

Efficacy of Implementing Pre-operative Health Education Program on Post-operative Outcomes of Patients Undergoing Total Knee Arthroplasty

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Abstract: Total knee arthroplasty (TKA) is considered international standard of care and one of the most common successful surgical interventions for treating degenerative knee arthritis. Health education is very essential for patients undergoing (TKA) as patients have numerous fears and expectations as regards their postoperative outcomes. The aim of this study was to evaluate the efficacy of implementing preoperative health education program on post-operative outcomes of patients undergoing total knee arthroplasty. **Materials and method:** quasi experimental design was utilized at orthopedic department at Mansoura University Hospital. A purposive sample of (60) patients undergoing TKA was randomly divided into two groups with equal size (control and study). **Tools:** Two tools were used to collect the data and achieve the aim of the study as follows: Tool I: Structured Interview Questionnaire includes three parts; demographic and medical data, patients' knowledge assessment, and patients' self-reported practices, Tool II: patients' outcomes assessment questionnaire. **Results:** The present study showed significant improvement in the level of total knowledge, self-reported practices and total Knee Injury and Osteoarthritis Outcome Score (KOOS) in the study group in comparison to the control group post educational program. The study concluded that; pre-operative educational program has a positive effect on postoperative outcomes of patients undergoing total knee arthroplasty. The current study recommends; developing educational and rehabilitation programs to improve postoperative outcomes of patients undergoing total knee arthroplasty.

Keywords: Health education program, postoperative outcomes, Total knee arthroplasty.

I. INTRODUCTION

Osteoarthritis (OA) influences hundreds of millions of individuals around the world leading to large burden of pain, functional disabilities, and loss of quality adjusted life anticipation. It was evaluated that 251 million individuals endured from knee OA around the world [1]. In Egypt, osteoarthritis of the knee is one of the most common musculoskeletal diseases caused by bad habits and daily malpractices which abuse the joints resulting in chronic injuries and disabilities that require surgical intervention. More than five million Egyptians have osteoarthritis (OA). It accounts more than 90% of total knee arthroplastys (TKA) [2].

Total knee arthroplasty (TKA) is the most common joint arthroplasty accomplished in the United States; more than 600,000 knee arthroplasty is implemented annually. The number of patients undergoing TKA is predictable to increase by 600% in the next years. The knee arthroplasty procedure has established to be a very effective and reliable treatment for arthritis of the knee when conservative treatments fail to treat intolerable pain that affect activities of daily living and limit enjoyment of life [3].

The success and achievement of positive outcomes of TKR depend on several factors, including selection of appropriate patient, prosthesis design, preoperative circumstances of the joint, surgical techniques, pre-operative preparations and postoperative rehabilitation. Pre-operative preparations for patients on waiting list for knee replacement are very essential for achieving satisfactory outcomes. One of these preparations is patient education. It is necessary to ensure that patients obtain appropriate knowledge and practices to be prepared physically and psycho-logically for rehabilitation process through providing them with clear expectations of the recovery process [4].

Developing appropriate and comprehensive educational programs for those undergoing (TKA) will increase the patients' independence in self-care, assist their family members to recognize the benefits of the surgery, help patients resume their daily living activities and reduce risk of complications [5]. The nurse has a vital role in the preparation, care and support of the patient, In addition to his/ her essential role as a health educator through providing patients with verbal and written information about pre-operative preparations, recovery and other post-surgical milestones such as home preparations, physical therapy, care of wounds, having healthy body weight and regular follow up. This would reduce the number of hospital re-admittance visits and enhance successful post-operative functional outcomes [6].

Aim of the study

This study aimed to evaluate the efficacy of implementing pre-operative health education program on post-operative outcomes of patients undergoing total knee arthroplasty.

Research hypothesis

Implementation of pre-operative health education program may have a positive effect on post-operative outcomes of patients undergoing total knee arthroplasty.

