Central European Journal of Nursing and Midwifery

*Cent Eur J Nurs Midw* 2017;8(3):682–690
doi: 10.15452/CEJNM.2017.08.0019

## ORIGINAL PAPER

# EFFECTIVENESS OF NON-PHARMACOLOGICAL NURSING INTERVENTION PROGRAM ON FEMALE PATIENTS WITH RHEUMATOID ARTHRITIS

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Received October 31, 2016; Accepted June 22, 2017. 

## Abstract

*Aim:* The aim of study was to evaluate the effectiveness of non-pharmacological nursing intervention programs on female patients with rheumatoid arthritis. *Design:* A quasi-experimental design was used in this study. *Methods:* Pre-post follow-up assessment of outcome was used in this study. The study was conducted in the inpatient and outpatient clinics of rheumatology and rehabilitation at Zagazig University Hospitals, Egypt. *Results:* There was a significant improvement in knowledge and practice of patients with RA in the post and follow-up phase of the program in the intervention group. In addition, the patients showed a high level of independence regarding ability to perform ADL. There was a statistically significant decrease in disability for patients in the intervention group. *Conclusion*: It is recommended that non-pharmacological intervention programs be implemented for patients with RA in different settings to help reduce the number of patients complaining of pain and disability.

**Keywords:** intervention program, non-pharmacological, rheumatoid arthritis.

## Introduction

The worldwide prevalence of clinical Rheumatoid Arthritis (RA) is believed to be about 1%. However, there is ample evidence that RA is a variable disease in time and place. In Egypt and Saudi Arabia, the prevalence of RA is 0.2– 0.5%. An earlier study from Iraq and a recent study from Kuwait have reported higher prevalences of 1% and 0.7% respectively. In Latin America, the prevalence ranges from 0.1% in Colombia to 0.5% in Peru (Chopra, Abdel-Nasser, 2008).

RA is a systemic progressive inflammatory autoimmune disease that affects the synovial lining of the peripheral joints, characterized by symmetrical inflammation leading to potentially deforming polyarthritis, and includes a wide spectrum of extra articular features. RA usually begins in the small joints of the hands and feet, spreading later to the larger joints (Solai, Mudigere, 2014).

Treatment for RA requires rectification of lifestyle with the use of non-conventional modalities. Increasing attention is now given to patient self-help in controlling the disease. One pain management strategy to consider is massage therapy, which may be of help for manually controlling symptoms in those diagnosed with RA. Thermotherapy, such as hot and cold water applications, is also a commonly used modality in treating RA. Additionally, physical activity is an essential part of the effective treatment of RA, with yoga being one of the best types of exercises for treatment of RA (Chawla et al., 2015).

Non-pharmacological therapy plays an important role in the successful treatment of RA. Exercise, a key component of non-pharmacological management, helps patients maintain mobility and function. RA patients are urged to participate in strengthening exercises to maintain joint function. Self management, including patient education, and cognitive and behavioral therapy, can also help patients manage RA symptoms, and improve both social and self-care capabilities (Dewing, Setter, Slusher, 2012).

The Arthritis Society (2015) classifies exercises into: Range of motion exercises, e.g., yoga, which help preserve normal joint movement, and relieve stiffness, and help patients to stay flexible, with basic stretching and gentle movements; strengthening exercises, e.g., using resistance bands to help preserve or increase muscle strength, as strong

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muscles can help support and protect joints affected by arthritis; and aerobic or endurance exercises, e.g., walking, cycling, dancing, yard work, and swimming, which improve cardiovascular fitness, help control weight, and improve overall function.

Therefore, every physician who assumes responsibility for the care of patients with RA should recognize the need to establish a program of symptomatic, constitutional, and supportive measures designed to relieve pain, prevent or minimize deformity, preserve or increase joint range and muscle strength, and maintain or improve functional capacity. Physical treatment consisting of heat, massage, and therapeutic exercise has proved valuable in attaining these goals. To be most effective, physical therapy must be combined with the other established principles of care, such as increased general rest, adequate local rest of the involved joints, avoidance of strain and irritation of the joints involved, intelligent use of splints, supports, shoes, and other medical agents (steroids), and surgical procedures as indicated (Sinkule, 2015).

