

Effect of Foot Reflexology with Pharmacological Treatment on Pain and Quality of Life among Elderly Suffering from Osteoarthritis

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Abstract

Elderly with osteoarthritis face considerable physical, social and emotional disabilities. In this chronic disease, there is no cure, improving elderly's quality of life and reduce joint pain are the best concern. **The aim of the study** was to evaluate the effect of foot reflexology with pharmacological treatment on pain and quality of life among elderly suffering from osteoarthritis in Tanta city. **Study design:** Experimental study design was used in this study. **Study settings:** This study was conducted at outpatient clinic in Physical, Rheumatology and Rehabilitation Department at Tanta University Hospital. **Study subjects:** A simple randomized sample of 175 elderly with osteoarthritis was included in the study. **Study tools:** Four tools were used by the researcher. **Tool I:** Structured Interview Schedule: which composed of three parts. **Part I:** Socio-demographic characteristics of the elderly. **Part II:** Medical history of the elderly. **Part III:** Anthropometric physical parameters. **Tool II:** Western Ontario and McMaster (WOMAC) Osteoarthritis Index. **Tool III:** Quality of Life Questionnaire. **Tool IV:** Knowledge regarding pharmacological treatment of OA. **Results:** The total mean WOMAC index was significantly reduced. Meanwhile, the total quality of life score increased immediately post and three months after implementation of the intervention ($p < 0.005$). Elderly knowledge about pharmacological treatment significantly improved immediately post program implementation for both groups ($p < 0.005$). **Conclusion:** Foot reflexology appears to have a significantly remarkable effect on pain reduction and improved quality of life. Also, the educational program of pharmacological osteoarthritis treatment was effective and improved elderly's knowledge of both groups Therefore, Foot reflexology technique should be recommended in hospital protocols and gerontological nursing curriculum beside pharmacological treatment of osteoarthritis.

Key words: Foot Reflexology –pharmacological treatment – Pain- Quality of life- Osteoarthritis.

Introduction

Osteoarthritis (OA) is the most common musculoskeletal diseases (MSDs), affecting older people >65 years old ⁽²⁾. It affects nearly 303 million globally and about 32.5 million in the United States ⁽³⁾. Osteoarthritis is a classic age-related disorder. Although older age is the greatest risk factor for OA. Osteoarthritis isn't an inevitable consequence of aging process ⁽⁴⁾. Aging changes in the musculoskeletal system increase the propensity to OA, but the joints affected and the severity of the disease are most closely related to other OA risk factors such as joint injury, obesity, genetics, and anatomical factors that affect joint mechanics ⁽⁵⁾. Osteoarthritis can occur in any joint, but the joints more commonly affected by OA are the hands, feet, spine, and large weight-bearing joints, such as the knees and hips ⁽⁶⁾.

There are two types of osteoarthritis: primary and secondary. Primary osteoarthritis is a chronic degenerative disease that is related to aging but not caused by any existing diseases or injury. Secondary osteoarthritis tends to show up earlier in life, often due to a specific cause such as an injury, a job that requires kneeling or squatting for long time, diabetes, or obesity ⁽⁷⁾. The most common symptoms are joint pain and

stiffness. Usually, the symptoms progress slowly over years. Other symptoms may include joint swelling, decreased range of motion, when the back is affected, weakness or numbness of the arms and legs is existed ⁽⁸⁾.

Osteoarthritis can cause inactivity in older people, secondary to pain and loss of function, and ultimately damages the quality of life. ⁽⁹⁾. Osteoarthritis affects negatively on all context of quality of life, physically, in the form of pain, stiffness, and muscle weakness ⁽¹⁰⁾. Psychologically, in the form of fear and anxiety, depression from long duration of therapy, low self-esteem from dependence on others in doing self-activities, ineffective motivation, and financial constraints. Socially from absence from workplaces, social gatherings, and festivities ^(11,12).

There is no definite curative treatment of OA, but all options are directed toward the relieving of OA signs and symptoms. There are pharmacological and non-pharmacological treatments of OA ⁽¹³⁾. Pharmacological treatment has a lot of side effects. Therefore, the need for using non-pharmacological treatment is urgently important ⁽¹⁴⁾. Non-pharmacological treatment such as weight reduction, physical exercise, using an assistive device,

occupational therapy, and using complementary and alternative therapy⁽¹⁵⁾. Reflexology is called zone therapy, which is an alternative medicine involving the application of pressure to the feet and hands with specific thumb, finger, and hand techniques that produce an effect elsewhere in the body⁽¹⁶⁾. Reflexology helps flush out the toxins from the body and this is important for relaxation of the body. Reflexology is an effective means of healing the body by relieving stress and muscle tension⁽¹⁷⁾. Community health nurse plays different roles when caring for elderly with osteoarthritis, undergoing of foot reflexology as care provider, educators, collaborator, administrator, and researcher. Today, community health nurse focus on the holistic health care and it is believed that complementary therapies are part of holistic nursing as it is one of the cheapest method of enhancing the whole dimensions of the health promotion of the elderly^(11,12). It is expected from the community health nurses to develop nursing applications based on the complementary medicine in the elderly care. Also, community health nurse plays important role on promoting elderly compliance with the pharmacological method by giving them accurate, and concise knowledge about

their correct uses, side effect and instruction to prevent them⁽¹⁸⁾.