II. MATERIALS AND METHOD

Research design

This study was carried out using quasi experimental design.

Setting

The study conducted at orthopedic department at Mansoura University Hospital.

Subjects

Patients undergoing total knee arthroplasty divided into two groups:

Group I (Control group): patients who received routine care of hospital.

Group II (Study group): patients who received hospital care in addition to pre-operative health education program.

Sampling

A purposive sample of 60 patients undergoing TKA divided with equal size. The patients were selected based on the following criteria: Adult of both sexes within the age of (21- 60) years old, conscious patients, have no previous knee surgery, and no apparent visual or auditory impairment.

The study tools

Two tools were utilized to collect data and achieve the aim of the study as the following:

Tool I: Structured Interview Questionnaire

It was designed by the researcher based on reviewing literatures, and scientific references to collect the required baseline data and assess patients' knowledge and self-reported practices. It includes three parts as follows;

Part (1): Demographic and medical data. This part was designed to collect personal and clinical data such as age, sex, marital status, occupation, level of education, causes of total knee arthroplasty, associated comorbidities, previous hospitalization, previous surgeries, family history and previous physiotherapy.

Part (2): Patients' knowledge assessment. This part was used to assess pre and post-operative patient's knowledge regarding total knee arthroplasty [7]. It includes (15) list questions; eleven questions have correct or incorrect response as they have only one correct answer, and four questions have correct and complete response as they have more than one correct answer.

Scoring system: The total scores of the knowledge ranged from 0 to 19. One mark awarded for each correct answer and zero for unknown or incorrect one. Questions that have correct or incorrect response scored 0- 1 with total score (0- 11) while, questions which have correct and complete response scored 0- 2 with total score (0- 8). The knowledge score was categorized into three levels: Poor < 50% of total scores (score 0 to 9), Fair = 50% to 65% of total scores (score 10 to 12), and Good > 65% of total scores (scores 13 to 19).

Part (3): Assessment of patients' self-reported practices. This part was used to assess patients' self-reported practices [8]. It includes three main items as follows; preoperative practices (it included two sub items), immediate post-operative practices (it included seven sub items), and day one till discharge practices (it included eight sub items).

Scoring system: The total self-reported practices score ranged from 0 to 17, one point awarded for each yes answer and zero for no answer. Patient self-reported practices scores were categorized into two levels: Improper < 65% of total scores, and Proper \geq 65% of total scores.

Tool II: Patients' outcomes assessment questionnaire

This tool was adopted from the Knee Injury and Osteoarthritis Outcome Score (KOOS) [9]. It is one of the patients' reported outcome measures that were designed to evaluate the functional health status of patients before and after implementing interventions. It includes 42 items which have five separate subscales involving knee symptoms and stiffness, knee pain, function in activity of daily living (ADLs), function in sport and recreation (Sport/Rec), and knee-related quality of life (QOL) [10].

Scoring system: Likert scale was utilized and each sub item has five possible answer options scored from 0 (No Problems) to 4 (Extreme Problem). The options of answer are; none or never (0 score), mild or rarely (1 score), moderate or sometimes (2 scores), severe or often (3 scores), and extreme or always (4 scores). The total KOOS score (0-168).

Validity and reliability of the tools:

The validity of the tools was tested by five experts in the field of the study; three experts of Medical- Surgical Nursing, one specialist professors of orthopedic surgery, and one specialist in biostatistics. They reviewed the clarity, relevance, understanding, and applicability of the study tools for implementation. According to their opinions, modifications were done. Reliability was measured to evaluate whether all items of the study tools measure the same variable, and how well the used items fit together conceptually. The reliability of the designed tools was calculated using Chronbach's alpha test and it was equal 0.817.

Pilot study: It was carried out on 10 % of the patients undergoing total knee arthroplasty (6 patients) who were randomly selected. It was done to check feasibility & applicability of the tools to help the researcher to determine the needed time for answering all the questions and excluded from total statistical analysis score. The needed corrections and modifications were done.