Nurses have an important role in comprehensive interdisciplinary rehabilitation programs for RA sufferers. Nursing interventions represent those activities nurses perform to assist individuals or families to move toward a desired outcome. These interventions include the use of medications and non-pharmacological methods to achieve pain relief (Zyrianova et al., 2011).

Rheumatology nursing is a practice specialty, and contributes significantly to the management of patients with rheumatic musculoskeletal diseases. Rheumatology nursing role development follows a worldwide tendency among healthcare practitioners to provide a more proactive, evidence-based, and patient-preference-based care. European League Against Rheumatism (EULAR) recommendations have highlighted the need for further research about the contribution of rheumatology nursing to patient outcome in order to strengthen research results. A core set of relevant patient outcomes should be defined, and nursing domains, roles, and interventions should be clarified (Larsson et al., 2015).

Orem's self-care theory of nursing has been adopted as the theoretical framework for this study. Orem identifies three requisites for self-care: universal, developmental, and health deviation requisites. These requisites represent the individual's needs for self-care. Patients with chronic rheumatoid arthritis have therapeutic self-care demands, and health deviation self-care requisites. The desire to promote their own human functioning, plus assistance from healthcare professionals, place them in supportive nursing systems in order to satisfy their universal self-care requisites, and overcome the deficits which result from the process of the disease.

RA is a chronic disease with an age-related incidence. It is present in all ethnic populations and at all ages. RA is a progressive, destructive joint disease leading to reduced physical function, impaired quality of life, and an increased risk of co-morbidity and mortality if untreated (Innala et al., 2014). Moreover, numerous studies have investigated mortality among patients with RA. Most of these studies have demonstrated reduced life expectancy in RA patients compared with the general population (Radovits et al., 2010).

For people with arthritis, physical activities such as walking, bicycling, and swimming can have many benefits. These benefits include less pain and better physical function, mental health, and quality of life. Therefore, this study evaluated the effectiveness of non-pharmacological nursing intervention program on female patients with rheumatoid arthritis at Zagazig University Hospitals.

## Aim

The aim of the study was to evaluate the effectiveness of non-pharmacological nursing intervention programs on female patients with rheumatoid arthritis.

Objectives:

1. To assess patients' knowledge, ADL, disability, and practice regarding rheumatoid arthritis.
2. To design and implement a non-pharmacological nursing intervention program.
3. To evaluate the effects of a non-pharmacological nursing intervention program on knowledge, ADL, disability, and practice for female patients with RA.

## Methods

### *Design*

A quasi-experimental design was selected to achieve the aim of the study. The study was conducted in inpatient and outpatient clinics of rheumatology and rehabilitation at Zagazig University hospitals.

### *Sample*

A purposive sample including (80) patients with RA was recruited for this study. The sample was calculated by power and sample size, using Epi Info (Epidemiological Information system) Software Version 6. The data collected had a confidence level of 95%, and the power of the study was 80%. Patients were recruited according to the following

inclusion criteria: ambulatory and able to communicate; age range between 20–60 years; and willingness to participate in the study. Exclusion criteria included: pregnant women; patients who become severely ill and are admitted to hospital; patients who have fractures, have had surgery, or are at the end stage of chronic illness; and patients who have liver cirrhosis or cancer. Patients were then divided into two equal groups: an intervention group (40) to be the subjects of the intervention, and a control group (40) to receive routine hospital care.

