Effectiveness of Nursing Intervention Protocol on Nurses' Performance and Patients' Self-Care after Cataract Surgery

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ABSTRACT

Context: Cataract is the leading cause of poor vision worldwide. Patients who knowledgeable and skillful nurses well prepare are better prepared to engage in appropriate self-care activities post-cataract surgery.

Aim: This study aimed to assess the effectiveness of nursing intervention protocol on nurses' performance and patients' self-care after cataract surgery.

Methods: The study followed a quasi-experimental, pretest-posttest design. The study was conducted in ophthalmology surgical inpatient units and the outpatient clinics at Benha University Hospital. The sample consisted of all available nurses (35) working in the ophthalmology surgical inpatient units, and the outpatient clinics who are willing and agreed to participate in the study and a convenient sample consisted of 50 patients of both genders were also included in the current study before implementing nursing intervention protocol. Three tools were used to conduct the study: A structured interview questionnaire, nurses' practice checklist, and patients' self-care activity checklist.

Results: The results showed statistically significant improvements in nurses' performance (knowledge and practice) immediately post and one-month follow-up post-nursing intervention protocol compared with pre-nursing intervention protocol implementation (p<0.001). General improvement in patients' self-care activities (41.6±11.042) increased significantly to (64.2±13.65) after nursing intervention protocol implementation at p=0.001. However, after one month of implementing the nursing intervention protocol, a slight decline occurred after one month (52.46±10.97) compared to pre intervention level. Highly statistically significant differences were observed at a p-value ≤0.001.

Conclusion: Findings of this study conclude that the nursing intervention protocol was effective in improving nurses' performance, which was reflected in improving the practice of patients' self-care activities cared for by nurses exposed to nursing intervention protocol implementation. It is recommended that further studies are suggested to investigate the outcome of the implementing nursing intervention protocol on decreasing the occurrence of complications post-cataract surgery.

Keywords: Post cataract surgery, nursing intervention protocol, nurses' performance, self-care

1. Introduction

Cataract, defined as the loss of the crystalline lens's optical consistency, develops gradually, extending from the smallest changes of original clearness of the lens to whole cloudiness *(WHO, 2013)*. It is the leading cause of vision loss in people over the age of 40 and the world's leading cause of blindness *(Randleman, 2014)*. According to the WHO, the cataract is the leading cause of poor vision worldwide *(Mandal, 2014)*. Despite the potential for excellent results, the outcome of cataract surgery may frequently be suboptimal, particularly in rural areas *(Robertson, 2015)*. Globally, the number of people of all ages visually impaired is estimated to be 285 million. The Beaver Dam eye study results demonstrated that 38.8% of men and 45.9% of women had visually significant cataracts *(Zetterberg & Celojevic, 2015)*.

WHO statistics demonstrate that Egypt has approximately 1 million people blind and 3 million visually impaired. Nearly 60% of the visually impaired people in Egypt have a cataract, which requires surgery *(WHO, 2019)*. Currently, cataract surgery is the only successful procedure for improving or maintaining vision *(Chen et al., 2018)*. However, *The Way Forward Cataract Report (2017)* estimates, the average expected rates of adult cataract surgery are around 7.30 per 1,000 people, and the number of cataract operations is expected to rise by 50% between 2015 and 2023 *(The Royal College of Ophthalmologists, 2017)*.

A cataract may cause no visual disturbances at first because the clouding affects only a small part of the lens, but as it grows, a variety of symptoms may notice *(Garland & Fisher, 2015)*. The patient with a cataract may complain of a decrease in vision, abnormal color perception, and glare.

A cataract is linked to poor health, limited activity, diminished driving capacity, severe emotional distress, and a decreased quality of life. Low vision may also be a major psychological stressor for patients and their families *(Lam & Ratra, 2015)*. When a person's vision deteriorates to around 20/50, it threatens the quality of life, and cataract surgery is normally suggested *(Oles, 2012)*.

The definitive cure for cataracts is surgery, which can be used when the visual disability interferes with a person's everyday activities. The natural lens is removed and replaced with a new, artificial lens during cataract surgery.

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It is one of the safest and most effective procedures available, but it is not available to all, and the available surgery does not yield the same results. Surgical facilities capable of providing good vision recovery must be readily available and suitable to anyone in need, regardless of their circumstances *(Trent & Albright, 2014)*.

Post-operative care refers to the care that a patient receives following a surgical procedure. Post-operative care begins immediately after surgery, for the duration of hospital stay, and may continue after discharge from the hospital *(Janice & Cheever, 2013)*.

Inadequate post-operative nursing knowledge may lead to serious complications for the patient with cataract surgery *(Oles, 2012)*. Potential complications that may occur with cataract surgery include infection in the eye (endophthalmitis), swelling and fluid in the center of the nerve layer (crystalloid macular edema), corneal edema, bleeding in the front of the eye, rupture of the capsule, and loss of fluid and retinal detachment *(Cynthia et al., 2010)*.

Self-care is the practice of being mindful of and attending to one's specific physiological and emotional needs regularly, such as determining one's daily routine, relationships, and the environment as needed to promote self-care. Self-care deficit was viewed as impaired ability to perform or complete bathing, dressing/grooming, toilet care, care related to feeding, hair care, and nail care. Guidelines of self-care were designed to enhance self-care ability and included scheduling daily activities *(Cook-Cottone, 2015; Wei, 2012)*.

Nurses are important in every aspect of cataract surgery. The challenges are avoiding or impeding the incidence of problems and punctually dealing with any that does occur. Hence, patient requirements must be identified, perfected, and delivered through proper nursing interventions. An educational nursing protocol would thus help the nurses in ophthalmology departments *(Needham et al., 2009)*.

Nursing intervention protocol could promote nurses' knowledge and practice, which reflect on patient care and enhance patient self-care activities that lead to a lower rate of post-operative complications. Also, it enhances the effectiveness and availability of care for the patient with cataract *(American College of Eye Surgeons, 2013)*.

