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Effect of Designed nursing intervention protocol on outcomes of patients with symptomatic knee osteoarthritis

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Abstract: **Symptomatic knee osteoarthritis is the most common chronic joint disease in the world, that lead to chronic pain and disability *(Postler, et al, 2018*). Egyptian patients with primary knee osteoarthritis have relatively poor health related quality of life; that manifested mainly by pain. Disease duration and affection of both knees considered indictors for lower scores of all quality domains, and knee stiffness *(Mahmoud, Moghazy, Fathy, and Niazy, 2018)*. Aims, this study aimed to examine the effect of designed nursing intervention protocol on outcomes of patients with symptomatic knee osteoarthritis. Research design: A quasi experimental research design was used to conduct this study. Research Setting: This study was conducted at orthopedic clinic of New Emergency Hospital (El Demerdash Hospital) affiliated to Ain Shams University, Cairo. Subjects: A Purposive sample of 50 patients diagnosed as symptomatic knee osteoarthritis. Tools: I. An Interviewing questionnaire it was consisted of. patient demographic characteristic, medical history, Patient with symptomatic knee osteoarthritis knowledge, and health practices. II: Knee Injury and Osteoarthritis Outcome Score (KOOS)*: It was adopted from Roos; et al., 1998. It was used to assess knee osteoarthritis outcomes. Results: This study revealed that, the age of 38% of the study subjects were between 50 to 60 years with mean age 47.52 ± 8.08, and 55% were females. There was highly statistically significant difference between patients' knowledge and health practices regarding osteoarthritis management pre/post implementation of the nursing intervention protocol, while there was no statistically significant difference between patients' Osteoarthritis Outcome Score pre/post implementation, although there was marked improvement post implementation. Conclusion: Implementation of designed nursing intervention protocol had a positive effect on improving patients' level of knowledge and health practices regarding osteoarthritis and markedly improving patient's outcomes. Recommendations: Conducting comprehensive health education programs for patients with symptomatic knee osteoarthritis in outpatient's clinics with simple printed guidelines in booklets, leaflets or brochures explaining how to manage the disease problems and application of similar studies to assess the needs and factors affecting such group of patients.**

Keywords: **symptomatic knee osteoarthritis, outcomes, nursing intervention protocol.**

1. INTRODUCTION

Symptomatic knee osteoarthritis (SKOA) is a type of joint disease that results from breakdown of joint cartilage and underlying bone. It is a common joint disease that usually affects middle to old age people of both sexes. It is commonly called joints "wear and tear", osteoarthritis globally causes different degrees of disability in 43.4 million people. Causes of osteoarthritis include abnormal joint or limb development, inherited factors, and previous joint injury ***(Dziedzic et al., 2018)*** It is the cause of about 2% of years lived with disability. In Australia, about 1.9 million people are affected, and in the United States, 30 to 52.5 million people are affected ***(Skou S., 2014)***.

A study estimated that about fourteen million persons had symptomatic knee osteoarthritis, more than half of them were advanced. This includes more than three million African American. Adults under 45 years of age represented nearly two million cases of SKOA and individuals between 45 and 65 years of age six million more. over half of all persons with SKOA are less than 65 years of age ***(Bhushan, 2016)***. policymakers should emphasize the need for the innovative prevention and treatment strategies for knee OA ***(Button et al., 2015).***

The most common SKOA symptoms are joint pain and stiffness. Other symptoms may include joint swelling, muscle weakness, and limited range of motion. ***(Teslim, Olumide & Kamil., 2016)*** Patients with hip or knee osteoarthritis decrease functional ability of affected joints. Furthermore, osteoarthritis has a major impact on physical functioning in daily life. Lack of regular physical activity is considered one of the most prevalent risk factors for activities of daily living function decline in patients with hip or knee osteoarthritis ***(Veenhof, Huisman, Barten, Takken, Pisters, 2012).***

Treatment relies upon the affected joint it includes exercise, decrease joint stress, support groups, and pain medications, measures to limit joint stress include resting and the use of assistive devices. Weight loss may help in overweight patients ***(Hinkle and Cheever, 2014).***

Osteoarthritis lead to significant disability and loss of function, and its management is considered high cost to the health care system. Advancement in prevention and treatment has been slow the joint disease process ***(Gamal, Mahran, Abo El Fetoh, Janbi., 2016).***

Patient education is an essential part of nursing care, with the aim that the patients will live as independently as possible, use their aid supplies correctly and properly take their medications, as the prescribed regimen, the side effects of drugs, strategies for maintaining individuals independence and functions. It is possible to reduce many of their limitations and problems by educating the patients with osteoarthritis regarding activity, rest, taking medications and their complications, and other issues related to lifestyle ***(Ganji et al., 2018).***

Significance of the study:

Osteoarthritis is the most prevalent chronic joint disease worldwide, and half of the world's population aged 65 or older suffers from some form of osteoarthritis and leading to chronic pain and disability in the United States and other developed countries, 30 million adults in the United States are living with osteoarthritis, and this making the condition the most prevalent form of arthritis ***(Postler, et al., 2018).***

Studies suggest that, education related to osteoarthritis could provide information that is directly relevant to improving outcomes. Osteoarthritis-specific education include knowledge about diagnosis, causes, risk factors, symptoms, treatments, and self-help, social support through group-based education and exercise ***(Skou, 2014 and Nawito, El-Azkalany & El-Sayad, 2019).***

Accordingly, it was crucial to the nurses to focus more attention on problems of patients with symptomatic knee osteoarthritis, as the nurse plays an important role in assessment and management of those patients. This emphasize the need for developing effective intervention protocol to provide care for patients with symptomatic knee osteoarthritis based on their identified needs.