Ethical considerations

Administrative preparations such as official permission were attained from the faculty of nursing of Mansoura University. In addition, official letter was obtained from the hospital administrative authority after sending official letter from the faculty and clarifying the aim and nature of the study.

Oral consent was obtained from the patients after illustration the aim and nature of the study. Patient was reported that they have the right to refuse participation in the study and this wouldn't influence their care. Anonymity, privacy, safety and confidentiality were absolutely assured throughout the study. The researcher emphasized to the patients that they can pull out of participation at any time.

Data collection

Collection of data lasted for a period of eight months started from the beginning of April 2018 to the end of November 2018. The study was carried out through the following three phases:

Phase I: Preparatory phase; the researcher prepared the tools from the different scientific references, and identified the patients who will undergo total knee arthroplasty and meet the inclusion criteria. The researcher oriented the patient about the aim of the study, phases, and goals of the program. This followed by collecting baseline data to help designing the educational program. In this phase the researcher assessed the control and the study group pre operatively as a pretest using tool I, part (1&2) and tool II. Based on the information obtained from pretest study, in addition to literature review, the researcher designed the instruction program under the guidance of the supervisors. Its main aim was to improve knowledge, practices and post-operative outcomes of patients undergoing total knee arthroplasty.

Phase II: Implementation phase; in this phase the health education program had been carried out at orthopedic department. The researcher stressed on the importance of continuous attendance and active participation. The program was conducted with three sessions; through three days (1 session /day), each session took about 30- 45 minute for study group. The first session was about; (definition of total knee arthroplasty, benefits, preoperative physiotherapy, preoperative home preparations and preparing for surgical procedure). The second session was about; (postoperative instructions related to respiration and keeping the chest clear, pain management, practicing exercise from day one till discharge, drug needed, and practicing daily living activities using assistive devices as walker and crutches). The third session was about; (health instructions related to allowed activities, nutritional regimen, possible complications, rehabilitation and follow up appointments).

Different teaching and learning methods were used during the sessions which included; interactive lecture, discussion, demonstration & redemonstration, instructional media such as pictures, and printed handout were presented in clear and concise form to be used as memorial reference. Patients were allowed to ask any interpretation, or explanation of any item included in the session. The instructional program was given for each patient alone according to the time table for their operation.

Phase IV: Evaluation phase (Posttest & follow-up tests): the efficacy of implementing the preoperative health education program on postoperative outcomes of patients undergoing total knee arthroplasty was evaluated to both groups (control and study group). It was evaluated three times as follows; immediately after the health education program implementation (Immediate post-test) using tool I part (2) at orthopedic department, Pre-discharge using tool I part (3) at orthopedic department and after 2 months of health education program implementation (follow-up) by using tool I part (2) & tool II at outpatient clinics. The results of both groups were compared to the pretest results to evaluate the effect of the educational program.

III. RESULTS

Table (1): Demographic and medical data of the studied patients (N= 60)

Demographic data		control group		study group		χ^2	P
		(N=30)		(N=30)			
		N	%	N	%		
Age	41-<51	4	13.3	3	10.0	0.162	0.688
	51-60	26	86.7	27	90.0		
Sex	Male	14	46.7	14	46.7	0.000	1.000
	Female	16	53.3	16	53.3		
Marital status	Married	30	100	30	100	-	-
Education level	Illiterate	12	40.0	15	50.0	2.933	0.231
	Read and write	6	20.0	9	30.0		
	Secondary education	12	40.0	6	20.0		
Occupation	Not working	8	26.7	6	20.0	0.373	0.542
	Working	22	73.3	24	80.0		