2. Significance of the Study

In Egypt, there are approximately 1 million unsighted peoples, and 3 million are visually impaired. Nearly 60% of the visually impaired in Egypt have cataracts *(WHO, 2015)*. Poor vision affects 47.9% of the Egyptian population of all ages, with cataracts being the leading cause of blindness (54.8 percent) *(Hegazy et al., 2012)*.

A cataract is also the leading cause of blindness in the world. Patients' independence in self-care and efficiency of activities of daily living (ADL) may be harmed as a result of this condition, resulting in lower quality of life. If a cataract surgery patient receives insufficient or inadequate knowledge of post-operative care after surgery, numerous complications will occur at any time. The most common

concerns were daily activities, complications, medications administration, and follow-up *(Leeds, 2015)*.

From clinical observation in the ophthalmology surgical inpatient unit and the outpatient clinics at Benha University Hospital, it was discovered that the number of patients suffering from cataracts has increased over the last years and these patients require centered care to save their lives. Since they are at risk of a variety of negative effects, these effects may have a detrimental effect on the patient's physical and mental health, which is why there is a need to do studies that could protect this group of patients from these severe consequences, Besides, spread research was done in this area especially on the countrywide level. It is also hoped that the results of this study would aid in humanizing the superiority of patient care. Moreover, set up evidence-based data that can encourage nursing practice and research.

3. Aim of the study

This study aimed to evaluate the effectiveness of nursing intervention protocol on nurses' performance and patients' self-care after cataract surgery through the following:
- Assess nurses' performance related to care for patients with cataract surgery.
- Assess patients' self-care practices post-cataract surgery.
- Design nursing intervention protocol about cataract surgery based on nurses' and patients' needs.
- Evaluate the impact of nursing intervention protocol on nurses' performance and patient self-care post-cataract surgery.

3.1. Research hypotheses

The following research hypotheses were developed to achieve the current study's aim:

H1: The post mean knowledge scores of nurses exposed to nursing intervention protocol will be significantly higher than before the intervention.

H2: The post mean practice scores of nurses exposed to nursing intervention protocol will be significantly higher than before the intervention.

H3: Self-care activities mean scores of patients cared for by nurses exposed to nursing intervention protocol implementation will be higher than before the intervention.

3.2. Operational definition

Nursing intervention protocol

It is a prepared intervention protocol provided for nurses working with cataract patients to improve their knowledge, practices and reflect its impact on patient self-care activities.

Nurses' performance

It is the nurses' knowledge and practice of nurses under the study.

Patient self-care activities

Patient ability to perform complete bathing, dressing/grooming, toilet care, care related to feeding, hair care, and nail care.

3.3. Conceptual framework

Orem's Self-care Theory of Nursing is the framework for this study. *Orem's (1995)* general theory comprises three interrelated theories: Theory of self-care, a theory of self-care deficit, and theory of nursing systems. The theme of the self-care theory is that individuals can care for themselves and their dependents. Orem views nursing performance as an effort to meet the self-care needs of individuals across the continuum of care. When a nurse practitioner assesses the patient's needs, actually nurse follows Orem theory *Banfield, (2011).*

4.Subjects & Methods

4.1. Research design

A quasi-experimental research design(pre/post-test) was used in this study. It includes the handling of an independent variable without the random assignment of participants to conditions. Among the important types are nonequivalent group designs, pretest-posttest, and interrupted time-series designs *(Shadish,2002)*. The independent variable is the nursing intervention protocol, while the dependent variables are nurses' knowledge, practices, and patients' self-care activities.

4.2. Research Setting

The study was conducted at ophthalmology surgical inpatient units and the outpatient clinics at Benha University Hospital. The ophthalmology surgical inpatient unit has five rooms, including ten beds. It receives patients from all over the Kalubeia Governorate.

4.3. Subjects

Group A: All nurses (35) worked at ophthalmology surgical inpatient units with different educational backgrounds willing to participate in the study.

Group B: The patients' group included 50 patients from both genders undergoing cataract surgery in the study setting selected by convenience sampling before implementing the nursing intervention protocol recruited in August 2018. Those handicapped, those with mental disabilities, and those who cannot communicate were excluded. It was according to power analysis using the epi-info program to estimate the sample size using the following parameters:
- Population size 150
- Expected frequency 50%
- Maximum error 10%
- Confidence Coefficient 95%.

4.4. Tools of the study

Three tools were used in this study:

4.4.1. Structured Interview Questionnaire

It was developed in a simple, clear Arabic language by the researcher based on a related literature review *(Hegazy et al.,2012*; *Abdel-hady2015; Elgazar, 2017)* to assess nurses' knowledge regarding care of patients undergoing cataract surgery (pre / post-tests). It was made up of the following parts:
- The first part is concerned with the nurses' demographic characteristics such as age, marital status, qualifications, job position, offspring's, years of experiences, and attendances of training programs related to cataract surgery.
- The second part was concerned with nurses' knowledge about cataract surgery and nursing intervention. It consisted of 40 multiple choice questions (MCQ) covering three main areas: Anatomy and physiology of the eye (5 MCQs), cataract illness such as meaning, causes and risk factors, types, signs and symptoms, diagnosis, and avoidance (10 MCQs), cataract surgery indications, techniques, and complications (10 MCQs). Finally, the nursing intervention following cataract surgery such as position after surgery, relieving post-operative pain, avoiding infection, the manifestation of a contaminated eye, healthy diet to help healing, and post-operative complications (15 MCQs).

Scoring system

For knowledge scoring, the correct answer received a score of (1), while an incorrect response received a zero score. The scores of the items were added together for each field of information, and the sum was divided by the number of items, yielding a mean score for the section. These numbers were then translated to a percentage. Knowledge was counted as unsatisfactory if the percent score was less than 60 %, satisfactory if the percent score was 60-75%, and good if the percent score was more than 75%.