Aim of the study:

This study aimed to examine the effect of designed nursing intervention protocol on outcomes of patients with symptomatic knee osteoarthritis. This aim was achieved through the following:

1. Assessing patient level of knowledge and health practices regarding symptomatic knee osteoarthritis and its management.

2. Assessing patient with symptomatic knee osteoarthritis outcomes (symptoms, stiffness, pain, activities of daily living difficulty, sports and recreational activity difficulty, and knee related quality of life).

3. Evaluate the effect of designed nursing intervention protocol on patient knowledge, health practices and outcomes of symptomatic knee osteoarthritis

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Research hypothesis:

This study supposed that patient knowledge, health practices and symptoms of symptomatic knee osteoarthritis (patient outcome) will improve post implementation of designed nursing intervention protocol.

Operational definitions:

1. Designed Nursing intervention protocol about symptomatic knee osteoarthritis care:

It provides information related to the following areas: symptomatic knee osteoarthritis, definition, causes, Signs and symptoms, risk factors, complications, medication, range of motion exercises, follow up, and management of symptomatic knee osteoarthritis.

2. Patient's outcomes are operationally defined as:

- The acquisition of knowledge and health practices related to management of symptomatic knee osteoarthritis as evidenced by the results of pre/post-test.

- The improvement of patient outcomes according to **Knee Injury and Osteoarthritis Outcome Score (KOOS) (Roos; et al., 1998) which include** symptoms, pain, stiffness, activities of daily living and knee-related quality of life of patients with symptomatic knee osteoarthritis as evidenced by the comparison of these items pre/post-implementation of the designed nursing intervention protocol.

2. SUBJECTS AND METHODS

Research design:

A quasi experimental research design was used to conduct this study.

Research Setting:

This study was conducted at orthopedic clinic of New Emergency Hospital (El Demerdash Hospital) affiliated to Ain Shams University, Cairo. It was one room that consisted of five partitions for patient's examination and small reception area.

Subjects:

Purposive sample of 50 patients diagnosed as symptomatic knee osteoarthritis which represent 10 % of patients visited the orthopedic clinic during the last year. Patients of both sexes, more than 18 years and all receive pharmacological treatment, and accept to participate in the study. Patients who were seriously ill as patients with osteoarthritis involving spinal problems, recent surgery, fractures, tendinitis, and patients with cognitive impairment were excluded from the subjects.

Tools of data collection:

The following tools were utilized to collect data of this study:

Tool I: An Interviewing questionnaire. It was designed by the researchers; it was consisted of four parts:

Part.1. patient demographic characteristic*, it was used* to gather information related to age, gender, level of education, marital status and occupation

Part.2. medical history: *it was used to assess* patients' history as regard, duration of osteoarthritis, affected limb, body mass index **(BMI)**, smoking and chronic diseases.

Calculation of body mass index (BMI) to indicate degree of obesity using equations according to (Castillo-Martinez, et al., 2012) as follows:

BMI = (weight in kilograms) / (height in meter)2

- Underweight < 18
- Normal BMI > 18 – 24.9

- Overweight > 25 – 29.9
- Obese > 30 - 40
- Morbid obese > 40

Part.3. Patient with symptomatic knee osteoarthritis knowledge: It was used to assess patient knowledge regarding symptomatic knee osteoarthritis. It was designed by the researcher in Arabic language after reviewing the related literature ***(Smeltzer, Bare, Hinkle & Cheever, 2016 and Stromberg, Dallred & Dewit, 2017)*** and it was used Pre and post implementation phase.

Part.4 Patients with symptomatic knee osteoarthritis health practices: This tool was developed in Arabic language by the researchers after reviewing relevant literatures ***(Linton, 2016 and Ladwig, Ackley & Makic., 2017)***. It included questions about the patients with symptomatic knee osteoarthritis health practices such as regulation of diet, exercises, smoking cessation, ways to manage arthritis symptoms.

Scoring system: for patients' knowledge and practices one score was given for each correct answer and zero for incorrect answer. The total patients' knowledge scores and practices were considered adequate if the percent score was 75% and more and inadequate if it was less than 75%.

Part 3 and 4 were assessed twice, pre/post the implementation of nursing intervention protocol.

Tool II: Knee Injury and Osteoarthritis Outcome Score (KOOS):

This is a valid and reliable tool. It was adopted from **Roos; et al., 1998.** It was used to assess short and long-term patient-relevant outcomes following knee osteoarthritis which include five outcomes: pain, symptoms, activities of daily living (ADL), sport and recreation function, and knee-related quality of life. It was used to assess patients' outcome pre and post implementation phase.

Scoring system:

The KOOS's five patient-relevant dimensions are scored separately: Symptoms (7 items); stiffness (2 items); Pain (9 items); ADL Function (17 items); Sport and Recreation Function (5 items); Quality of Life (4 items). A Likert scale was used, and all items had five possible answer options scored from 0 (No problems) to 4 (Extreme problems) and each of the five scores is calculated as the sum of the items included.

Administrative Consideration:

An official permission for conducting the study at orthopedic clinic at New Emergency Hospital (El Demerdash Hospital) was obtained from the hospital administration after explaining the aims of the study, as well as, to get better cooperation during the implementation phase of the study.

Ethical Consideration:

Human rights were considered by explaining the aim of the study to each participant to be familiar with importance of his or her participation. Oral consent was taken from the subjects that they agreed to be included in the study**.** Participants were informed about their right to refuse participation and to withdraw at any time without giving any reason. Confidentiality of subjects' data was ensured.

Preparatory phase:

The preparatory phase was concerned with designing the nursing intervention protocol instructional booklet about symptomatic knee osteoarthritis care and construction of the study tools after extensive review of literature and studies related to present study using the national and international resources.

Tools validity:

Tools were evaluated for face and content validity by a panel of 7 experts in the field of the study, 5 professors in medical surgical nursing, and 2 lecturers of orthopedic medicine who reviewed the content of the tools for comprehensiveness, clarity and accuracy.