Aim of the Study

The aim of the study was to evaluate the effect of foot reflexology with pharmacological treatment on pain and quality of life among elderly suffering from osteoarthritis in Tanta city.

Research Hypothesis:

Foot reflexology with pharmacological treatment expect to positively reduce pain and improve quality of life more than pharmacological treatment only among elderly suffering from osteoarthritis.

Subjects and method

1- Subjects

Study design: Experimental research design was used in this study.

Study Setting: The study was conducted at outpatient clinic in Physical, Rheumatology and Rehabilitation Department at Tanta University Hospital.

Subjects: A simple randomized sample of 175 newly registered elderly with osteoarthritis.

Inclusion Criteria:

- 1- Subjects were eligible for inclusion in the study if their age was 60 years old or over and they gave oral informed consent.
- 2- Subjects who were free from vascular disease that affecting the lower extremities as calf pain, recent major

surgery, broken bones, sprains and bruises of the lower extremities.

- 3- Subjects who were free from mental or congenital health problems.

Subjects were classified into two groups.

- Group A was managed by foot reflexology with pharmacological treatment. This group included 105 elderly, classified into three equal subgroups of mild, moderate and severe degree of osteoarthritis and each subgroup included of 35 elderly.
- Group B was managed by pharmacological treatment only. It included 70 elderly.

Tool of data collection

Four tools were used by the researcher in order to obtain the necessary data.

Tool I: Structured Interview Schedule

This tool included three parts:

Part (1): Socio-demographic characteristics: such as age, sex, marital status, level of education, occupation, residence, and monthly income.

Part (2): Medical history: which included items related to onset, duration of the disease, family history, signs and symptoms, type of management (pharmacological & non – pharmacological treatment), drugs used (type, common side effects and their compliance) and degree of the disease.

Part (3): Anthropometric physical parameters: This part included measuring

of height (cm), weight (kg) and thigh circumference.

a)- The body mass index (BMI) was calculated according to Guidelines for Taiwan, (2011)⁽¹⁹⁾. It categorized into four levels: Underweight (BMI < 18.5), Ideal weight (BMI ≤ 18.5 - < 24.9), Overweight (BMI ≤ 25 - < 29.9) and Obese (BMI ≥ 30.0).

b)- Measuring Thigh Circumference: The thigh circumference was measured in cm and compared to the normal contralateral knee to determine the amount of quadriceps atrophy present⁽²⁰⁾.

Thigh circumference was categorized into three levels:

- Less than 2.5th percentile indicated quadriceps muscle atrophy, from 2.5th to 90th percentile indicated normal quadriceps muscle circumference and from 95th and more percentile indicated of more quadriceps muscle circumference.

Tool II: Western Ontario and McMaster (WOMAC) Osteoarthritis Index:

This index was developed and adopted by Bellamy, (2005)⁽²¹⁾. It is a self-reporting measure of physical disabilities and comprised of 24 questions in three subscales (WOMAC pain, stiffness and physical function disability). There were five alternatives on the Likert scale for each question. They were 0= no constraints

or difficulties, 1= slight, 2=moderate, 3=severe, 4= extreme constraints. The total score ranged from 0 to 96. **The total score was classified as the following:** No or slight constraints (0 - 24 degrees), moderate constraints (25 – < 48 degrees), severe constraints (48 – <72 degrees) and extreme constraints (72 – 96 degrees).

Tool III: Quality of Life Questionnaire

This tool was developed by McHorney C, Ware J & Sherbourne C, (1992) ⁽²²⁾ and composed of 36 questions (items) measuring physical and mental health status in relation to eight health domains: physical functioning, role limitations due to physical health, role limitations due to emotional health, vitality (energy/fatigue), emotional well-being, social functioning, pain and general health. **The total scoring system for elderly's quality of life was as follow:** Poor quality of life: <50% of the total score, fair quality of life: 50 - <75% of the total score and good quality of life: >75% of the total score.

Tool IV: Knowledge of the studied elderly regarding pharmacological treatment of OA

This tool was developed by the researcher based on the literature review ^(10,15,23,24). It consisted of 43 multiple choice questions that covered the following items: drug used, drug side effects, contraindications,

instructions of use and compliance of these drugs. **Knowledge score was calculated as follows:** the correct answer scored "one", the incorrect answer scored "zero". **The total scoring system for elderly's knowledge** was classified into: Poor knowledge: <50% (<21grades), Fair knowledge: 50 - 65% (21-27grades) and Good knowledge: >65% (> 27 grades) of the total knowledge score.

Method

The study was carried out as follows:

1-Obtaining approval was obtained from the Dean of the Faculty of Nursing to Manager of Physical, Rheumatology and Rehabilitation Center in Tanta University Hospital to conduct the study.

2- Ethical considerations: -

Subjects were informed about the confidentiality of the information and the nature of the study does not cause any harm or pain. Subjects were assured that the data collected will be used only for the purpose of the study. Oral consents of subjects were obtained to participate in the study after explaining the aim of the study.