4.4.2. Nurses' Practice Checklist

This checklist aimed at assessing actual nurses′ practice regarding nursing care provided to cataract patients post-surgery. It was created by the researcher using relevant literature *(MeCann and Judith, 2010; Cooper et al. (2009); Wilkinson et al., 2016)* (pre/post-test)*. It evaluated the nurse's skills in administering eye drops (8 steps), administering ointment (7 steps), and adjusting eye dressings (16 steps); performing eye care and infection control (12 steps). In addition to relieving post-operative pain with non-pharmacological methods (72 steps) that were divided into relaxation massage (9 steps), tense and relax exercise (40 steps), deep breathing exercise (7steps), and psychological support (16 steps).

Scoring system

The practice items observed to be done correctly were scored (1), and the items not done or incorrectly done were scored (0). The total score for all items was115 marks. The scores of the items were added together for each subsection, and the total was divided by the number of items, yielding a mean score for the section. These results were then translated to a percentage ranking, means and standard deviations were computed. The practice was considered incompetent if the percent score was less than 60%, competent if the percent score was 60-75%, and good if the percent score was more than 75%.

4.4.3. Patients Self-care Activity Checklist

It was developed in a simple, clear Arabic language based on a study of relevant literature by *El gazar (2017), El-sayed (2013), Abdel-hady (2015), McCarty(1998)*(Pre/Post-test). It included the following parts:

Part 1 (Patients demographic data): It was used to assess patient's characteristics such as age, gender, marital status, educational level, working status, and residence.

Part II (Patient's medical history): It was used to assess the patient medical history, such as the presence of chronic diseases, another eye disease, family history of cataract, and history of smoking.

Part III (Patient self-care practice assessment): It consisted of six parts: Eyecare post-surgery(five closed-ended questions), medication administration(three closed-ended questions), proper position after surgery(two closed-ended questions), performing the activity of daily living (five closed-ended questions), nutrition to reduce straining and constipation(five questions), and important general knowledge related to self-care (twenty-five closed-ended questions) such as exercise, avoiding heavy lifting, activity restriction in the initial week (shaving chin, self-bathing, brushing hair, and winding down), unusual symptoms, how to detect complications and follow-up.

Scoring system

Possible scores for each question are zero, one, or two points. A score of "zero" indicates that patients' do not practice self-care behavior, and a score of "one" point indicates that patients may practice a self-care behavior but not regularly. A score of "two" indicates that patients practice self-care behavior regularly according to the advice given by a physician or nurse. Total scores equal to 90 scores. These results were then translated to a percentage score. Self-care practice was considered unsatisfactory if less than 50%, satisfactory if the percent score was 50-70%, and good if the percent score was more than 70%.

4.5. Procedures

Validity and reliability of the tools: Five specialists in nursing and medical education evaluated the tools' face and content validity. The internal consistency approach was used to assess the tool's reliability (1, 2, and 3). Cronbach's alpha reliability coefficients of 0.902, 0.922, and 0.932 proved to be strong.

A pilot study was implemented on 10% of the total study subjects (patients and nurses) to test the tools. This testing was done to determine the clarity, applicability, feasibility of the research process, and validity of the research method and tools used and estimate the amount of time needed for data collection. A modification on tools was made based on the results of the pilot study. Therefore, the pilot study sample was excluded from the final sample.

Ethical considerations: The required approvals were obtained from the head of the ophthalmology department and the general director of Benha University Hospital to undertake this research. Letters from Benha University's Faculty of Nursing illustrating the study's purpose were sent to them to gain permission and cooperation. Competent committees gave their approval to the study protocol. After being told about the study's nature, aim, procedures, benefits, and voluntary participation, each participant gave verbal consent during the initial encounter with each patient or nurse. By coding all details, we were able to ensure the confidentiality and privacy of any information obtained. Participants were told by the researcher that the information gathered would be used strictly for the study and improve the patients' health. Any technique in the study's implementation could not be expected to cause harm.

Fieldwork: The study was implemented through four phases (Assessment, planning, implementation, and evaluation phase) from August 2018 to January 2019.

Assessment and planning phase: The researcher conducted a full analysis of the application materials and literature.

- For Nurses: Assessment of the nurse's knowledge and practical skills were made. The researcher developed a designed nursing intervention protocol: Desires, needs, and shortcomings were identified and converted into program goals and objectives. Furthermore, education supplies were prepared, i.e., audiovisual materials on the eye, eye anatomy, and management modalities. After preparing the tools and before the nursing intervention protocol was designed, the nurses' knowledge was assessed using a structured interview questionnaire (Tool I). After that, they were seen while they worked with cataract patients using the observation checklist (Tool II). So, the protocol was based on the nurses' needs and deficiencies.

- For Patients: Patients' practice of self-care activities was assessed using the patients' activity checklist (Tool, III).

Implementation phase: The information was gathered from August 2018 to January 2019. The researcher approached the responsible nursing supervisors and the responsible physician of determined areas daily to identify the number of admitted patients who underwent the cataract surgery, in addition to the allocated assessment times before and after the designed nursing intervention protocol.

- For Nurses: Before answering the questions, the nurses were informed about the study's aim. The research was conducted during the morning and afternoon shifts via interviewing; the tools were filled. The researcher introduces herself at the outset of the interview to establish a communication line and provide information about the reasons for the nursing intervention protocol.

- For Patients: Each interview took approximately 30-40 minutes. The demographic and medical data sheet was completed for selected patients. Then patients were observed by the researcher using the patient's activity practice checklist.

A designed nursing intervention protocol for nurses consisted of two parts:

Theoretical part: a designed nursing intervention protocol presented in the Arabic language. It included data related to Anatomy and physiology of the eye, cataract illness such as meaning, causes, risk factors, types, signs and symptoms, diagnosis, avoidance, in addition to cataract surgery indications, techniques, and complications; nursing

intervention following cataract surgery such as position after surgery, relieving post-operative pain, avoidance of infection, a manifestation of a contaminated eye, healthy diet to help recovery, post-operative complications.