Tools reliability:

Testing reliability of the study tools were done using Chronbach alpha test and the test indicate high tool reliability. Chronbach value was 0.913.

Pilot study:

A pilot study was performed on 10 % of studied patients from the orthopedic departments to test the clarity and applicability of the study tools, and determining the time needed for conducting the study. Based on the findings of the pilot study and expertise opinions, minimal modifications were done, and those patients were excluded from the actual study.

Procedures:

The study started from May 2018 to March 2019. The researchers were present two days a weak Saturdays and Tuesdays, as the orthopedic clinic works during these days, in the morning 9 am :1 pm. Sessions were held in patient group 5-10 patients according to their availability. It was designed in three phases' assessment, implantations and evaluation.

Assessment phase: During this phase an official approval was obtained to conduct the study from the director of New Emergency Hospital (El Demerdash Hospital) and head of orthopedic clinic. An exploratory visit was done to the clinic in order to estimate the intended patients flow rate, and suitable time for data collection.

– All the data collection tools were distributed to the patients according to their availability after explaining the purpose of the study and obtaining their consents. It included assessment of patient knowledge and health practices regarding symptomatic knee osteoarthritis by using interview questionnaire before developing nursing intervention protocol to assess patient's educational needs and obtain baseline data., Assessment of knowledge were done two times first before implementation of nursing intervention protocol and the second immediately after implementation.

– **The second tool, Knee Injury and Osteoarthritis Outcome Score (KOOS)** were filled to Assess the patients with symptomatic knee osteoarthritis outcomes, this assessment was done two times first before implementation of Nursing intervention protocol and the second were three months after implementation.

– All the tools consumed about 30-40 minutes to be fill out.

– **Designed Nursing intervention protocol preparation:** It was designed by the researchers in simple Arabic language and based on the review of the related literature (**Smeltzer, Bare, Hinkle & Cheever; 2016 and Stromberg, Dallred & DeWit; 2017)** and the results of pre-assessment. It includes information about knee osteoarthritis, definition, causes, signs and symptoms, complications, all health practices related to symptomatic knee osteoarthritis and management of the disease symptoms.

- Media was proposed by the researches including the nursing intervention protocol booklet, posters and audiovisual materials CD. Its content validity was tested through 5 experts' opinions.

Implementation phase:

– During this phase, nursing intervention protocol booklet was given for each patient and the teaching program has been implemented in 6 sessions.

– Each session time was approximately 30-45 minutes, two sessions for the theoretical part which include information about knee osteoarthritis, definition, causes, signs and symptoms, complications, and 4 sessions concerning the practical part about exercise (range of motion exercise and aerobic exercise), positioning, body mechanics, rest, sleep, sitting, joint protection measures, using assistive devices, hot & cold applications, healthy diet, monitoring activities of daily living, and pain management.

– An instructional media was used, group discussions and demonstration and redemonstrations was used as a teaching method.

– Telephone contact between the researchers and studied subjects were done to ensure program implementation and arrange meeting with them during follow up visits in the clinic, and for answering any questions from the studied subjects to assure understanding.

Evaluation Phase:

It was done using the same pretest tools immediately post implementation regarding patients' knowledge, health practices and three months post intervention regarding other patient outcomes as symptoms, pain ADL, and knee related quality of life. Comparison between the collected data before and after intervention was done to determine the effectiveness of this nursing intervention protocol in improving patients' knowledge, health practices and signs and symptoms of symptomatic knee osteoarthritis knowledge (Patient outcomes).

Statistical analysis:

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

The following tests were done:

- Chi-square (x^2) test of significance was used in order to compare proportions between two qualitative parameters.
- The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following:
- Probability (P-value)

– P-value ≤0.05 was considered significant.

– P-value ≤0.001 was considered as highly significant.

– P-value >0.05 was considered insignificant.

3. RESULTS

Table 1: Demographic characteristics of studied patients(n=50).

Socio demographic data	No	%
Age (years)		
30- <40 years	13	26
40- <50 years	15	30
50- <60 years	19	38
≥60 years	3	6
Mean ± SD	47.52 ± 8.08	
Gender		
Female	26	52
Male	24	48
Level of education		
Not read or write	12	24
Read and write	29	58
High	9	18
Marital status		
Married	18	36
Single	32	64
Occupation		
Heavy work	29	58
Sedentary work	21	42

Table (1): reveals that, the age of 38% of the study subjects were between 50 to 60 years with mean age 47.52 ± 8.08. Regarding gender 55% of them were females, 58 % were read and write, 24% Not read or write, and 18% had high education. Regarding occupation 58% of them had heavy work.

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Table (2): Distribution of medical data of patients with symptomatic knee osteoarthritis (n=50).

Medical data	No.	%
Duration of osteoarthritis		
Less than one year	21	42
1-3 years	26	52
More than 3 years	3	6
Affected limb		
Left knee	18	36
Right knee	10	20
Both	22	44
BMI		
Normal	12	24
Overweight	15	30
Obese	23	46
Smoking		
Smoker	20	40
Non smoker	19	38
Ex-smoker (individual who has given up smoking)	11	22
Chronic diseases		
Hypertension	17	34
Diabetes mellitus	21	42
Thyroid diseases	13	26
Previous bone fractures/surgeries	8	16
Autoimmune diseases	3	6

Table (2) describes that 52 % of the studied patients' duration of disease was 1-3 years, 44% of them both of their knees were affected by osteoarthritis. The table also illustrates that 46 % of them considered obese according to their BMI. Regarding smoking 40 % of subjects were smokers and were had chronic illness such as hypertension and diabetes mellitus (34% & 42% respectively)

Table (3): Distribution of patients' satisfactory knowledge level regarding management of symptomatic knee osteoarthritis pre/post implementation of the nursing intervention protocol (n=50).