***Data collection***

1. A structured interview questionnaire for patients, designed by the researchers in the light of relevant literatures, and written in basic Arabic, including the following sections:
   A. Demographic characteristics of patients, e.g., age, marital status, occupation, level of education, etc.)
   B. Medical history of patients, e.g., chronic illness, family history, and disease duration).
   C. Questions to assess patients' knowledge (Pre/ Post/ follow-up test) including questions about RA such as: definition, causes, signs and symptoms, joints affected by RA, diagnosis, and complications; questions about medication adherence; and questions about non-pharmacological methods: type, importance, duration, times of application. A correct answer was scored as 1 and an incorrect answer as 0. The scores were totalled and converted into a percentage score. A patient who achieved 60% or a higher total score was considered to have satisfactory knowledge, and those with lower scores, unsatisfactory knowledge.
   D. Questions to assess patients' practice, including questions about non-pharmacological methods: type, importance, duration, precautions of using the method, and times of application. For scoring, an item correctly answered was scored as 1, and incorrectly answered as 0. The scores were totalled and converted into a percentage score. A patient who achieved a total score of 60% or higher was considered to have satisfactory practice, while those with lower scores were deemed to have unsatisfactory practice.
2. The Lawton Instrumental Activities of Daily Living (IADL) Scale (Pre/ Post/ follow-up test), adopted from Lawton and Brody (1969). It was effective in identifying how a patient is currently functioning, and in identifying improvement or deterioration over time. It measures eight function domains: food preparation, housekeeping, shopping, ability to use a telephone, laundry, mode of transportation, responsibility for self-medication, and ability to deal with finances. Scoring: for each category, patients circle the item description that most closely resembles their highest functional level (either 0 or 1). The scores are totalled and converted into a percentage score. A patient who achieved a total score of 60% or higher was considered independent, and those with lower scores, dependent.
3. The Oswestry Disability Questionnaire, adopted from Fairbank and Pynsent, 2000 (Pre/ Post/ follow-up test). It was used to measure patients' permanent functional disability. It included 10 sections: pain intensity, personal care, lifting, walking, sitting, standing, sleeping, sex life, social life, and traveling. Interpretation of scores 0–20%: minimal disability; 21–40%: moderate disability; 41–60%: severe disability; 61–80%: crippled; 81–100%: patients either bed-bound, or exaggerating their symptoms.

*Content validity and reliability*

Once the tools were prepared, their face and content validity were ascertained by a panel of five experts in medical-surgical nursing, who revised the tools for clarity, relevance, applicability, comprehensiveness, and ease of implementation. The agreement percentage was between 80–100%. In light of their assessments, minor modifications were applied. The reliability of the IADL was assessed in the present study, showing excellent reliability, with a Cronbach's alpha coefficient r = 0.97, and Oswestry Disability questionnaire showing excellent reliability with a Cronbach's alpha coefficient r = 0.97.

*Description of the intervention*

The intervention program was designed to be practical in nature, addressing the knowledge and practice of patients with RA. The content of the program was developed after reviewing related literature (Isik et al., 2007; Miriovsky et al., 2010). The program contents covered the areas of RA definition, picture of a joint with RA, causes, risk factors, signs and symptoms, complications, treatment. The non-pharmacological intervention included: 1) Heat therapy, such as hot compresses and paraffin bath (precautions when applying them, duration, frequency); 2) Cold therapy, such as cold compresses (indications, precautions, duration, frequency); 3) Exercises such as stretching, strengthening exercises for joints, and aerobic

exercise such as walking (importance, duration, frequency); 4) Promotion of self-management and patient education. A booklet containing all the program materials and illustrations was prepared in basic Arabic.

Official permission was requested from the dean of Faculty of Nursing at Zagazig University, and the director of Zagazig University hospitals before conducting the study. Additional written consent was provided by the patients who participated, after receiving explanation of the purpose of the study. In addition, the aim of the study and the procedures were explained to them to obtain their cooperation in data collection. The study was implemented from June 2015 to April 2016. The data used were collected every day from the inpatient clinic of rheumatology and rehabilitation at Zagazig University Hospitals, between 9:00 am to 1:00 pm. Patients were put into groups, each group including 4–5 patients. The study consisted of theoretical and practical sections. The theoretical section was implemented in seven sessions, each lasting 30 minutes. It included definition of RA, causes, manifestations, risk factors, complications, and treatment. The practical section was implemented in eleven sessions, lasting 45 minutes. It included heat, cold therapy, and exercises. The total duration of the program was 44 weeks: eight weeks for the pre-program phase; four weeks for the theoretical section; and 16 weeks for the practical section. The collection of the follow-up data from the outpatient clinic took eight weeks, and took place three months after the intervention was completed. The program took the form of presentations and group discussions.