For theoretical contents, teaching sessions were conducted. Each session took from 35-55 minutes. The number of sessions was (6) sessions. The nurses were divided into seven groups, each with five nurses. Every nurse received an information booklet, which they used to ensure comprehension and clarify any misunderstandings during each session. The researcher proceeded to reinforce what had been learned, answer any questions posed, and provide feedback. Between the researcher and the study group participants, a line of communication was kept open. Following that, a post-knowledge test was conducted. A printed copy of a designed nursing intervention protocol was offered for each nurse to use as future reference.

The practical part included installing eye drops, applying the ointment, changing eye dressing, performing eye care and infection control, relieving post-operative pain; with non-pharmacological methods such as (relaxation massage, tense and relax exercise, deep breathing exercise, psychological support). For practical contents, before presenting any details (pre-test), each nurse's output regarding the predetermined protocol was assessed using the formulated checklists (second tool). The subjects were then split into small groups (each with 4-5 nurses). Every nurse received ten sessions of demonstrations and redemonstrations. After that, there was an immediate post-practice examination.

Theoretical work was completed in the department head's office, and practical work was completed in the clinical field. Lectures, small group discussions, and problem-solving scenarios were used as instructional tools. Posters, videotapes, handouts, and a pen and paper test were used as teaching aids. The area had been set up and was ready to go.

Evaluation phase:

For nurses: The evaluation of the impact of nursing intervention protocol on nurses' knowledge, practices, and patients' self-care activities was carried out using the same assessment tools. Each nurse was evaluated before (pre-test), immediately after implementation of the protocol (post-test), and one month after the implementation of the protocol (follow-up).

Three evaluations were conducted for each patient in the study after cataract surgery; the first was at the beginning of the study before developing a designed nursing intervention protocol. The second evaluation was immediately following the implementation of the designed nursing intervention protocol post-cataract surgery to detect its effect on patients' self-care activities. The third evaluation was done one month after implementing a designed nursing intervention protocol post-cataract surgery. The same assessment tool was used during the three evaluations.

4.6. Data analysis

The collected data were coded, processed then analyzed using the Statistical Package of Social Science (SPSS version 20). The quantitative data were presented in mean and standard deviation (SD), while the qualitative data was presented as number (N) and percent (%). T-test was used to compare differences in the distribution of frequencies between the pre/post study subjects. P-value ≤0.05 indicates a significant result. Pearson correlation was done between variables, and Cronbach's alpha was used to measure internal consistency.

5. Results

Table 1 shows the demographic data of the study nurses. This table illustrates that more than half (51.4%) of nurses their age was 30 or more, ranges between 20 and 42 years, with a mean±SD of 31.94±8.33 years. The majority (85.7%) of the nurses were staff nurses, married (80%), had secondary school nursing diploma (71.4%), had experience of 10 or more years (51.4%), and not attending any previous training courses related to cataract (80%)

Table 2 documents that the highest mean score pre-intervention protocol implementation was related to post-operative care of cataract and complications (6.657±2.190), but the lowest mean score was related to anatomy and physiology of the eye (1.914±0.368). On the other hand, the mean scores were increased immediately, and after one month post, nursing intervention protocol implementation (9.857±1.973 & 8.114±1.488, respectively) related to post-operative care of cataract and complications. Also, a mean score of 2.542±0.805 and 2.2 ± 0.465, respectively, related to anatomy and physiology of the eye with statistically significant differences were observed at a p-value of ≤0.001. The mean scores got low in the follow-up phase (one-month post nursing intervention protocol).

Also, this table demonstrates nurses' total knowledge about cataract surgery throughout program phases. It indicates that the mean scores of the studied nurses post nursing intervention protocol (29.142±3.649) as compared to pre-nursing intervention protocol implementation (20.971± 3.714), with a statistically significant improvement at (p<0.001). With a decrement to (25.4± 2.738) after one month from nursing intervention protocol implementation, with a statistically significant improvement at (p<0.001).

Figure 1 demonstrates that pre-nursing intervention protocol implementation, more than two-thirds (68.6%) of nurses had unsatisfactory total knowledge scores, which reached (14.3% and 31.4%, respectively) immediately after and 1-month post nursing intervention protocol. As well (8.6%) of the study subjects had a good knowledge score pre-nursing intervention which increased to (65.7%) post nursing intervention protocol and decreased to (31.4%) after one month from implementing nursing intervention protocol.

Table 3 demonstrates low mean practice scores among the studied nurses pre implementing nursing intervention protocol. However, immediately post nursing intervention

protocol implementation, a general improvement in nurse's practices mean scores with highly statistically significant differences were observed at p-value ≤0.001. Also, this table demonstrates a statistically significant improvement in the nurses' total practice regarding care after the nursing intervention protocol implementation, and this improvement is relatively maintained.

Figure 2 demonstrates that pre-nursing intervention protocol implementation, more than half (57.10%) of nurses had incompetent practice scores, which reached 17.10% & 37.10%, respectively, immediately after and 1-month post nursing intervention protocol. As well (14.30%) of the studied nurses had good practice score pre-nursing intervention which increased to (68.60%) post nursing intervention protocol and decreased to (34.30%) after one month from implementing nursing intervention protocol.

Table 4 reveals that head nurse, had offspring's, widowed, and bachelor's degree and attended a previous training course, obtained a high knowledge mean scores in the three different assessment periods. Statistically significant differences were observed at p-values of≤0.05.

Table5 demonstrates a statistically significant positive correlation immediately post and post one month of study group nurses' age and both knowledge, practice. Also, the table reveals a statistically significant positive correlation between the years of experience and both knowledge and practice of studied nurses immediately post and after one month of implementation of the nursing protocol. Additionally, a statistically significant positive correlation was revealed between knowledge and practice pre, immediately post, and after one month; statistically, significant differences were observed at p-values of≤0.001.