3- Developing the study tools:

- The study tools I part (1&2) and tool IV were developed based on review of related literature^(10,15,23,24) but, tools (II, III & I part 3) were adopted and translated into Arabic language. Five expertise in the

field of community health nursing & physical, rheumatology and rehabilitation department of Tanta University Hospital tested the face and the content validity =95%.

4-Conducting pilot study:

- A pilot study was carried out on 20 elderly to test the tools for its clarity, organization, applicability of the study tools. The necessary modifications were done accordingly. The Pilot study was excluded from the study sample (Cronbach's Alpha which was 0.86.

5- Actual Study: was conducted through the following phases:

- I- Assessment phase:** in which the researcher used the pre designed study tools and interviewing each elderly of both groups (A&B) individually in the predetermined setting to assess knowledge regarding pharmacological treatment, pain level and quality of life for elderly suffering from osteoarthritis as a pre-intervention assessment.
- II- Planning phase:** Health education program about pharmacological treatment for both groups and foot reflexology intervention for the study group were organized. This phase included two parts.
 - A-Planning phase for foot reflexology program.**

The intervention program was be planned according to elderly's needs determined at the assessment phase with the assistance of professor of physical medicine, rheumatology & rehabilitation department as well as based on literature review.

B- Planning phase for health education program:

two health education sessions about medications and their compliance were administered for both groups.

The planning phase included the following steps:-

- 1-Setting the goal and objectives of intervention program:
- 2-Preparing and organizing the content of the intervention program which covered the reasons behind the application of the session.

III- Implementation phase:

- The researcher took a training sessions on reflexology technique by professor of Physical, Rheumatology and Rehabilitation department at Tanta University Hospital for a period of one month.
- The program was totally carried out by the researcher in the previously mentioned setting throughout the week according to the work schedule of the department.

Group A: Study Group

Foot reflexology technique: The researcher met the subjects three times per week for group A with severe osteoarthritis (36 sessions/3months) and 2 times per week for group A for those with mild and moderate degrees of osteoarthritis (24 sessions/3months). Health education program: The researcher gave two health education sessions during the application of the foot reflexology technique individually for each elderly.

The sessions of the reflexology technique consist of

A-Preparatory phase

Elderly sit in a supine position, and the nurse sit on a chair facing the elderly's feet, with the feet of the elderly at the nurse's chest level. Relaxation techniques (deep breathing exercise and using smoothing essential oils (lavender oil) was applied firstly to the both feet for 5 minutes.

B-Application phase of foot reflexology on elderly's feet.

This phase took 15 minutes for each foot. All reflex points that affect whether directly or in directly on reducing of pain and improve of function of the affected joints were stimulated with thumb pressing, finger pressing, rubbing, stroking and squeezing plus all the affected joints

with osteoarthritis such spinal column, shoulder and the elbow and solar plexus for 15 minutes. Finally, finishing the massage by lifting the foot under the ankle with an inactive hand, then pulling the static tissue in the ankle for a short seconds (15 seconds and then releasing it), as well as constant pressure on this area in circular movements from top to bottom and back.

GROUP B: Control Group

- The researcher divided the control group into 2 equal small subgroups
- (each group was about 35elderly). The researcher gave sessions of health education on consecutive days through the week. The total days for these sessions were 2 days for 2 subgroups of control group. . Each session took 60 minutes.
- The implementation phase was conducted on the second months of starting of the data collection and the total duration of the study was about 8-9 months from the first of February to the middle of January 2021 except period from 28 march to 16 July 2020 because it is period of corona ban on outpatient clinics .

Evaluation phase:

The Effects of the foot reflexology and educational program on elderly's pain and quality of life were done through comparing the pretest and posttest. This phase was done three times before,

immediately and three months after the intervention program implementation.

Results

Table (I) represents the distribution of the studied elderly according to their socio-demographic characteristics. This table showed that the mean age of the study group was 69.50 ± 6.829 years and 61.9% of them were females, while the mean age of the control was 68.63 ± 6.61 years and 72.9% of them were females, 41.9% of the study group were married and 30.5% were widow compared to 38.6% and 34.3% were married and widow respectively of the control group. About 25.7% of the study group and 31.4% of the control group were illiterates compared to 29.6% and 31.5% of the study and control groups respectively were university and postgraduates. 55.2% and 62.9% of the study and control groups respectively had adequate income. Nearly 41% and 35.7% of the study and control groups respectively lived with spouse, 57.1% and 60.0% of the study and control groups respectively came from rural area.