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level of working	Moderate	6	27.3	9	37.5	0.180	0.671
	Heavy and very heavy	16	72.7	15	62.5		
Live with	Partner	30	100	30	100	-	-
Medical data							
Causes of (TKA)	Osteoarthritis	26	86.7	26	86.7	0.000	1.000
	Traumatic arthritis	4	13.3	4	13.3		
Comorbidities	No	14	46.7	14	46.7	0.000	1.000
	Diabetes mellitus	5	16.7	5	16.7		
	Hypertension	9	30.0	9	30.0		
	DM and HTN	2	6.7	2	6.7		
Preoperative physiotherapy	No	30	100	30	100	-	-
Previous hospitalization	No	26	86.7	26	86.7	0.000	1.000
	Yes	4	13.3	4	13.3		
Family history of previous knee surgery	No	30	100	30	100	-	-

χ^2 : Chi-square test

Table 1 represents the demographic and medical data of the studied patients and shows that, the majority of control and study group (86.7 % and 90%) respectively ranged between 51 to 60 years old, more than half of the studied patients (53.3 %) were females, 72.7% of the control and 62.5% of the study group were working heavy and very heavy working activities, and 86.7% of the studied patients were having osteoarthritis. Also, there is no statistically significant difference between the two groups as regards demographic and medical data (P > 0.05).

Table (2): Comparison between control and study group according to the level of total knowledge pre and post program (N= 60).

Level of total knowledge	The studied patients with total knee arthroplasty (n=60)												χ^2 P				
	Control group (n=30)						Study group (n=30)						(Control vs Study group)				
	Pre-operative		Immediate post-program		2 months post-program		χ^2 P	Preoperative		Immediate post-program		2 months post-program		χ^2 P	Pre	Immediate Post	2 months post
	n	%	n	%	n	%		n	%	n	%	n	%				
Poor (<50%) (0-9)	30	100	28	93.3	29	96.7	2.069 0.355	30	100	0	0	0	0	90.327 0.0001*	-	56.000 0.0001*	57.000 0.0001*
Fair (50-65%) (10-12)	0	0	2	6.7	1	3.3		0	0	2	6.7	3	10.0				
Good (>65%) (13-19)	0	0	0	0	0	0		0	0	28	93.3	27	90.0				

Table 2 represents the comparison between control and study group according to the level of total knowledge pre and post program and shows that, 100% of the studied patients (control and study group) had poor score level of knowledge preprogram while, 93.3% and 90% of study group had good score level of knowledge immediately and two months post program respectively. Also, there is a statistically significant difference between study and control group regarding the level of total knowledge immediately and two months post program (p < 0.05).