Patients received a program booklet, and an explanation from the researchers regarding its use. At the end of the program, its effectiveness was evaluated through a post-test performed for both groups, using the same data collection tools.

*Pilot study*

A pilot study for tools of data collection was carried out on eight female patients matching the inclusion criteria, in order to test for clarity, relevance, comprehensiveness, intelligibility, feasibility, applicability, and ease of implementation. The results of the data obtained from the pilot study helped in the modification of the tools; items were then corrected or added as necessary. Patients who participated in the pilot study were excluded from the main study sample.

### *Data analysis*

All collected data were organized, categorized, tabulated, entered, and analyzed using SPSS (Statistical Package for Social Sciences) version 20, which was applied to frequency tables and statistical significance. Associations were assessed by using the One-Sample Kolmogorov-Smirnov Test, ANOVA, the Monte Carlo and Fishers exact tests, and the Friedman test. Coefficient correlations (r) were used to detect the relationships between variables, significant if $p \leq 0.05$.

## Results

Table 1 and 2 show that most patients in the intervention group and all of the patients in the control group were housewives (91.7%; 100%).

**Table 1** Frequency and distribution of demographic characteristics for patients with RA in both intervention and control group (n = 72)

| Demographic characteristics | Intervention group (n = 36) n (%) | Control group (n = 36) n (%) | MCP |
|---|---|---|---|
| **Age in years** | | | |
| < 50 | 20 (55.6) | 19 (52.8) | |
| 50+ | 16 (44.4) | 17 (47.2) | 0.813 |
| range | 20–60 | 20–60 | |
| mean ± SD | 46.1 ± 11.3 | 46.4 ± 10.5 | |
| median | 47.0 | 48.5 | |
| **Residence** | | | |
| rural | 27 (75.0) | 27 (75.0) | 1.000 |
| urban | 9 (25.0) | 9 (25.0) | |
| **Marital status** | | | |
| married | 27 (75.0) | 29 (80.6) | |
| single | 2 (5.6) | 6 (16.7) | 0.070 |
| widow | 4 (11.1) | 0 (0.0) | |
| divorced | 3 (8.3) | 1 (2.8) | |
| **Level of education** | | | |
| illiterate | 25 (69.4) | 29 (80.6) | 0.103 |
| read and write | 8 (22.2) | 2 (5.6) | |
| intermediate level | 2 (5.6) | 5 (13.9) | |
| high level | 1 (2.8) | 0 (0.0) | |
| **Occupation** | | | |
| employee | 2 (5.6) | 0 (0.0) | 0.209 |
| housewife | 33 (91.7) | 36 (100.0) | |
| student | 1 (2.8) | 0 (0.0) | |
| **Living with** | | | |
| alone | 2 (5.6) | 2 (5.6) | 0.840 |
| family | 33 (91.7) | 32 (88.9) | |
| son | 1 (2.8) | 2 (5.6) | |
| **Treated at state expense** | | | 0.002* |
| no | 23 (63.9) | 10 (27.8) | |
| yes | 13 (36.1) | 26 (72.2) | |

*MCP – Monte Carlo exact probability; *p < 0.05 (significant)*

In addition, the majority of patients in both intervention and control groups lived with their family (91.7%; 88.9% respectively). The majority

of patients in both groups had no chronic illness (86.1%; 88.9% respectively). A minority of patients in both groups (19.4%; 16.7% respectively) had a family history of RA. The tables also show that 41.7% of patients in the intervention group and 33.3% of patients in the control group had disease duration of between five-ten years.