Table (II) represents the distribution of the studied elderly according to their medical history of OA, duration, affected joints, symptoms, OA degrees, body mass index and thigh circumference and. It

showed that 62.8%, 62.9% of the study and control groups respectively had OA from < 5 years, while 4.8% and 5.7% respectively had OA from 20 < 30 years. The majority of both the study and control groups (88.6% and 95.7% respectively) had knee joint OA. Concerning reported symptoms of OA, about 74.8%, 74.8 % and 72.4% of the study group complained of stiffness, increase pain during physical activities and limited physical movement respectively, followed by crackling sound by 64.8% and finally swelling by 51.4%. As regards the control group 80% and 74.3% of them reported limited physical movement and increased pain respectively, followed by joint stiffness by 68.6% and finally swelling by 44.3%. One third (33.3%, 33.3%, 33.3%) of the study group had mild, moderate, and severe degrees of the osteoarthritis. This is compared to 32.9%, 35.7% and 31.4% of the control group had mild, moderate, and severe degree respectively. Regarding the mean of BMI of the study group, it was 33.07 ± 4.98 , while it was $35.15 \pm 6.52 \text{ Kg}\backslash(\text{m})^2$ for the control group. More than half (53.3% and 57.1%) of the study and control groups respectively had thigh circumference $\geq 95^{\text{th}}$ percentile compared to 11.4% and 8.6% of the elderly from both groups respectively suffered from muscle atrophy.

Table (III) Shows that the mean total score of WOMAC of the study group was 60.65 ± 18.02 pre intervention, while it was 43.45 ± 13.6 immediately after implementation of the intervention. After three months of the implementation of the intervention, it was 45.64 ± 16.31 . There was a statistically significant improvement of the total WOMAC score from the baseline total score to the total score three months after implementation of intervention ($p=0.000$). For the control group, slightly more than half (51.4%) had moderate constraints, while 1.4% had mild or no constraints pre and three months after the implementation of the intervention with no a statistically significant difference from the base line assessment to the three months posttest ($p=0.135$). There was a statistically significant difference between the total mean of WOMAC index three months after implementation of the intervention between the study and control groups ($p= 0.021$).

Table (IV) represents mean and standard deviation of the study group in relation to degree of OA and WOMAC index subscale. There was a statistically significant improvement in the mean scores of elderly with mild, moderate and severe degrees of osteoarthritis pre, immediately post and three months after implementation

of the intervention regarding total WOMAC pain subscale, stiffness subscale and total physical function disabilities ($p<0.05$). Regarding the total WOMAC score, the great improvement was seen in mild degree with the mean of 34.58 ± 2.16 pre intervention, to 14.58 ± 1.84 immediately post and 17.33 ± 1.23 three months after intervention with statistically significant difference (pre, immediately post), (pre, three months) and immediately post , three months ($p=0.000$). The total WOMAC for the moderate degree changed from 57.10 ± 2.27 to 46 ± 2.02 three months posttest with a statistically significant difference from pre intervention to three months after implementation of the intervention ($p=0.000$). The total WOMAC score for severe degree was 79.92 ± 2.11 as the initial assessment and changed to 70.84 ± 1.46 three months after implementation of the intervention with a statistically significant difference in pre, immediately post and pre- three months posttest only ($p= 0.000$) and there was no a statistically significant difference in immediately post and three months posttest ($p=0.109$).

Table (V) Shows the distribution of the studied elderly in relation to total score of quality of life. The total mean score of the quality of life of the study group increased

from 32.81 ± 12.38 pre intervention to 52.77 ± 16.21 immediately post and 55.56 ± 16.78 three months after the implementation of the intervention, with a statistically significant difference between them ($P=0.000$). Regarding the control group, there was no a statistically significant difference in the total mean quality of life score pre, immediate post and three months after the implementation of the intervention ($p=0.558$). There was a statistically significant difference between the total mean three months quality of life score of the study and the control groups ($p=0.000$).

Table (VI) represents mean and standard deviation of the studied elderly in relation to total quality of life and degree of osteoarthritis among the elderly suffering from osteoarthritis. Concerning the total mean score of quality of life, for elderly with the mild degree of osteoarthritis, it was found that the total mean quality increased from 40.87 ± 1.51 pre intervention to be 63.04 ± 2.56 and 65.77 ± 2.89 immediately post and three months after the implementation of the intervention with a statistically significant difference from pre intervention to three months after the implementation of the intervention ($p=0.000$). For elderly with moderate degree of osteoarthritis, the total mean

score of quality of life increased from 36.78 ± 3.68 pre intervention to be 55.06 ± 2.18 and 57.51 ± 1.71 immediately post and three months after the implementation of the intervention respectively with a statistically significant difference from pre to three months after the implementation of the intervention ($p=0.000$). For elderly with severe degree of osteoarthritis, the total mean score of quality of life increased from 20.14 ± 1.32 pre intervention to 30.83 ± 1.31 and 32.01 ± 1.33 immediately post and three months after the implementation of the intervention with a statistically significant difference from pre intervention to three months after the implementation of the intervention ($p=0.000$).

Table (VII) Shows the distribution of the studied elderly according to their total knowledge score regarding the pharmacological treatment, it was observed that, all the study and control groups had poor level of knowledge with the total mean of 9.14 ± 2.90 and 9.40 ± 2.61 respectively preprogram. After the implementation of the educational program, more than half (56.2%) and more than two fifths (45.7%) of both the study and control groups respectively had fair level with the total means of 25.97 ± 3.31 for the study group and 21.74 ± 3.16 for the

control group immediately post educational program. There was a statistically significant difference between preprogram and immediately post educational program in each the study and control groups ($p=0.000$), also there was a statistically significant difference between immediately post educational program total mean knowledge between the study and control groups ($P=0.000$).