Items	Patients' satisfactory knowledge regarding symptomatic knee osteoarthritis					
	Pre		Post		Pre & post	
	N	%	N	%	x^2	P-value
Definition	21	42	39	78	12.042	<0.001**
Causes	24	48	43	86	14.654	<0.001**
Signs and symptoms	48	96	50	100	0.510	0.475
Risk factors	10	20	41	82	36.014	<0.001**
Complications	12	24	38	76	25.000	<0.001**
Management of symptomatic knee osteoarthritis	26	52	40	80	7.531	0.006*
Total knowledge	13	26	45	90	39.450	<0.001**

p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS

Table (3): shows highly statistically significant difference between patients' satisfactory knowledge level regarding most items of symptomatic knee osteoarthritis management pre/post implementation of the nursing intervention protocol, post implementation phase, results showed highly statistically significant improvements in all areas of osteoarthritis knowledge (p <0.001).

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Table (4): Patients' adequate health practices regarding symptomatic knee osteoarthritis pre/post Implementation of the nursing intervention protocol (n=50).

Health Practice Items	Patients' Adequate Health Practices Regarding symptomatic knee osteoarthritis(N=50)					
	Pre		Post		Pre & post	
	N	%	N	%	x^2	P-value
Stop smoking	19	38	29	58	3.245	0.072
Practicing physical exercises: (Range of motion and Aerobic exercise)	8	16	28	56	15.668	<0.001**
Body mechanics and positioning	13	26	45	90	39.450	<0.001**
Balancing activity with rest	11	22	39	78	29.160	<0.001**
Improving sleep	23	46	44	88	18.091	<0.001**
Healthy Diet	18	36	43	86	24.212	<0.001**
Adjusting body weight	12	24	25	50	6.178	0.013*
Hot & cold applications	12	24	38	76	25.000	<0.001**
Pain control measures	23	46	38	76	8.239	0.004*
Medication precautions	27	54	44	88	12.433	0.004*
Joint protection measures	7	14	34	68	27.945	<0.001**
Stiffness management	10	20	41	82	36.014	<0.001**
Monitoring activities of daily living	10	20	41	82	36.014	<0.001**
Using assistive devices	19	38	29	58	3.245	0.072
Getting regular Follow up	21	42	45	90	23.573	<0.001**
Total practices	18	36	42	84	22.042	<0.001**

p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS

Table (4): illustrates highly statistically significant difference between patients' adequate health practices regarding most items of symptomatic knee osteoarthritis management pre/post implementation of the nursing intervention protocol, post implementation phase, results showed highly statistically significant improvements in all areas of osteoarthritis practice (p <0.001).

Table (5): Percentage distribution of studied patients according to their symptoms pre and post implementation of the nursing intervention protocol (n=50).

Symptoms	Pre (N=50)		Post (N=50)		Chi-square test	
	No.	%	No.	%	x2	p-value
Knee swelling						
Never	6	12.0%	10	20.0%		
Rarely	14	28.0%	20	40.0%		
Sometimes	15	30.0%	9	18.0%		
Often	10	20.0%	6	12.0%	9.463	0.048*
Always	5	10.0%	5	10.0%		
Feel grinding. Hear clicking or noise when knee moves						
Never	2	4.0%	4	8.0%		
Rarely	10	20.0%	15	30.0%	4.092	0.394
Sometimes	13	26.0%	15	30.0%		

Often	15	30.0%	11	22.0%		
Always	10	20.0%	5	10.0%		
Knee catch or hang up when moving						
Never	8	16.0%	10	20.0%		
Rarely	15	30.0%	20	40.0%	6.165	0.187
Sometimes	5	10.0%	14	28.0%		
Often	8	16.0%	4	8.0%		
Always	4	8.0%	2	4.0%		
Can straighten knee fully						
Never	18	36.0%	20	40.0%		
Rarely	18	36.0%	20	40.0%	5.163	0.271
Sometimes	6	12.0%	8	16.0%		
Often	4	8.0%	2	4.0%		
Always	4	8.0%	0	0.0%		
Can bend knee fully						
Never	2	4.0%	6	12.0%		
Rarely	10	20.0%	15	30.0%	7.828	0.098
Sometimes	15	30.0%	18	36.0%		
Often	10	20.0%	6	12.0%		
Always	13	26.0%	5	10.0%		

p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS

As regards Patients symptoms, **table (5)** presents that although there was no statistically significant difference except for swelling, there was marked improvement of symptomes among study subjects post implementation of nursing intervention protocol than pre.

Table (6): Percentage distribution of studied patients according to their stiffness pre and post implementation of the nursing intervention protocol (n=50).

Stiffness	Pre (N=50)		Post (N=50)		Chi-square test	
	No.	%	No.	%	x2	p-value
Knee Stiffness severity after first wakening in the morning						
Non	0	0.0%	3	6.0%		
Mild	5	10.0%	10	20.0%	9.290	0.054
Moderate	10	20.0%	15	30.0%		
Severe	15	30.0%	7	14.0%		
Extreme	20	40.0%	15	30.0%		
Stiffness severity after sitting, lying or resting later in the day						
Non	2	4.0%	6	12.0%		
Mild	10	20.0%	15	30.0%		
Moderate	15	30.0%	18	36.0%	7.828	0.098
Severe	10	20.0%	6	12.0%		
Extreme	13	26.0%	5	10.0%		

p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS

Table (6): shows that there was no statistically significant difference between knee stiffness among studied patients pre and post implementation of the nursing intervention protocol, but there was improvement among study subjects post implementation of nursing intervention protocol than pre.