**Table 2** Frequency and distribution of medical history for patients with RA in both intervention and control group (n = 72)

| Medical history | Intervention group (n = 36) n (%) | Control group (n = 36) n (%) | MCP |
|---|---|---|---|
| **Chronic illness** | | | |
| Hypertension | 3 (8.3) | 4 (11.1) | 0.340 |
| Diabetes mellitus | 2 (5.6) | 0 (0.0) | |
| none | 31 (86.1) | 32 (88.9) | |
| **Family history of RA** | | | 0.759 |
| no | 29 (80.6) | 30 (83.3) | |
| yes | 7 (19.4) | 6 (16.7) | |
| **Disease duration** | | | |
| < 5 years | 10 (27.8) | 6 (16.7) | 0.221 |
| 5–10 | 15 (41.7) | 12 (33.3) | |
| > 10 years | 11 (30.6) | 18 (50.0) | |

*MCP – Monte Carlo exact probability*

Table 3 shows that patients in the intervention group had a satisfactory level of knowledge about RA, non-pharmacological methods, and management of complications in the post and follow-up phase. None of the patients in the control group had a satisfactory level of knowledge throughout the study phases. The table also shows a statistically significant difference in the intervention group throughout the study phases (p = 0.001).

Table 4 illustrates that all of the patients in the intervention group (100%) had a high level of independence regarding the ability to perform IADL in post and follow-up phase, with mean ± SD 6.9 ± 0.9, 7.4 ± 0.6, while only two of the patients in the control group (5.6%) had a level of independence in the follow-up phase, with mean ± SD 2.7 ± 1.2. The table shows a statistically significance difference in the intervention group (p = 0.001), while there was no statistical significance difference in control group throughout the study phases (p = 0.086).

Table 5 indicates that the majority of patients in the intervention group had a moderate level of disability post-program (83.3%), with mean ± SD 13.3 ± 3.4, while only one patient in the control group had moderate disability post-program (2.8%), with mean ± SD 26.1 ± 2.8. Half of the patients in the intervention group had minimal disability, and the other half had moderate disability in the follow-up phase, while all patients in the control group (100%) had severe disability in the follow-up phase. The table also clarifies that there was a statistically significant difference in the intervention group (p = 0.001), while there was no statistically significant difference in the control group throughout the study phases (p = 0.781).

**Table 3** Frequency and percentage distribution of patients' knowledge in both intervention and control groups throughout the study phases (n = 72)

| Knowledge | Intervention group (n = 36) | | | Control group (n = 36) | | |
|---|---|---|---|---|---|---|
| | Pre n (%) | Post n (%) | Follow Up n (%) | Pre n (%) | Post n (%) | Follow Up n (%) |
| **knowledge about RA** | | | | | | |
| satisfactory | 0 (0.0) | 36 (100.0) | 35 (97.2) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| p | | 0.001* | | | - | |
| **non pharmacological methods** | | | | | | |
| satisfactory | 0 (0.0) | 36 (100.0) | 21 (58.3) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| p | | 0.001* | | | - | |
| **complications management** | | | | | | |
| satisfactory | 0 (0.0) | 36 (100.0) | 18 (50.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| p | | 0.001* | | | - | |
| **overall knowledge** | | | | | | |
| satisfactory | 0 (0.0) | 36 (100.0) | 30 (83.3) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| p | | 0.001* | | | - | |

*p – Friedman test for repeated measures; *p < 0.05 (significant)*

**Table 4** Frequency and percentage distribution of patients' ability to perform IADL in both intervention and control group (n = 72)

| IADL | Intervention group (n = 36) | | | Control group (n = 36) | | |
|---|---|---|---|---|---|---|
| | Pre | Post | Follow Up | Pre | Post | Follow Up |
| | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) |
| dependent | 31 (86.1) | 0 (0.0) | 0 (0.0) | 31 (86.1) | 36 (100.0) | 34 (94.4) |
| independent | 5 (13.9) | 36 (100.0) | 36 (100.0) | 5 (13.9) | 0 (0.0) | 2 (5.6) |
| mean ± SD | 3.3 ± 1.7 | 6.9 ± 0.9 | 7.4 ± 0.6 | 2.9 ± 1.6 | 2.6 ± 0.9 | 2.7 ± 1.2 |
| p | | 0.001* | | | 0.086 | |

*p – Friedman test for repeated measures; *p < 0.05 (significant); SD – standard deviation*