Table (VIII) shows correlation between quality of life , WOMAC and knowledge regarding the pharmacological treatment of the Osteoarthritis. the present study revealed that there was a negative correlation between total quality of life score and total WOMAC index, also negative correlation between total knowledge score and total WOMAC index

for the study and control group pre, immediately post and three months after the implementation of the intervention. Moreover, there was a positive correlation between quality of life and total knowledge score for both groups pre, immediately post and three months after the implementation of the intervention.

(I): Distribution of the studied elderly according to their socio-demographic characteristics

Socio-demographic Characteristics	The studied elderly (n=175)			
	Study group (n=105)		Control group (n=70)	
	n	%	n	%
Age/years				
60 < 70	65	61.9	49	70
70- 80	34	32.4	18	25.7
> 80 years	6	5.7	3	4.3
Range	(60- 86)		(60-85)	
Mean ± SD	69.50 ± 6.829		68.63± 6.61	
Gender				
Female	65	61.9	51	72.9
Male	40	38.1	19	27.1
Material Status				
Married	44	41.9	27	38.6
Widow	32	30.5	24	34.3
Divorced	15	14.3	10	14.3
Single	14	13.3	9	12.9
Education				
Illiterate	27	25.7	22	31.4
Read and write	13	12.4	9	12.9
Elementary	15	14.3	5	7.1
Secondary	19	18.1	12	17.1
University & postgraduates	31	29.6	22	31.5
Occupation before retirement				
Housewife	38	36.2	25	35.7
clerical work	23	21.9	16	22.9
Manual work	21	20	13	18.6
Professional work	17	16.2	15	21.4
Private work	6	5.7	1	1.4
Income				
Adequate	58	55.2	44	62.9
Not Adequate	29	27.6	11	15.7
Adequate and Save	18	17.1	15	21.4
Living with				
Spouse	43	41.0	25	35.7
Alone	29	27.6	24	34.3
son/daughter	11	10.5	4	5.7
Geriatric room	14	13.3	9	12.9
Relatives	8	7.6	8	11.4
Residence				
Rural	60	57.1	42	60
Urban	45	42.9	28	40.0

Table (II): Distribution of the studied groups in relation to their medical history of osteoarthritis

Medical History	The Studied Elderly (n=175)			
	Study Group (n=105)		Control Group (n=70)	
OA ^a duration \years	N	%	n	%
<5	66	62.8	44	62.9
5 < 10	16	15.2	14	20
10< 15	10	9.5	7	10
15<20	8	7.6	1	1.4
20<25	5	4.8	4	5.7
*** Affected Joints				
knee joint	93	88.6	67	95.7
Neck Joint	39	37.1	29	41.4
Spinal cord vertebra	36	34.3	28	40
hip joint	16	15.2	10	14.3
Fingers joint	12	11.4	7	10
elbow joint	9	8.6	9	12.9
*** symptoms of OA^a				
Stiffness	77	74.8	48	68.6
Increased pain during performing of physical actives	77	74.8	52	74.3
Limited of physical movement	76	72.4	56	80.0
Crackling sound when bending joint	68	64.8	37	52.9
Swelling around joint	54	51.4	31	44.3
Degree of OA^a				
Mild	35	33.3	23	32.9
Moderate	35	33.3	25	35.7
Severe	35	33.3	22	31.4
Height (Meter) Mean & SD	1.62±0.078		1.63±0.079	
Weight\ (Kg) Mean & SD	90.65±13.83		86.91±14.34	
BMI				
▪ 18.5- 24.9 Kg\ (m) ²	11	10.5	6	8.6
▪ 25-<30 Kg\ (m) ²	14	13.3	11	15.7
▪ ≥ 30 Kg\ (m) ²	80	76.2	53	75.7
Range	(22.5 – 44.1)		(22.5- 50.60)	
Mean & SD	33.07± 4.98		35.15± 6.52	
Thigh Circumference				
▪ < 2.5 th percentile (muscle atrophy)	12	11.4	6	8.6
▪ From 2.5 th - 90 th percentile (normal)	37	35.2	24	34.3
▪ From 95 th & more	56	53.3	40	57.1

Table (III): Distribution of the studied groups in relation to their total score of WOMAC osteoarthritis index

WOMAC Score	The Studied Elderly (n=175)														t test & p value between 3month total score study & control groups
	Study Group (n=105)							Control Group (n=70)							
	Pre intervention		Immediate post intervention		3 months Post intervention		X ² P	Pre intervention		Immediate post intervention		3 months Post intervention		X ² P	
	N	%	n	%	n	%		n	%	N	%	n	%		
WOMAC Score															
No or mild	1	1	34	32.4	32	30.5	168.21	1	1.4	1	1.4	1	1.4	2.34	8.89 0.021**
Moderate	33	31.4	30	28.6	27	25.7	0.000**	36	51.4	35	50	36	51.4	0.135	
Severe	36	34.3	31	29.5	30	28.6		25	35.7	26	37.1	25	35.7		
Extreme	35	33.3	10	9.5	16	15.2		8	11.4	8	11.4	8	11.4		
Range	(20-95)		(15-76)		(19-79)		F\ P	(16-87)		(16-87)		(16-87)		F\ P	
Mean &SD	60.65±18.02		43.45±13.6		45.64±16.31		152.71 0.000**	51.40±16.4		51.42±16.5		51.42±16.5		2.029 0.159	