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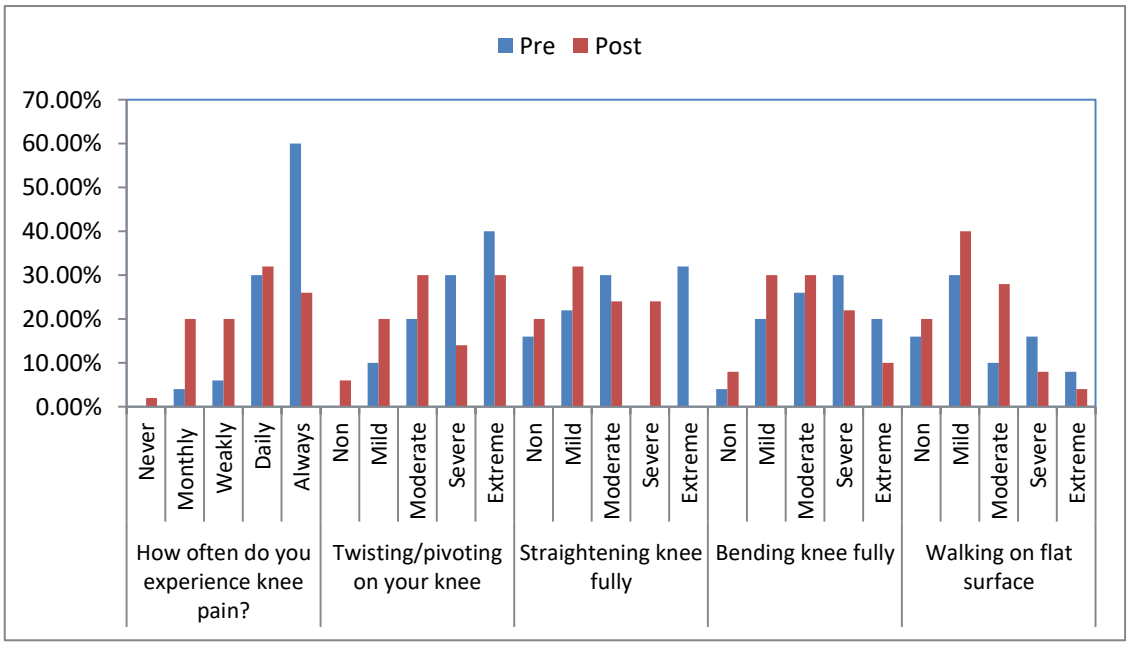
Figure (1.1): Comparison between degree of pain during activities pre and post implementation of the nursing intervention protocol among studied patients (n=50).



Concerning to degree of pain during activities (**figure 1.1)** delineates that there were statistically significant differences between pre and post implementation of the nursing intervention protocol in relation to currency of experiencing pain, degree of pain during activities such as straightening knee fully among studied patients. While there were no statistically significant differences between pre and post regarding pain during other activities as knee twisting, bending and walking in flat surface.

Figure (1.2): Comparison between degree of pain during activities pre and post implementation of the nursing intervention protocol among studied patients (n=50).

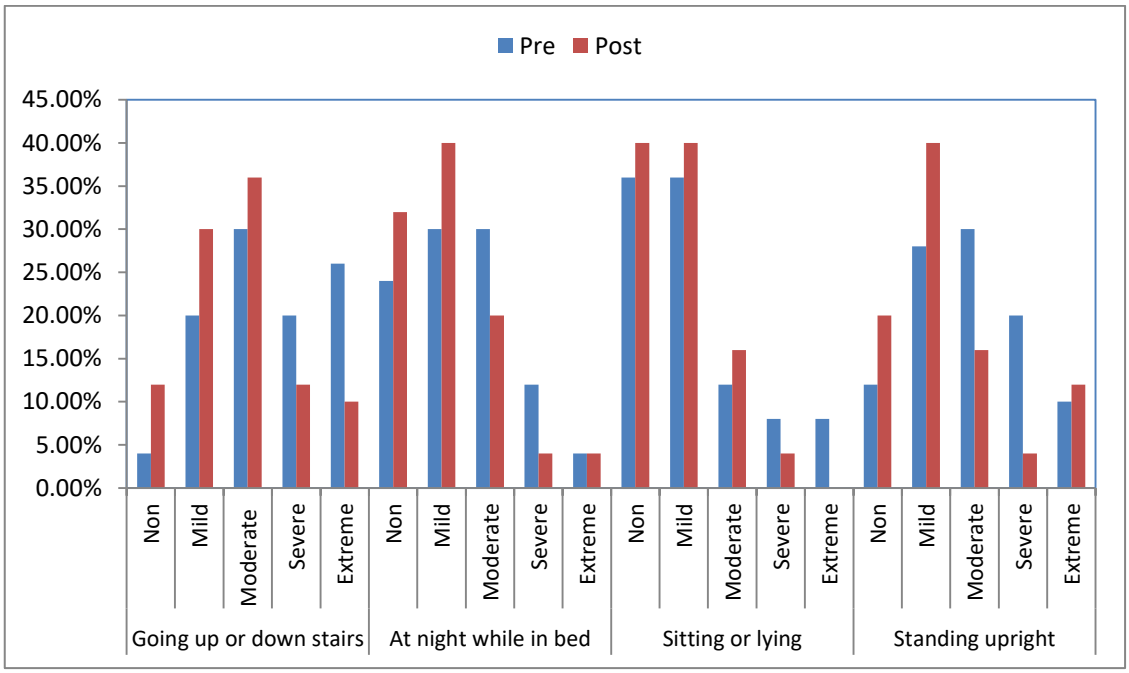


Figure (1.2) shows that there were no statistically significant differences between pre and post implementation of the nursing intervention protocol in relation to all items except for standing upright among studied patients.

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Table (7.1): Degree of difficulty of daily living activity Function pre and post implementation of the nursing intervention protocol among studied patients (n=50).