**Table 5** Frequency and percentage distribution of patients with RA in both intervention and control groups regarding total disability score throughout the study phases (n = 72)

| Disability scale total | Study group (n = 36) | | | Control group (n = 36) | | |
|---|---|---|---|---|---|---|
| | Pre | Post | Follow Up | Pre | Post | Follow Up |
| | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) |
| minimal disability | 0 (0.0) | 6 (16.7) | 18 (50.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| moderate disability | 14 (38.9) | 30 (83.3) | 18 (50.0) | 10 (27.8) | 1 (2.8) | 0 (0.0) |
| severe disability | 22 (61.1) | 0 (0.0) | 0 (0.0) | 26 (72.2) | 35 (97.2) | 36 (100.0) |
| mean ± SD | 22.5 ± 4.8 | 13.3 ± 3.4 | 9.6 ± 3.9 | 22.8 ± 3.3 | 26.1 ± 2.8 | 25.2 ± 2.4 |
| p | | 0.001* | | | 0.781 | |

*p – Friedman test for repeated measures; *p < 0.05 (significant); SD – standard deviation*

Table 6 reveals that most of the patients in the intervention group had a satisfactory level of practice in the post and follow-up phases (97.2%; 94.4% respectively), with mean ± SD 7.8 ± 0.7, 7.8 ± 0.1, while only one patient in the control group (2.8%) post-program, and none in follow-up phase had a satisfactory level of practice, with mean ± SD 2.6 ± 1.2, 2.2 ± 0.7. The table also shows that there was a statistically significant difference in the intervention group (p = 0.001), while there was no statistically significant difference in the control group throughout the study phases (p = 0.854).

**Table 6** Frequency and percentage distribution of total practice obtained by patients with RA in intervention and control groups throughout the study phases (n = 72)

| Practice | Intervention group (n = 36) | | | Control group (n = 36) | | |
|---|---|---|---|---|---|---|
| | Pre | Post | Follow Up | Pre | Post | Follow Up |
| | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) |
| unsatisfactory | 35 (97.2) | 1 (2.8) | 2 (5.6) | 32 (88.9) | 35 (97.2) | 36 (100.0) |
| satisfactory | 1 (2.8) | 35 (97.2) | 34 (94.4) | 4 (11.1) | 1 (2.8) | 0 (0.0) |
| p | | 0.001* | | | 0.854 | |
| mean ± SD | 2.3 ± 1.4 | 7.8 ± 0.7 | 7.8 ± 1.0 | 3.1 ± 1.6 | 2.6 ± 1.2 | 2.2 ± 0.7 |

*p – Friedman test for repeated measures; *p < 0.05 (significant); SD – standard deviation*

## Discussion

The aim of the study was to evaluate the effectiveness of a non-pharmacological nursing intervention program on female patients with rheumatoid arthritis.

The majority of patients included in this study were married, housewives, and illiterate, meaning they spent most of their time at home, and had few hobbies. When they contracted a painful disabling disease like RA, they became dependent on their family members, especially their husbands and children.

Regarding living arrangements, the results of the current study indicated that the majority of patients in both intervention and control groups lived with their families. This finding was in accordance with Elsayed (2016), Ain Shams University, who found that the majority of study subjects lived with their families. This might be due to the strong family bonding between the members of families in Egyptian society.

With regard to medical history, the results of this study clarified that the majority of patients in both groups did not have any chronic illness. This finding disagreed with Kim et al. (2010), who found hypertension to be the most common disease in both groups.

Regarding family history, the study findings indicated that the minority of patients in both groups had a family history of RA. This finding is supported by Abd El-Maksoud (2008), Zagazig University, who found that a minority of a studied sample had a family history of RA. This might be because no specific pattern of inheritance exists, although there is a twofold increase in first-degree relatives of patients with RA.

Concerning disease duration, the results of the present study illustrated that fewer than half of the patients in the intervention group had disease duration of between five and ten years. This finding was in accordance with Ahmed (2009), Cairo University, who found that the majority of subjects studied had had arthritis for five to ten years. This finding contrasted with Ibrahim (2013), Benha University, who found that more than half of the studied subjects had had the disease for ten years or more. This might be because RA is a chronic progressive inflammatory disease that patients can adapt to.