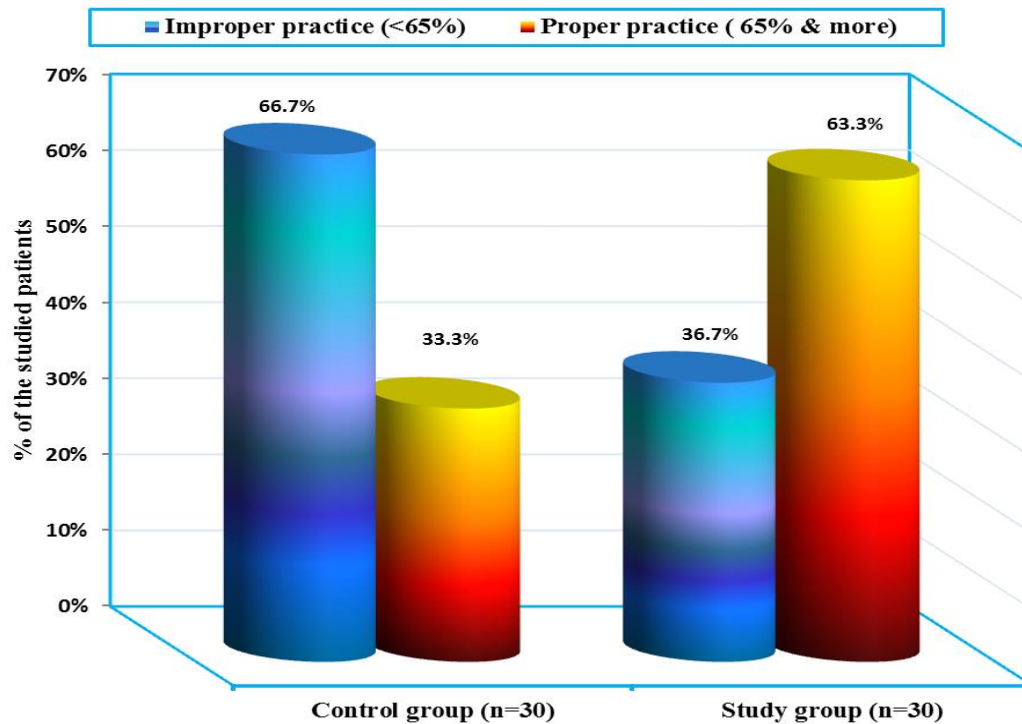


Figure (1): Level of total self-reported practices among control and study group

Figure 1 displays the comparison between control and study group according to the level of total self-reported practices and shows that, there is a significant improvement in the level of total self-reported practices (proper level) in study than control group (63.3% and 33.3% respectively).

Table (3): Comparison between control and study group in the mean scores of (KOOS) sub items pre and postoperatively

Knee injury and Osteoarthritis Outcome Score (KOOS) (sub items)	No. of items (score)	The studied patients with total knee arthroplasty (n=60)						t-test P (Control vs. Study group)	
		Control group (n=30)			Study group (n=30)			Pre-operative	Post-operative
		Preoperative	Postoperative	Paired t-test P	Preoperative	Postoperative	Paired t-test P		
1. Knee symptoms and stiffness	7 (0-28)	Range 15-10 Mean±SD 17.33±2.09	Range 7-16 Mean±SD 10.50±0.78	10.771 0.0001*	Range 15-19 Mean±SD 17.17±1.02	Range 9-12 Mean±SD 10.57±0.90	26.607 0.0001*	0.393 0.696	0.125 0.901
2. Knee pain	9 (0-36)	Range 27-34 Mean±SD 29.67±3.14	Range 8-17 Mean±SD 12.60±2.44	23.474 0.0001	Range 27-34 Mean±SD 29.67±3.14	Range 6-10 Mean±SD 8.33±0.99	35.436 0.0001*	0.000 1.000	8.858 0.0001*
3. Degree of experienced difficulty in Activity of daily livings (ADLs)	17 (0-68)	Range 49-56 Mean±SD 52.00±2.99	Range 9-24 Mean±SD 17.33±6.34	27.071 0.0001*	Range 49-56 Mean±SD 52.00±2.99	Range 9-18 Mean±SD 14.40±2.93	49.148 0.0001*	0.000 1.000	2.299 0.025*
4. Function, sports and recreational activities	5 (0-20)	Range 20-20 Mean±SD 20.00±0.00	Range 5-15 Mean±SD 10.93±4.29	11.574 0.0001*	Range 20-20 Mean±SD 20.00±0.00	Range 8-9 Mean±SD 8.10±0.30	213.612 0.0001*	0.000 1.000	3.608 0.001*
5. Quality of life	4 (0-16)	Range 11-13 Mean±SD 12.00±0.83	Range 4-6 Mean±SD 5.20±0.92	29.966 0.0001*	Range 11-13 Mean±SD 12.00±0.83	Range 4-6 Mean±SD 4.67±0.88	33.114 0.0001*	0.310 0.758	2.283 0.026*
Total KOOS scores	42 (0-168)	Range 129-134 Mean±SD 131.00±2.20	Range 36-75 Mean±SD 56.57±13.86	29.051 0.0001*	Range 127-134 Mean±SD 130.83±1.97	Range 40-75 Mean±SD 46.07±3.50	115.570 0.0001*	4.023 0.0001*	

*Significant (P<0.05)

Table 3 shows the comparison between control and study group according to the mean scores of (KOOS) sub items pre and postoperatively and clarifies that, there is a statistically significant difference within control and study group pre and postoperatively in all (KOOS) sub items while, in between control and study group there is a statistically significant difference regarding mean scores of (KOOS) sub items post operatively except in item of knee symptoms and stiffness.