Function/ daily living degree of difficulty	Pre (N=50)		Post (N=50)		Chi-square test	
	No.	%	No.	%	x2	p-value
Descending stairs						
Non	2	4.0	13	26.0		
Mild	11	22.0	23	46.0		
Moderate	17	34.0	8	16.0	31.788	<0.001**
Severe	15	30.0	2	4.0		
Extreme	5	10	4	8.0		
Ascending stairs						
Non	6	12.0%	10	20.0%		
Mild	15	30.0%	20	40.0%		
Moderate	12	24.0%	16	32.0%	4.286	0.368
Severe	15	30.0%	2	4.0%		
Extreme	2	4.0%	2	4.0%		
Rising from sitting						
Non	8	16.0%	10	20.0%		
Mild	15	30.0%	16	32.0%		
Moderate	11	22.0%	12	24.0%	29.481	<0.001**
Severe	0	0.0%	12	24.0%		
Extreme	16	32.0%	0	0.0%		
Standing						
Non	2	4.0%	4	8.0%		
Mild	10	20.0%	15	30.0%		
Moderate	13	26.0%	15	30.0%	4.092	0.394
Severe	15	30.0%	11	22.0%		
Extreme	10	20.0%	5	10.0%		
Bending to floor/ pick up one object						
Non	2	4.0%	6	12.0%		
Mild	10	20.0%	15	30.0%		
Moderate	15	30.0%	18	36.0%	7.828	0.098
Severe	10	20.0%	6	12.0%		
Extreme	13	26.0%	5	10.0%		
Walking on flat surface						
Non	6	12.0%	10	20.0%		
Mild	14	28.0%	20	40.0%		
Moderate	15	30.0%	8	16.0%	9.463	0.048*
Severe	10	20.0%	2	4.0%		
Extreme	5	10.0%	6	12.0%		
Getting in/out of car						
Non	0	0.0%	3	6.0%		
Mild	5	10.0%	10	20.0%		
Moderate	10	20.0%	15	30.0%	9.290	0.054
Severe	15	30.0%	7	14.0%		
Extreme	20	40.0%	15	30.0%		
Going shopping						
Non	8	16.0%	10	20.0%		
Mild	11	22.0%	16	32.0%		
Moderate	15	30.0%	12	24.0%	29.481	<0.001**
Severe	0	0.0%	12	24.0%		
Extreme	16	32.0%	0	0.0%		

p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS

Table (7.1): concerned with degree of difficulty of daily living activity function among studied patients. The results revealed that there were statistically significant differences between pre and post implementation of the nursing intervention protocol in relation to descending stairs, rising from sitting, walking on flat surface and going shopping. However, there were no statistically significant differences between pre and post regarding other items as ascending stairs, standing, bending to floor/ pick up one, and getting in/out of car.

Table (7.2): Degree of difficulty of daily living activity Function pre and post implementation of the nursing intervention protocol among studied patients (n=50).

Function/ daily living degree of difficulty	Pre (N=50)		Post (N=50)		Chi-square test	
	No.	%	No.	%	x2	p-value
Putting on socks/stocking						
Non	0	0.0%	1	2.0%		
Mild	2	4.0%	10	20.0%		
Moderate	3	6.0%	10	20.0%	16.856	0.002*
Severe	15	30.0%	16	32.0%		
Extreme	30	60.0%	13	26.0%		
Rising from bed						
Non	6	12.0%	10	20.0%		
Mild	15	30.0%	20	40.0%		
Moderate	15	30.0%	16	32.0%	4.286	0.368
Severe	12	24.0%	2	4.0%		
Extreme	2	4.0%	2	4.0%		
Taking off socks/ stocking						
Non	8	16.0	12	24.0		
Mild	14	28.0	20	40.0		
Moderate	18	36.0	12	24.0	4.251	0.236
Severe	8	16.0	4	8.0		
Extreme	2	4.0	2	4.0		
Lying in bed (turning over maintaining knee position)						
Non	8	16.0	10	20.0		
Mild	18	36.0	26	52.0		
Moderate	12	24.0	8	16.0	4.927	0.177
Severe	8	16.0	4	8.0		
Extreme	4	8.0	2	4.0		
Getting in/out of bath						
Non	2	4.0	8	16.0		
Mild	12	24.0	14	28.0		
Moderate	15	30.0	10	20.0	4.985	0.173
Severe	18	36.0	16	32.0		
Extreme	3	6.0	2	4.0		
Sitting						
Non	2	4.0	10	20.0		
Mild	18	36.0	22	44.0		
Moderate	19	38.0	12	24.0	9.535	0.023*
Severe	8	16.0	3	6.0		
Extreme	3	6.0	3	6.0		
Getting on/ off toilet						
Non	8	16.0%	10	20.0%		
Mild	11	22.0%	16	32.0%		
Moderate	15	30.0%	12	24.0%	29.481	<0.001**
Severe	0	0.0%	12	24.0%		
Extreme	16	32.0%	0	0.0%		
Heavy domestic duties						
Non	2	4.0	6	12.0	7.200	0.066
Mild	18	36.0	26	52.0		

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Moderate	14	28.0	6	12.0		
Severe	14	28.0	10	20.0		
Extreme	2	4.0	2	4.0		
Light domestic duties						
Non	4	8.0	10	20.0		
Mild	16	32.0	24	48.0		
Moderate	18	36.0	10	20.0	16.616	<0.001**
Severe	8	16.0	4	8.0		
Extreme	4	8.0	2	4.0		

p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS

Table (7.2) revealed that there were statistically significant differences between pre and post implementation of the nursing intervention protocol in relation to putting on socks/stocking, sitting, getting on/ off toilet, and light domestic duties. While, there were no statistically significant differences between pre and post regarding other items.