Regarding the demographic characteristics of the studied patients, table 6 shows that nearly two-thirds of them (60%) their age was between 50years and more, with a mean age of 53.22±9.82. Regarding gender, 60% of the studied patients were females. Concerning marital status, more than two-thirds of the studied patients (64%) were married, and 42% of them cannot read and write. Regarding working status, the same table clarifies that 60% of the studied patients had work. Regarding residence, The majority (90%) of studied patients from rural areas.

Table 7 demonstrates the distribution of the studied patients' medical history. As illustrated in this table, more than one-third of them (40%) have diabetes mellitus, and 80% of them had cataracts in the other eye. The highest percentage of the studied patients (62%) had a family history of cataracts. Concerning smoking, the same table clarifies that 84% of the studied patients are not smoking.

Table 8 documents that the highest mean score pre-implementation of the protocol concerns general knowledge

of patient practice self-care (20.66±8.99), but the lowest mean score was concerning the position of the patient after surgery (2.58±0.49). On the other hand, the same mean scores in the previous items increased significantly, immediately and one month after nursing intervention protocol implementation (36.44±9.38 and 28.94±9.16, respectively) regarding general knowledge of practice self-care and (3±0.44 and 2.82±0.38, respectively) concerning the position of the patient after surgery with highly statistically significant differences were observed at a p-value ≤0.001.

Also, this table demonstrates patients' total practice of self-care throughout program phases. It indicates that the mean scores of the studied patient after nursing intervention protocol were 64.2±13.65 compared to pre-nursing intervention protocol implementation41.6±11.02 with a statistically significant improvement at (p<0.001) with a decrement to 52.46±10.97 after one month after nursing intervention protocol implementation with a statistically significant improvement at (p<0.001).

Table 9 documents low mean practice scores among the studied patients pre-nursing intervention protocol implementation. However, immediately post nursing intervention protocol implementation, a general improvement in mean practice scores regarding eye care post-cataract surgery. However, a slight decline occurred in mean scores after one month post implementing the nursing intervention protocol. Highly statistically significant differences were observed at a p-value of ≤0.001 regarding all eye care procedures.

Figure 3illustrates that pre-nursing intervention protocol implementation, three quarters (74%) of the studied patients had unsatisfactory scores of self-care practices that reached 20%, 30%, immediately after and 1-month post nursing intervention protocol, respectively. Also, 8% of the studied patients had good practice scores pre-nursing intervention, which increased to 50% post nursing intervention protocol and decreased to 36% after one month from implementing the nursing intervention protocol.

Table 10 shows a statistically significant positive correlation between the nurses' knowledge and patient self-care activities pre and immediately post-intervention. A statistically positive correlation was revealed between nurses' practice with patients' self-care activities immediately post and after one month of implementing nursing intervention protocol.

Table (1): Frequency and percentage distribution of studied nurses' demographic characteristics.

Demographic characteristics	No. 35	Percentage (%)
Age (years)		
<30	17	48.6
30+	18	51.4
Range		20.0-42.0
Means ± SD		31.94±8.33
Marital status		
Single	3	8.6
Married	28	80
Divorced	2	5.7
Widowed	2	5.7
Nursing Qualification		
Secondary school diploma in nursing	25	71.4
Technical institute nursing diploma	5	14.3
Bachelor degree in nursing	5	14.3
Job position		
Staff Nurse	30	85.7
Head nurse	5	14.3
Offspring's		
Present	28	80
Absent	7	20
Years of experience in nursing		
<10	17	48.6
10+	18	51.4
Range		2.0-22.0
Means ± SD		13.485±7.997
Years of experience in the ophthalmologic department		
<10	21	60
10+	14	40
Range		2.0-22.0
Means ± SD		6.77±4.881
Attended training courses related to cataract		
Yes	7	20
No	28	80

Table (2): Comparison of nurses' knowledge throughout the program phases.

Knowledge domain	Pre-test Mean±SD	Immediately after Mean±SD	T1-Test	P1-Value	After1month Mean±SD	T2-Test	P2-Value
Anatomy and physiology of the eye	1.914±0.368	2.542±0.805	4.197	<0.001	2.2±0.465	2.853	<0.01
Cataract illness	6.228±0.864	8.2±0.919	9.25	<0.001	7.514±0.874	6.19	<0.001
Knowledge related to cataract surgery	6.142±0.832	8.485±0.499	14.29	<0.001	7.457±0.647	7.38	<0.001
Post-operative nursing care of cataract and complications	6.657±2.190	9.857±1.973	6.42	<0.001	8.114±1.488	3.256	<0.01
Total scores of knowledge	20.971±3.714	29.142±3.649	9.28	<0.001	25.4±2.738	5.68	<0.001

*T1 and p1 compare between pre and post-test, while T2 and p2 are for comparison between pre and follow-up after one month.