Table (IV): Mean and standard deviation of the study group in relation to degree of OA and WOMAC index subscale

OA Degrees	The study Group n=105			
	Pre intervention	Immediate post-intervention	3months post intervention	F P
	Mean &SD	Mean &SD	Mean &SD	
Total WOMAC Pain Subscale				
Mild	7.92±0.64	3.33±0.48	3.58±0.33	29.15 0.000**
Moderate	13.10±0.58	9.70±0.49	10.40±0.43	53.61 0.000**
Severe	16.23±0.66	13.76±0.303	13.69±0.308	13.96 0.001**
Total WOMAC Stiffness Subscale				
Mild	2.66±0.22	0.91±0.23	0.83±0.27	46.54 0.000**
Moderate	4.70±0.33	3.70±0.34	3.30±0.30	11.45 0.004**
Severe	6.61±0.21	5.76±0.16	5.70±0.21	18.33 0.000**
Total Physical function disabilities Score				
Mild	24. ±1.93	9.67±1.56	13.33±1.2	54.89 0.000**
Moderate	39.30±2.16	32.60±1.09	32.40±1.77	5.73 0.000**
Severe	57.07±1.72	51.23±1.23	52. ±1.4	13.06 0.000**
Total WOMAC Score				
Mild	34.58±2.16	14.58± 1.84	17.33± 1.23	122.07 0.000**
tP (Pre & immediate post)	14.90 0.000**			
tP (Pre & 3months)	15.81 0.000**			

t\ P (immediate post & 3months)	4.31 0.000**			
Moderate	57.10±2.27	45.90± 1.47	46±2.02	112.13 0.000**
t\ P (Pre & immediate post)	15.41 0.000**			
t\ P (Pre & 3months)	15.16 0.000**			
t\ P (immediate post & 3months)	1.51 0.140			
Severe	79.92±2.11	70.23± 1.18	70.84± 1.46	37.36 0.000**
t\ P (Pre & immediate post)	8.71 0.000**			
t\ P (Pre & 3months)	7.80 0.000**			
t\ P (immediate post & 3months)	1.645 0.109			

Table (VI) : Mean and standard deviation of the studied elderly according to total quality of life and degree of osteoarthritis among the elderly suffering from osteoarthritis

Total score of quality of life	The Studied Elderly (n=175)												Friedman test (X ²)	(X ²) between 3 months posttest study and control	
	Study Group (n=105)						Friedman test (X ²)	Control Group (n=70)							
	Pre intervention		Immediate post intervention		3 months Post Intervention			Pre intervention		Immediate post Intervention		3 months Post intervention			
	n	%	n	%	n	%		n	%	n	%	n			%
Poor	94	89.5	39	37.1	36	34.3	181.68 0.000**	52	74.3	53	75.7	52	74.3	0.000 1.000	30.64 0.000**
Fair	11	10.5	54	51.4	52	49.5		18	25.7	17	24.3	18	25.7		
Good	0	0.0	12	11.4	17	16.2		0	0.0	0	0.0	0	0.0		
Range Mean & SD	(9-67) 32.81±12.38		(21-81) 52.77±16.21		(24-81) 55.56±16.78			F\ P 266.98 0.000**	(13-71) 37.97±14.79		(13-71) 37.97±14.79		(14-71) 37.90±14.60		

Table (VII): Distribution of the studied elderly according to their total knowledge score regarding to pharmacological treatment of OA

Total Knowledge score	The Studied Elderly (n=175)										t test\ P between immediate post mean Study Vs. Control groups
	Study Group (n=105)					Control Group (n=70)					
	Pre program		Immediate post program		T test \P between mean pre and post program	Pre program		Immediate post program		T test \P between mean pre and post program	
	N	%	N	%		n	%	n	%		
Poor	100	100	8	7.6	Paired t test= 37.46 P= 0.000**	70	100	34	48.6	Paired t test= 27.45 P= 0.00**	23.67 0.000**
Fair	0	0.0	59	56.2		0	0.0	32	45.7		
Good	0	0.0	38	36.2		0	0.0	4	5.7		
Range Mean &SD	(3-18) 9.14±2.90		(15-33) 25.97 ±3.31			(3-17) 9.40±2.61		(16-28) 21.74 ±3.16			

Table (VIII): Correlation between quality of life, WOMAC and knowledge regarding the pharmacological treatment of the Osteoarthritis

Variables	The Studied Elderly (n=175)											
	Study Group (n=105)						Control Group (n=70)					
	Total Quality of life score			WOMAC score			Total Quality of life score			WOMAC score		
	Pre intervention	Immediately-post	3 months Post	Pre intervention	Immediately-post	3 months Post	Pre intervention	Immediately-post	3 months Post	Pre intervention	Immediately-post	3 months Post
r	R	r	r	R	R	r	R	R	r	r	r	
P	P	P	P	P	P	P	P	P	P	P	P	
WOMAC Score	-0.673 0.000**	-.685 0.000**	-.692 0.000*	-----	-----	-----	-0.323 0.001**	-0.422 0.001**	-0.369 0.001**	-----	-----	-----
Total knowledge score	0.692 0.000**	0.874 0.000**	-----	-0.346 0.001*	-0.383 0.001**	-----	0.263 0.028*	0.272 0.023*	-----	-0.569 0.000*	-0.678 0.000*	-----