Table (8): Degree of difficulty of sports and recreational activities function pre and post implementation of the nursing intervention protocol among studied patients (n=50).

sports and recreational activities Function difficulty	Pre (N=50)		Post (N=50)		Chi-square test	
	No.	%	No.	%	x2	p-value
Squatting						
Non	0	0.0	2	4.0		
Mild	5	10.0	10	20.0		
Moderate	17	34.0	15	30.0	4.282	0.237
Severe	20	40.0	18	36.0		
Extreme	8	16.0	5	10.0		
Running						
Non	0	0.0	2	4.0		
Mild	5	10.0	10	20.0		
Moderate	18	36.0	16	32.0	4.282	0.236
Severe	10	20.0	7	14.0		
Extreme	17	34.0	15	30.0		
Jumping						
Non	12	24.0%	16	32.0%		
Mild	15	30.0%	20	40.0%		
Moderate	15	30.0%	10	20.0%	4.286	0.368
Severe	6	12.0%	2	4.0%		
Extreme	2	4.0%	2	4.0%		
Twisting/ pivoting on your injured knee						
Non	0	0.0%	3	6.0%		
Mild	5	10.0%	10	20.0%		
Moderate	10	20.0%	15	30.0%	9.290	0.054
Severe	15	30.0%	7	14.0%		
Extreme	20	40.0%	15	30.0%		
Kneeling						
Non	2	4.0%	4	8.0%		
Mild	10	20.0%	15	30.0%		
Moderate	13	26.0%	15	30.0%	4.092	0.394
Severe	15	30.0%	11	22.0%		
Extreme	10	20.0%	5	10.0%		

p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS

Concerning to degree of difficulty of sports and recreational activities function **Table (8)** shows that there were no statistically significant differences between pre and post implementation of the nursing intervention protocol regarding degree of difficulty of sports and recreational activities function among studied patients, however, there was marked improvement post implementation of nursing intervention protocol than pre.

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Table (9): Knee-related quality of life pre and post implementation of the nursing intervention protocol among studied patients pre and post implementation of the nursing intervention (n=50).

Stiffness	Pre (N=50)		Post (N=50)		Chi-square test	
	No.	%	No.	%	x2	p-value
How often are you aware of your knee problems?						
Never	6	12.0%	2	4.0%	7.828	0.098
Monthly	15	30.0%	10	20.0%		
Weekly	18	36.0%	15	30.0%		
Daily	6	12.0%	10	20.0%		
Always	5	10.0%	13	26.0%		
Have you modified your lifestyle to avoid potentially damaging activities to your knee?						
Not at all	12	24.0%	0	0.0%	29.481	<0.001**
Mildly	10	20.0%	8	16.0%		
Moderately	16	32.0%	11	22.0%		
Severely	12	24.0%	15	30.0%		
Totally	0	0.0%	16	32.0%		
How troubled are you with lack of confidence in your knee?						
Not at all	0	0.0%	3	6.0%	9.290	0.054
Mildly	5	10.0%	10	20.0%		
Moderately	10	20.0%	15	30.0%		
Severely	15	30.0%	7	14.0%		
Totally	20	40.0%	15	30.0%		
In general, how much difficulty do you have with your knee?						
None	0	0.0%	1	2.0%	16.856	0.002*
Mild	3	6.0%	10	20.0%		
Moderate	2	4.0%	16	32.0%		
Severe	15	30.0%	10	20.0%		
Extreme	30	60.0%	13	26.0%		

p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS

Regarding Knee-related quality of life **Table (9)** reveals that there were statistically significant differences between pre and post implementation of the nursing intervention protocol in relation to lifestyle modification and difficulty with knee (p value < 0.001 & 0.002 respectively) among studied patients.

4. DISCUSSION

This study aimed to examine the effect of designed nursing intervention protocol on outcomes of patients with symptomatic knee osteoarthritis.

Regarding demographic characteristics the results of the current study revealed that, more than one third of the study subjects their age was between 50 and 60 years with mean age 47.52 ± 8.08. The current study result is on the same line with ***Fadl, Yousef, EL-Labba, Teleb, and Gamal (2014)*** who stated that the studied patients their age ranged between 50 and 62 years, also ***Prieto-Alhambra, et al (2014)*** who stated that osteoarthritis causes impaired joint function and disability especially among older patients.

Regarding gender, more than half of the study subjects were females, that is similar to ***Dziedzic., et al (2018),*** who stated that three quarters of the study subjects were females. They read and write, had hard work that requires a muscular and joint effort, this reflect the risk factors for symptomatic knee osteoarthritis that included females more than males and, malalignment and abnormal loading of the joints which occurs with those whose work need excessive effort on the joints which is similar to what is found by ***Johnson and Hunter (2014)*** that highly repetitive, and strong physical activity seems to lead to increased risk of developing hip and knee osteoarthritis**.**

Regarding medical data the results of the current study found that more than half of the studied patients' duration of disease was 1-3 years, less than half of them both of their knees were affected by osteoarthritis, considered obese according to their BMI. This reflect the obesity as risk factor for developing knee osteoarthritis. These results are consistent with ***Mahmoud, Moghazy, Fathy, and Niazy (2018)*** who found that most of the studied patients suffered from bilateral knee osteoarthritis, also, ***Abd Elstaar, Salama, Esaily (2016) and Palazzo et al., (2016)*** found that the majority of the studied patients were overweight.

Regarding smoking less than half of studied subjects were smokers and had chronic illness such as hypertension and diabetes mellitus. This could be due to the association between smoking and chronic diseases as diabetes mellitus and inflammation in the different body tissues, which is in the same line with ***Abd El Hamid, El Sawy, Abo Zeid, and Abdelmaksoud (2018)*** who found that knee osteoarthritis is more prevalent in diabetic population, it is associated with more severe symptoms and signs that reflect increased inflammation and cartilage degeneration in diabetic patients. Also, ***Zhang, Wang and Liu (2017)*** showed that there was a significant relationship between hypertension and knee osteoarthritis.