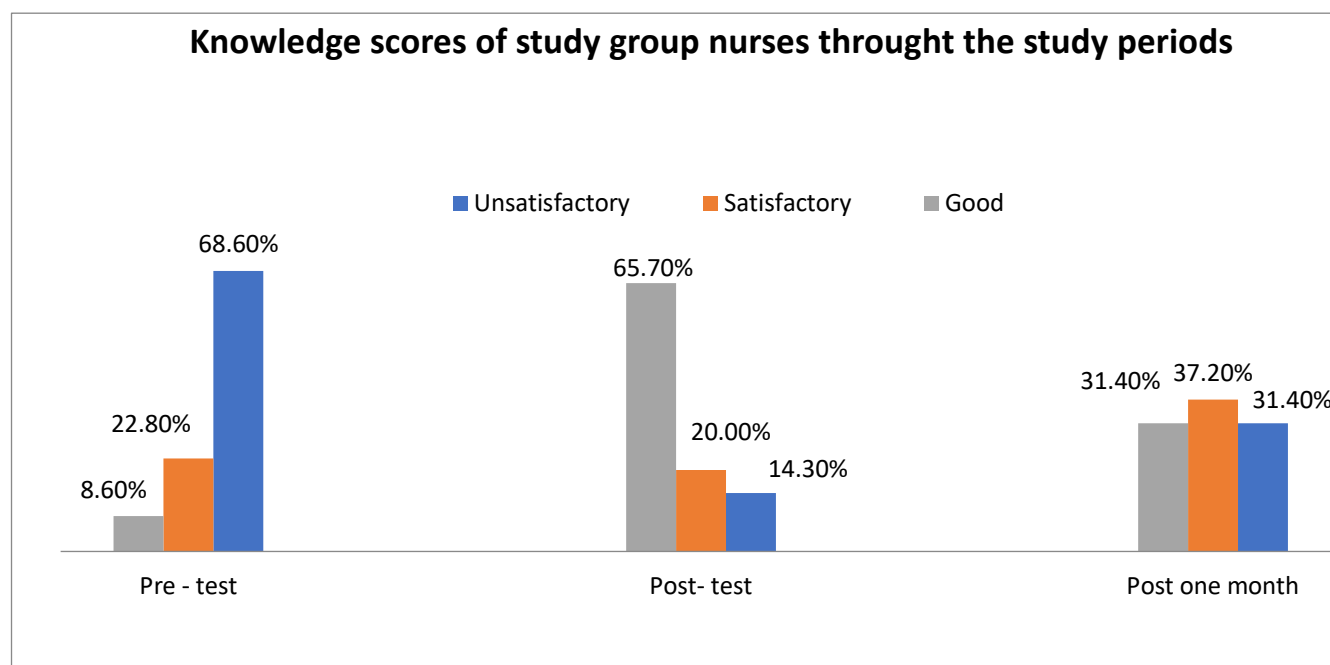## Knowledge scores of study group nurses throught the study periods

Fig (1): Percentage distribution of total knowledge scores of study group nurses all through the study periods.

Table (3): Comparison of nurses' practice scores throughout the program phases.

Caring practice	Pre-test	Immediately after	T1-Test	P1-Value	After one month	T2-Test	P2-Value
	Mean±SD	Mean±SD			Mean±SD		
Eye drop	4.942±0.859	6.028±0.559	6.26	<0.001	5.457±0.839	2.54	<0.05
Eye ointment	4.828±0.506	5.885±0.318	10.46	<0.001	5.457±0.602	4.73	<0.001
Eye dressing	8.257±1.729	11.4±2.017	6.99	<0.001	9.4±1.607	2.86	<0.01
Eye care and prevention of infection	6.828±1.027	9.085±1.338	7.92	<0.001	7.914±1.155	4.16	<0.001
Providing healthy eye: Relieve pain, relaxation, tense relaxation, deep breathing, psychological support	46.771±2.508	58.257±6.842	9.32	<0.001	50.028±3.745	4.28	<0.001
Total scores of practice	71.628±4.554	90.828±10.388	10.01	<0.001	78.257±6.380	5.00	<0.001

*T1 and p1 compare between pre and post-test, while T2 and p2 are for comparison between pre and follow-up after one month.

Nurse's practice regarding eye care post cataract surgery throughout the protocol implementation phases
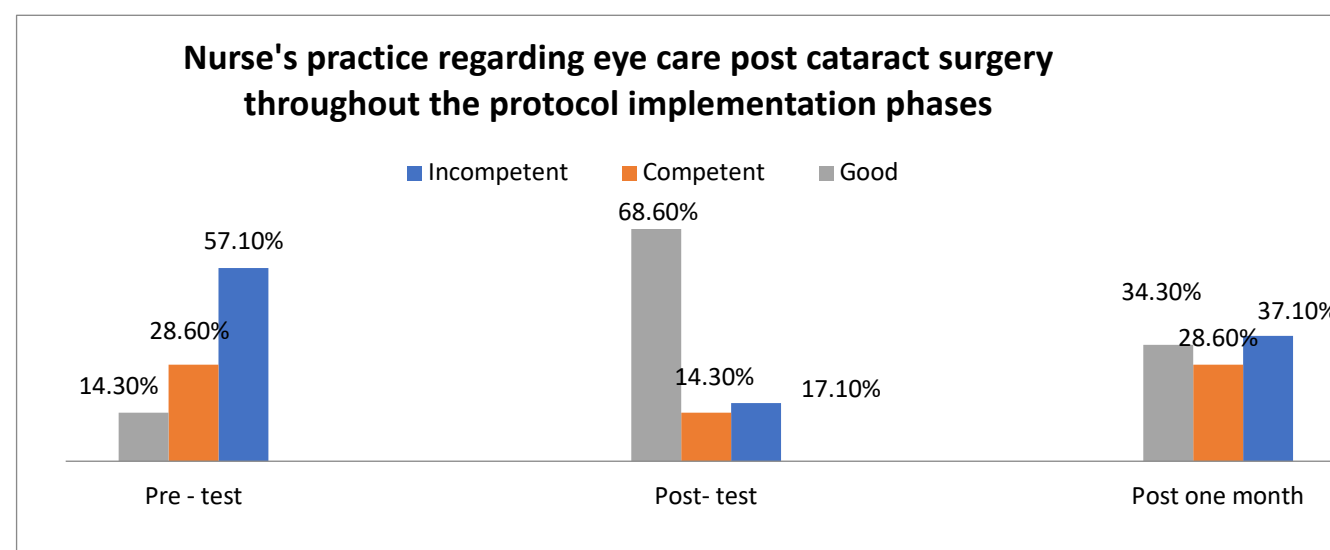
Fig (2): Percentage distribution of total practice scores of study group nurses throughout the study periods.

Table (4): The relationship between nurses' knowledge and selected demographic variables through the intervention phases.