*Correlation is significant at the (p < 0.05 level) (2-tailed)

**Correlation is significant at the(p< 0.01 level) (2-tailed)

Discussion

Osteoarthritis (OA) is considered the most common musculoskeletal diseases all over the world. It is a painful and disabling inflammatory disease of the joints and is caused by multiple factors as joint injury, overuse, obesity, heredity and increasing age⁽⁴⁾. Osteoarthritis is not cured, its care focuses on preserving the elderly's functional ability by managing pain, other symptoms and improving joint movement and function. Foot Reflexology is an alternative complementary therapy that uses reflex points on the hands and feet to stimulate the body's healing⁽⁸⁾.

It can be used effectively with OA. It is designed to bring the body into balance by applying pressure at points corresponding to areas of the body⁽¹⁶⁾. It is effective in release of endorphins and blocks the pain pathways which cause effective pain relief⁽¹⁸⁾. The findings of this study revealed that the mean age of the study group was 69.50 years and less than two thirds of them were females, while the mean age of the control group was 68.63 years and three quarters of them were females. (**Table I**). This may be due to the fact that, along with the rise in age, the cartilage inside a joint becomes thinner and

components of the cartilage become altered, which may make the joint less resilient and more susceptible to damage and this may lead to osteoarthritis. This finding is in the line with **Łęgosz et al., (2020)**⁽²⁵⁾, who assessed the complexity of molecular processes in osteoarthritis of the knee joint in Poland and reported that the mean age of the patients with osteoarthritis was 71.26 ± 7.88 years. The study result is also consistent with the findings of the **Center for Disease Control and Prevention (CDC) and National Public Health Agenda for Osteoarthritis (2020)**⁽³⁾, that reported that the prevalence of OA was more among whose age above 65 years and among the females related to loss or reduce of calcium and vitamin D that responsible for increase of bone density. Osteoarthritis has a lot of reported symptoms include pain, morning and night stiffness, reduced range of joint movement, crepitation, fatigue, sleep disturbance, experience of social isolation⁽¹⁰⁾. The present study demonstrated that about three quarters of the study group complained of stiffness, increase pain during physical activities and limited physical movement, followed by crackling sound by about two thirds and finally swelling by half of the elderly. (**Table II**). This may be explained by that when osteoarthritis occurred, the

cartilage that prevent friction between two bones during movement teared or lost thus, pain during movement occurred, followed by swelling, redness and stiffness, which prohibit elderly from doing the daily activities. Also, these symptoms were aggravated by the prevalence of obesity among the studied participants. The present study is similar with **Abdel Mohsen et al., (2018)**⁽²⁶⁾, who assessed the physical functional status among patients with hip osteoarthritis in Fayoum governorate, reported that all subjects had more than one complaint such as severe pain at the affected joint, inability of movements, joint stiffness, numbness and joint crepitation.

Foot reflexology is a noninvasive and manual therapeutically approaches that helps to improve the performance in elderly's life day to day activities and has a valuable effect on the quality of life and the well-being,⁽²⁷⁾. From this point, the present study showed that, there was significant improvement in the total WOMAC score from pre to immediate and three months post implementation of the program. Also there was a statistical significant improvement in the mean score of all items of pain severity, stiffness, and physical functional disability subscales of WOMAC index. For the control group, no

significant improvement in the mean score of total WOMAC was observed through the study phases(**Table III**). Reduction of the pain severity, stiffness and physical functional constraints among the studied elderly, could be attributed by giving pressure at the reflex points on the foot by foot reflexology, helped in release of endorphins and blocked the pain pathways which caused effective pain relief. Also, it was effective in enhance circulation and remove waste products from the body that improve joint mobility. This is in agreement with a study conducted by **Abdelaziz et al., (2019)**⁽²⁸⁾, who made a study about the effect of reflexology on knee osteoarthritis patients at Cairo University, and concluded that there was an improvement in the average of WOMAC score after the intervention for the study group. Moreover, the patients reported a reduction in pain intensity, joint stiffness, improvement in the physical functions and no improvement was observed in the control group. Osteoarthritis has a profound impact on every aspect of a person's life.

Ongoing pain, physical limitations and depression can affect an individual's ability to engage in social, community and occupational activities⁽²⁹⁾. The present study revealed that, before the

implementation of the intervention, the majority of the study group and slightly less than three quarters of the control group had poor level of quality of life pre intervention (**Table V**). After the implementation of foot reflexology intervention, the present study demonstrated that, for the study group, there was a statistically significant improvement in the mean score of all domains of the quality of life through the study phases. On the other hand for the control group, there was no statistically significant improvement in the mean score of all domains of the quality of life pre, immediately post and 3 months after implementation of the intervention. (**Table V**).