Table (4): Correlation between total practice scores and both total knowledge scores and (KOOS) post-program among control and study group

Variables	Total practice scores among the studied patients (N= 60)			
	Control group (n=30)		Study group (n=30)	
	r	P	r	P
Total knowledge score				
Immediate post program	0.070	0.713	0.833	0.0001*
two months post program	0.131	0.489	0.070	0.715
Knee injury and Osteoarthritis Outcome Score (KOOS) post-operatively:				
1. Knee symptoms and stiffness	-0.421	0.020*	-0.777	0.0001*
2. Knee pain	-0.159	0.400	-0.512	0.004*
3. Degree of experienced difficulty in Activity of daily livings (ADLs)	-0.635	0.0001*	-0.963	0.0001*
4. Function, sports and recreational activities	0.367	0.046*	-0.916	0.0001*
5. Quality of life	0.081	0.671	-0.186	0.326
Total KOOS scores	-0.700	0.0001*	-0.965	0.0001*

***Significant (P<0.05)**

r=Correlation Coefficient

Table 4 represents the correlation between total practice scores and both total knowledge scores and (KOOS) post-program among control and study group and reveals that, there is a significant positive correlation between total knowledge post program and total practices while a negative correlation between total practice scores and total (KOOS) in both control and study group except item of quality of life.

IV. DISCUSSION

Total knee arthroplasty (TKA) is currently a universal standard of care and one of the most common successful surgical interventions for treating degenerative knee joint disease and certain knee joint fractures. It is an effective surgery of relieving pain, restoring physical functioning and promoting health related quality of life [3]. But, surgery can be stressful - emotionally and physically. It is thought that patients, who receive information and educated preoperatively about their surgery and recovery will have successful outcomes.

Regarding demographic and medical data, the present study revealed that, there is no statistically significant difference between the two groups as regards demographic and medical data. This implies that both control and study group are homogenous and comparable. This came in accordance with Steimle et al., (2018) who stated that, the comparison of demographic information and personal characteristics of the two groups undergoing total knee arthroplasty was similar [11].

In relation to age, the current study represented that, the majority of the control and the study group ranged between fifty one to sixty years old. This result was in agreement with Dayucos et al., (2019) who reported that the majority of the studied patients were in the age group of fifty to less than or equal sixty years old [12]. These findings may be related to cumulative exposure to various risk factors and biological changes that occur with advanced age such as thinning of the cartilage and decreased muscle strength.

Regarding sex, the current study revealed that more than half of the studied patients were females. These findings were similar to AlKuwaity et al., (2018) who found that more than half of TKA patients were females and was in the same line with Kremers et al., (2015) who stated that the prevalence of TKA was higher among women than men [13, 14].

As regards occupation, the present study clarified that, two thirds of the studied patients were working heavy and very heavy working activities. This can be attributed to the fact that manual work that requires excessive stress on the knee joint is the most work available for these patients based on their middle or lower level of education. These findings agree with Lombardi et al., (2014) who stated that more than half of the patients undergoing TKA were working heavy and very heavy working activities [15]. Moreover, these results supported by Williams et al., (2011) who mentioned that there is a strong relationship between occupational activities that require heavy works and the incidence of osteoarthritis [16].