The present study clarified that none of the patients in both groups had a satisfactory level of knowledge regarding RA, non-pharmacological methods, and management of complications pre-program. This could be explained by the fact that patients do not receive sufficient information from healthcare providers and/or that health professionals do not have time to provide them with sufficient information, and because, in addition, the majority of the studied patients were illiterate.

After implementation of the non-pharmacological nursing intervention program, the results of the study showed that there was a statistically significant difference in the mean score of knowledge in the intervention group between pre- and post- measures compared to the control group regarding RA, non-pharmacological methods, and management of complications. This finding agrees with Lorig, Konkol, Gonzales (1987) and Mullen et al. (1987), who found that patients' knowledge of RA and its management was significantly increased at four months after participation in an arthritis self-care education program.

The results of the present study indicate that the majority of patients in the intervention group had a high dependence level regarding ability to perform IADL pre-program, which significantly improved to a high independence level in post and follow-up phases of the program. This finding agrees with Ali et al. (2005), who found that independence was significantly lower in the initial assessment, but was significantly higher at the first and second follow-up.

This might indicate that patients need more motivation in order to continue following the recommendations of the education session. Mohamed (2008), Ain Shams University, also reported an improvement in the study group throughout the program phases regarding performance of daily activities.

Regarding level of disability, the results of the current study revealed that the majority of patients in the intervention group had a moderate level of disability post-program, and half had minimal disability in the follow-up phase. This finding agrees with Warsi et al. (2003), who found that an arthritis self-management education program led to a significant reduction in pain and disability. It is generally agreed that this program was a highly effective and relatively inexpensive way of providing patients with tools to better manage their arthritis.

Similarly, Hirsh, Lozada (2002), stated that randomized trials have shown that participants in arthritis self-management programs have reduced joint pain and disability, increased physical activity, and improved quality of life. While Dogu et al. (2013), found that patients reported pain diminishment, reduced disability, better walking performance, and improved symptoms.

It was observed that patients had an unsatisfactory level of practice of non-pharmacological methods, including exercises, paraffin baths, and cold and hot compresses pre-program, which significantly improved after patients' involvement in the education sessions. This finding was in the line with those of Ali et al. (2005), who reported that there was improvement in practice regarding joint protection and range of motion exercises after the program. This might be because patients required adequate instruction about practices to help minimize the occurrence of joint deformities.

These findings were also supported by Dogu et al. (2013), who observed that after both types of exercise there was a reduction in pain, an increase in hand functions and abilities, and a positive impact of such improvements on quality of life. Similarly, Buljina et al. (2001), illustrated that after a three-week-long physical therapy and exercise program, there was a decrease in pain and tenderness, and an increase in ROM, ADL and hand strength.

 

## Conclusion

In light of the current study results, the intervention program showed an improvement in patients' knowledge which reflected an improvement in their practice, either in post or follow-up phases. In addition, patients demonstrated a high level of independence regarding ability to perform IADL in post or follow-up phases. There was also a decrease in disability for patients in the intervention group, either in post or follow-up phases.

Recommendations: It is recommended that non-pharmacological intervention programs be applied to patients with RA in various settings to help decrease the number of patients reporting pain and disability. Replication of the current study on a larger probability sample is recommended to achieve generalization and wider utilization of the designed non-pharmacological nursing intervention program.

### *Limitation of the study*

Patients with joint deformities were unable to perform exercises during the intervention program, and so were excluded from the study.

## Ethical aspects and conflict of interest

Ethical issues were taken into consideration during all phases of the study. The ethical research considerations in this study included the following: research approval was obtained before the program was implemented, the objectives and the aims of the study were explained to the participants, the researcher ensured the confidentiality of participants, and participants participated voluntarily, with the right to withdraw from the study at any time without penalty.

## Author contribution

The first author contributed to the conception of the research, development of tools, statistical analysis, commentary on the tables, wrote the discussion and references, prepared the patient program, and helped with data collection. The second author contributed to the sample collection, provided the pre, post and follow-up test, applied the program to patients, and participated in the references collection, and analysis of data. The third author contributed to the translation of the tools and booklet into Arabic, participated in the references and data collection, and administered the program. The fourth author contributed to preparation of videos, color brochure and posters, participated in data collection, and administered the program.

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