Demographic variables	Pre-test	Immediately after	t-test	P value	After one month	t-test	P Value
	Mean±SD	Mean±SD			Mean±SD		
Marital status							
Married	21.71±4.62	31.35±4.44	7.96	<0.001	26.35±4.15	3.95	<0.001
Single	17.66±0.47	24.66±0.47	18.24	<0.001	22.33±0.47	12.16	<0.001
Divorced	23±1	32.5±2.5	4.99	<0.001	31±3	3.57	<0.001
Widowed	24.5±0.5	34.5±0.5	20.00	<0.001	31.5±0.5	14.00	<0.001
Job position							
Staff nurse	20.2±2.68	30.36±4.56	10.21	<0.001	25.4±3.77	5.80	<0.001
Head nurse	30±2.89	35±0.63	3.77	<0.01	33.8±0.74	2.85	<0.01
Offspring's							
Present	21.89±4.53	31.92±4.19	8.60	<0.001	27±4.14	4.41	<0.001
Absent	20.42±3.41	27.42±4.03	3.51	<0.01	25.85±3.79	2.81	<0.01
Education							
Secondary school diploma	19.56±2.31	30.16±4.83	9.90	<0.001	25.04±3.71	6.27	<0.001
Technical institute diploma	23.4±2.05	31.4±2.65	5.34	<0.001	27.2±3.54	2.077	<0.01
Bachelor's degree	30±2.89	35±0.63	3.779	<0.001	32.2±0.74	2.85	<0.01
Previous training							
Yes	25.71±4.55	34.14±1.80	4.56	<0.001	30±3.38	2.00	<0.05
No	20.57±3.66	30.25±4.67	8.63	<0.001	25.46±3.93	4.81	<0.001

Table (5): Correlation coefficient for nurses' knowledge, practice age, and years of experience (n=35).

Variables	r	p
Age with knowledge		
Pre-intervention	0.0816	0.6412
Immediately post	0.5700	<0.001
After one month	0.4567	<0.001
Age with practice		
Pre intervention	0.5029	< 0.001
Immediately post	0.6236	<0.001
After one month	0.5841	< 0.001
Years of experience with knowledge		
Pre-intervention	0.0953	0.5860
Immediately post	0.5797	<0.001
After one month	0.4508	< 0.001
Years of experience with the practice		
Pre intervention	0.5028	< 0.001
Immediately post	0.6511	< 0.001
After one month	0.6482	< 0.001

Table (6): Frequency and percentage distribution of demographic characteristics of the studied patients (n=50).

Demographic characteristics	No	%
Age in years		
Less than 30	4	8
30 – 50	16	32
50 and more	30	60
Mean ±SD	53.22±9.82	
Gender		
Male	20	40
Female	30	60
Marital status		
Married	32	64
Unmarried	18	36
Level of Education		
Cannot read and write	21	42
Primary education	16	32
Secondary education	7	14
University education	6	12
Working status		
Work	30	60
Not work	20	40
Residence		
Rural	45	90
Urban	5	10

Table (7): Frequency and percentage distribution of the studied patients' medical history (n=50).

Medical history	No	%
Chronic disease		
Diabetes mellitus	20	40
Hypertension disease	7	14
Cardiac diseases	3	6
Liver diseases	6	12
Non	14	28
Other eyes disease		
Glaucoma	2	4
Vernal keratoconjunctivitis	4	8
Cataract (on other eyes)	40	80
None	4	8
Family History of cataracts		
Yes	31	62
No	19	38
Smoking		
Yes	8	16
No	42	84

Table (8): Comparison of patients' practice of self-care activities throughout the program phases.

Patient self-care activities	Pre	Immediately after	T1-test	P1-value	After one month	T2-test	P2-value
	Mean±SD	Mean±SD			Mean±SD		
Eye hygiene	4.8±0.63	6.8±1.34	9.55	<0.001	5.6±0.56	6.92	<0.001
Medication administration	3.2±0.4	4.26±0.79	8.46	<0.001	3.62±0.52	4.53	<0.001
Position after surgery	2.58±0.49	3±0.44	4.51	0.001	2.82±0.38	2.74	<0.01
The activity of daily living	5±0.52	6.66±1.29	8.44	0.001	5.6±0.48	5.99	0.001
Nutrition	5.36±0.84	6.98±1.08	8.37	0.001	5.86±0.72	3.20	<0.01
General knowledge of practice self-care	20.66±8.99	36.44±9.38	8.59	0.001	28.94±9.16	4.56	0.001
Total practice scores	41.6±11.02	64.2±13.65	9.109	0.001	52.46±10.97	4.94	0.001

*T1 and p1 compare between pre and post-test, while T2 and p2 are for comparison between pre and follow-up after one month.

Table (9): The mean patients' practice scores regarding eye care post-cataract surgery throughout the study periods (n=50).

Patient practices regarding eye care	Pre-test Mean±SD	Immediately after Mean±SD	T1-test	P1-value	After one month Mean±SD	T2-test	P2-value
Administration of eye ointment	4.7±2.35	7.3±2.24	5.66	<0.001	6.5±2.32	3.85	<0.001
Administration of eye drops	4.72±2.28	7.36±2.20	5.89	<0.001	6.48±2.36	3.79	<0.001
Clean the eye properly	5.2±2.28	7.98±2.19	6.22	<0.001	7.34±2.39	4.58	<0.001
Total patient practice regarding eye care	14.62±6.86	22.64±6.55	5.98	<0.001	20.28±7.01	4.08	<0.001

*T1 and p1 compare between pre and post-test, while T2 and p2 are for comparison between pre and follow-up after one month.