Concerning the assessment of patients' knowledge, the present study showed significant improvement in the level of total knowledge in the study than control group post educational program. This consistent with the results of O'Reilly et al., (2018) who reported that, total knowledge score revealed a statistically significant difference between pre and post-attending educational program about TKA surgery [17]. Similarly, this positive response to the educational program is supported by Yin, Goldsmith & Gambardella, (2015) who confirmed that preoperative education enhances patients' knowledge regarding their upcoming surgery and post-operative recovery, so patients will be less anxious and has real expectations [18].

In relation to the assessment of patients' self-reported practices, the current study presented that there is a significant improvement in the level of total self-reported practices (proper level) in study than control group after implementation of educational program. These results agree with Chen et al., (2014) who mentioned that, preoperative educational intervention enhances patients' self-care skills, leading to improving their postoperative physical functioning and the study group displayed improvements in health practices in comparison with the control group [19].

On the other hand, the findings supported by Edwards, Mears & Barnes, (2017) who emphasized that preoperative educational program for TKA may help patients to adhere to healthcare guidelines and treatment plans, prepare them for rehabilitation after surgery, modify their health behaviors and make lifestyle changes to manage their conditions [20]. In contrast, Kim et al., (2015) showed that there were no significant differences in patients' practices between the study and control group after implementation of educational program [21].

In relation to the assessment of Patients post-operative outcomes, the present study revealed significant improvement in the studied patients (control and study group) in total KOOS post operatively. Likewise similar findings reported by Eil, Ismail, Shokri, & AbRahman, (2016) who demonstrated that, the total analysis of the five subscales of the KOOS, shows significant improvement after total knee arthroplasty in the two groups [22]. These results confirmed by Khan, Osman, Green & Haddad, (2016) who mentioned that TKA is the most common successful operations in orthopedic surgeries and most patients have better outcomes [23].

In addition, the current study revealed significant improvement of total KOOS of the study group after applying educational program, in comparison with the control group. The results supported by Calatayud et al., (2017) who observed a significant improvement in all KOOS subscales in the study than the control group postoperatively [24]. These findings were contradicted with Aydin et al., (2015) who performed a meta-analysis study to decide whether the literature proves the positive effect of preoperative patient education and stated that three studies found no significant difference between the study and control group as regards postoperative outcomes [25].

From the researcher point of view, the improvement in the study group indicates the success of the educational program, beside, the fact that when the patient is regarded as an important person by encouragement, reinforcement and education, he or she becomes more motivated, cooperative, ready to learn and actively participate in the rehabilitation program to

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quickly return to the proper level of functioning. In addition, the good preparation and proper education by written instructions with illustrations, active participation, and effective performance of exercise and self-care skills can enhance patient recovery and post-operative outcomes.

As regards the correlation between knowledge and practice, the present study revealed a positive correlation between total knowledge scores post program and total practice scores among the studied patients. These findings came in the same line with Wlodkowski, & Ginsberg, (2017) who proved that, there is a positive relationship between knowledge and practice that will encourage health care providers to the challenge of educating, motivating and providing full support to those who wish to modify their lifestyle [26].

In reference to the correlations between practices and improvement of total KOOS, the current study clarified that there a positive correlation between self-reported practices and improvement of total KOOS in the study group. The results matched with the study done by Rosso et al., (2018) who mentioned that, functional outcome subscale of KOOS showed statistical highly significant improvement in the study than the control group due to improvement of their health practices [27].

V. CONCLUSION

Based on the results of the current study we concluded that implementation of pre-operative health education program has a positive effect on improving knowledge, practices and post-operative outcomes of patients undergoing total knee arthroplasty.

VI. RECOMMENDATION

1. Developing educational and rehabilitation programs to improve postoperative outcomes of patients undergoing total knee arthroplasty.
2. Arabic, colored booklet regarding knee arthroplasty surgery should be available for all patients undergoing total knee arthroplasty.
3. Evaluation of functional outcomes of patients undergoing TKA progressively using objective outcome measures.
4. Implementing follow up programs to assess the quality of life for patients undergoing TKA.

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