaints.
- Encouraging social agencies to enhance public awareness about reflexology through the media, publications, educational sessions and lectures.

- Reflexology should be introduced to nursing and medical students, and in postgraduate staff development programs.
- Periodic application of foot reflexology for RA patients and other chronic conditions to reduce intensity of pain and improve QOL.
- Training programs on how to apply foot reflexology for nurses are needed.
- Replication of the study on large sample selected from different geographical areas of Egypt is recommended for generalizing the study findings.
- Further research is recommended for the long-term effect of this treatment modality in terms of pain and disablement.
- Research may also extend to assess the effectiveness of as a useful modality in geriatric care and for patients with other chronic conditions.
- A comparative study can be conducted to assess the effectiveness of the alternative and complementary therapies.
- A Meta analysis study can be conducted to have the more valid information.
- The study can be conducted to assess the knowledge and practice of nurses with regard to foot reflexology for control of pain and QOL improvement in patients with RA and other chronic conditions.

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