According to ***El-Banouby, Zaki, Hamza, and Adly (2014)*** in Egyptian study, Knee was present in most of osteoarthritis study subjects. More than one third of them were obese and less than one quarter of them were smokers. Females have significantly more knee osteoarthritis than males. Females were more obese and less smokers.

According to the current study results, there was highly statistically significant difference between patients' knowledge and health practices regarding osteoarthritis management pre/post implementation of the nursing intervention protocol, post implementation phase, results showed highly statistically significant improvements in all areas of osteoarthritis knowledge and most items of health practices regarding symptomatic knee osteoarthritis management. The knowledge and health practices improvement might be related to the patient education and providing educational booklet and verbal instructional information, added to curiosity of the studied subjects. Moreover, education for patients with chronic diseases have a perceptive effect on their knowledge and understanding the risk involved with carelessness about the health.

This result reflects the first aim concerning the current study, as the nursing intervention protocol had a positive effect on the studied patients' knowledge and health practices. This result is consistent with ***Fadl et al., (2014)*** who documented a significant improvement in patients' knowledge and practices post program in addition to reaching of a satisfactory level of independence for daily activities living, with relive pain and a significant improvement in muscle strength.

Concerning the second aim, Patients outcomes, it will be discussed into five parts; symptoms, stiffness, pain, ADL, sports and recreational activities and knee related quality of life.

In relation to symptoms, this study presents that, there was no statistically significant difference except for swelling, although there was marked improvement of symptomes among study subjects post implementation of nursing intervention protocol than pre. This could be attributed to increasing their knowledge and practice level after the intervention and how to manage the symptoms.

On the same line ***Cuperus et al, (2015)*** who found that, there is no significant improvements were found on several secondary outcome including patient, but relatively small improvements were observed at the short and long-term.

The study results shows that there was no statistically significant difference between knee stiffness among studied patients pre and post implementation of the nursing intervention protocol, but there was marked improvement among study subjects post implementation of nursing intervention protocol than pre. This could be due to the nature of the knee stiffness that need time to be improved and this result is inconsistent with ***Mahmoud, Moghazy, Fathy, and Niazy (2018)*** who describe that knee stiffness had no changes post intervention.

Concerning to pain degree during activities, the study results delineates that there were statistically significant differences between pre and post implementation of the nursing intervention protocol in relation to currency of experiencing pain, degree of pain during activities such as straightening knee fully among studied patients. While there were no statistically significant differences between pre and post regarding pain during other activities as knee twisting, bending and walking in flat surface. this could be due to the effort and joint flexibility needed to make some movements easily and comfortably. These results agree with ***Ganji, et al., (2018)*** who reported that the self-management educational program had an impact on pain of the older adults with osteoarthritis.

In relation to degree of difficulty of daily living activity function among studied patients, The results revealed that there were statistically significant differences between pre and post implementation of the nursing intervention protocol in relation to descending stairs, rising from sitting, walking on flat surface, going shopping, putting on socks/stocking, sitting, getting on/ off toilet, and light domestic duties. However, there were no statistically significant differences between pre and post regarding other items as ascending stairs, standing, bending to floor/ pick up one, and getting in/out of car. This could be due to pain and disability of symptomatic knee osteoarthritis that can decrease the ability to perform daily activities.

These results are on the same line with ***Ganji et al. (2018)*** who found that, the use of self-management education is the best way to convince the patients of behavioral changes and non pharmacological treatment to promote their health, prevent the disease and successfully control it, also ***Mahmoud, Moghazy, Fathy, and Niazy (2018)*** added that education of osteoarthritis patient is necessary to achieve an optimum level of functioning, and ***Teirlinck et al., (2016)*** mentioned that there was no difference found between study and control groups regarding pain and physical function.

Concerning to degree of difficulty of sports and recreational activities function the current study findings showed that there were no statistically significant differences between pre and post implementation of the nursing intervention protocol regarding degree of difficulty of sports and recreational activities function among studied patients, however, there was marked improvement post implementation of nursing intervention protocol than pre. This could be due to training and increasing their knowledge and health practices. Regarding this result, ***Hansson et al., (2010)*** reported that patients with osteoarthritis education is useful and can improve self-perceived health as well as function in some degree,

Regarding Knee-related quality of life the results reveals that there were statistically significant differences between pre and post implementation of the nursing intervention protocol in relation to lifestyle modification and difficulty with knee among studied patients. This finding is inconsistent with ***Mahmoud, Moghazy, Fathy, and Niazy (2018)*** who mention that Egyptian patients with primary knee osteoarthritis have relatively poor health related quality of life.

In summary this study hypothesis was supported, as there were improvement in the patients with osteoarthritis including knowledge, health practices and outcomes according to KOOS questionnaire which include symptoms, stiffness, pain, activities of daily living, recreational activities and knee related quality of life, although there were no significant differences between pre and post implementation of the designed intervention protocol regarding most items, there was marked improvement as evidenced by percentage distribution.

5. CONCLUSION

Implementation of designed nursing intervention protocol had a positive effect on improving patients' level of knowledge and health practices regarding symptomatic knee osteoarthritis and markedly improving of Patient's outcomes regarding pain, symptoms, activities of daily, sports and recreational activities and knee related quality of life.

6. RECOMMENDATIONS

- Conducting comprehensive health education programs for patients with symptomatic knee osteoarthritis in outpatient's clinics with simple printed guidelines such as booklets, leaflets or brochures explaining how to manage the disease problems.
- Application of similar studies in symptomatic knee osteoarthritis to assess the needs and factors affecting such group of patients.
- Future efforts should be directed toward educating symptomatic knee osteoarthritis patients in accordance with their educational needs so patient-centered, personalized, and disease-specific effective education can be provided.

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