Improvement of the elderly's quality of life may be explained by that the reduction of pain and stiffness intensity by foot reflexology may improve elderly's independent involvement in personnel and self-care, as well as social functioning, with positive impact on self-esteem and quality of life. This finding is in line with a study made by **Lee et al., (2020)⁽³⁰⁾**, who studied the relationship between obesity and balance in the community-dwelling elderly population in South Korea, and another study made by **Xiaonan and Dinglu (2020)⁽⁹⁾**, who assessed the quality

of life of older people with osteoarthritis in China. They concluded that the patients with osteoarthritis had low level of quality of life both physically and mentally. The present study showed that the best improvement in the total mean of WOMAC index and total mean of quality of life was seen for mild degree of osteoarthritis, moderate degree came in the second level of improvement and finally the lowest improvement was seen for the severe degree of osteoarthritis. There was statistically significant difference with in the whole study period for each different osteoarthritis degrees (**Table IV and VI**). This could be explained by that the mild degree of osteoarthritis had low or mild symptoms so when the foot reflexology applied , the best improvement was seen, but the severe degree needed complex and multi approach management plan and some of these elderly may need surgery as their final choice to cure the osteoarthritis.

The present study finding is supported by **Barot (2019)⁽³¹⁾** who studied the reflexology benefits and limitations, and found that foot reflexology did not guarantee to cure some serious problems or critical stage of illness and could not be used as conventional medicines / medications to cure the problem completely. The present study finding was

also supported by the **American College of Rheumatology (2020)**⁽³²⁾, that revealed that massage therapy was considered conditionally recommended for hand, hip and knee osteoarthritis. This means that some cases of osteoarthritis had positive outcomes and minimal risk and felt strongly that massage therapy was beneficial for symptom management. However, other cases of osteoarthritis specifically, were conditional recommended against the use of massage for reduction of OA symptoms.

Concerning the knowledge of the elderly about the pharmacological treatment of osteoarthritis, the present study found that before implementation of the educational program, all the elderly of study and control groups had poor total knowledge score before implementation of the educational program. After the implementation of the educational program, There was a statistically significant improvement of their knowledge (**Table VII**). Poor elderly knowledge pre educational program may be attributed by as people grow old, they became less motivated to gain more health information compared to younger ones, Furthermore, the drugs that used for the treatment of osteoarthritis had multi approached and different chemical names

that were very difficult for elderly to memorize them.

Improvement of the elderly's knowledge after the implementation of the educational program may be due to the effect of educational program that motivate the elderly to ask questions and gain more information, as well as the effect of foot reflexology on reducing of pain, stiffness, physical functional constraints, and improve the quality of life. These improvements led to relaxation of the elderly and enhance the ability to understand the components of the educational program of pharmacological treatment. This is in line with a study done by **Abdel Mohsen et al., (2018)**⁽²⁶⁾, who concluded that the majority of nurses had poor level of knowledge and awareness related to risk factors, exercises, diet and treatment methods that required to enhance patients' physical function pre educational program ,but after implementation of the educational program, there was statistically significant increase in their knowledge .

The present study revealed that there was a negative correlation between total quality of life score and total WOMAC index, also negative correlation between total knowledge score and total WOMAC index for the study and control group pre, immediately post and three months after

the implementation of the intervention. Moreover, there was a positive correlation between quality of life and total knowledge score for both groups pre, immediately post and three months after the implementation of the intervention (**Table VIII**). This may be explained by that high degree of pain, stiffness and physical constraints could lead to severe deterioration in the quality of elderly life. However, when the elderly had good knowledge about the correct use of the pharmacological treatment of OA, this could reduce of pain and enhance of the quality of life. This is in agreement with **Khachiana et al., (2020)** ⁽³³⁾, who studied the effect of self-management program on outcome of adult knee osteoarthritis in Iran, and reported that the self-management program, which included pain relief methods, proper diet and exercise, resulted in reducing pain, symptoms, enhance function and improvement of the quality of life. Moreover, a study made by **Gay et al., (2018)** ⁽³⁴⁾ who studied the efficacy of self-management exercise program with spa therapy for behavioral management of knee osteoarthritis in France, showed that health education program could improve the physical activity of male and female patients with osteoarthritis aged 50 – 75 years old.

Conclusion

Based on the findings of the present study, it can be concluded that, foot reflexology for elderly suffering from osteoarthritis, appears to have a significantly remarkable effect on pain reduction and improved quality of life for the study group. Meanwhile, the total quality of life score increased immediately post and three months after implementation of the intervention. However, the control group showed no statistically significant difference between pre and three months after implementation of the intervention. Furthermore, the educational program of pharmacological osteoarthritis treatment was effective and improved elderly's knowledge of both groups.

Recommendations

Based on the results of the present study the following recommendations were suggested:

- Foot reflexology technique should be recommended in hospital protocols beside pharmacological treatment for management of osteoarthritis.
- Incorporate the foot reflexology in gerontological nursing curriculum of undergraduate students.
- Continuous health education program about pharmacological treatment of osteoarthritis should be applied to

elderly in the different community settings to improve their knowledge that affect their quality of life.

- Continuous evaluation of elderly's knowledge for enhancing compliance with pharmacological treatment of osteoarthritis is urgent need.

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