Patients practice regarding self care activities through the three assessment periods

■ Unsatisfactory   ■ Satisfactory   ■ Good

Pre - test: 8.00%, 18.00%, 74.00%
Post- test: 50.00%, 30.00%, 20.00%
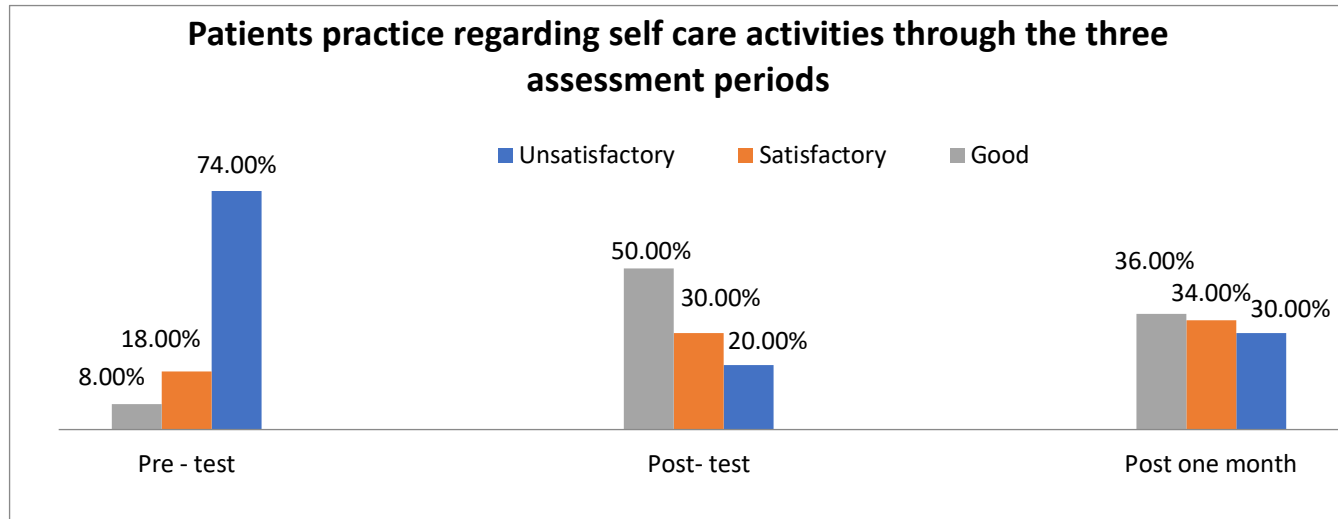Post one month: 36.00%, 34.00%, 30.00%

Figure (3): Percentage distribution of patients' total self-care activities post-cataract surgery

Table (10): Correlation matrix between total nurses' knowledge, practice, and self-care throughout the program phases.

	Nurses' knowledge		Nurses' practices		Patients self-care	
	r	p-value	r	p-value	r	p-value
Pre						
Nurses' knowledge			0.749	0.000	0.467	0.005
Nurses' practices	0.749	0.000			0.145	0.412
Patient s self-care	0.467	0.005	0.145	0.412		
Post						
Nurses' knowledge			0.653	0.000	0.651	0.005
Nurses' practices	0.653	0.000			0.651	0.005
Patients' self-care	0.651	0.005	0.651	0.005		
After one month						
Nurses' knowledge			0.723	0.000	0.025	0.887
Nurses' practices	0.723	0.000			0.562	0.031
Patients' self-care	0.025	0.887	0.562	0.031		

6. Discussion

According to *World Health Organization (2017)*, cataract disease is considered the most common ocular condition affecting vision globally. It may affect patients' independence in self-care and performance of the activities of daily living. Nurses can play an important role in achieving required outcomes if they provide a designed and systematic nursing intervention to patients after cataract surgery.

Regarding nurses' demographic data, the current study's findings reveal; that the greater part of nurses' age ranged between 20-42 years old; had worked as a staff nurse and married; secondary school of the nursing diploma was the highest proportion. More than half of them had ten years or more experience, and the bulk of them have no in-service cataract surgery training. This finding can be explained by a shortage of the nursing team, which strengthens power on the presence of the preparation courses to prevent patient complication and achieve the optimum outcomes.

This result agrees with *Abid et al. (2018)*, who studied "Effect of implementing nursing guideline on nurses' performance regarding patients undergoing cataract or glaucoma surgery," Master thesis, Mansoura University. They demonstrated that most of the studied nurses did no report attending previous training courses related to nursing care in ophthalmic surgery. This result was in dissimilarity

with *Mafwiri et al. (2014)*, who found that above two-thirds of the nurses had received eye care training.

The current study's results followed up the first hypothesis, in which the mean knowledge scores of the study group nurses improved significantly immediately post implementing nursing intervention protocol. The current study findings reported that nurses' knowledge was low before implementing a designed nursing intervention protocol, predominantly knowing the anatomy and physiology of the eye and post-cataract surgery and its related nursing care. This result may be because most nurses neglect any knowledge related to anatomy due to the concept of difficulty and a restricted spotlight of education courses concerning composition and structure of the eye. So, nurses need anatomy and physiology to comprehend how to take good care of their patients and prepare nurses to think and act quickly.

This result matched with the result found by *Taha and Abd Elaziz (2015)*, who studied "Effect of nursing intervention guidelines on nurses' role, patients' needs, and visual problems post-cataract surgery" and with *Belal (2004)*, who studied "Post-operative self-care guide for patients with intraocular surgery" at Ain-Shams University Hospitals who believed that nurses' comprehension of the anatomy and physiology of the eye was lacking. Furthermore, *Byamukama and Courtright (2010)* establish that most nurses in their learning had a low level of knowledge about eye anatomy.

The current study findings reported a general improvement in nurses' knowledge regarding cataract surgery and all required nursing care after implementing a designed nursing intervention protocol. This finding may be due to the augmentation in nurses' knowledge score due to energetic participation of nurses in learning sessions and valued appraisal of knowledge provided. Additionally, nurses in the present study were paying attention to the instruction and adopt an active role all through the accomplishment of a designed nursing intervention protocol. Also, the content of a designed protocol is based on nurses' needs, simplicity, clear audiovisual aids, and educator availability. It was designed for additional explanation to fasten the information.

Supporting these study findings, *El Shafaey et al. (2018)* studied "Effect of implementing teaching program on knowledge and practice of nurses and clinical outcomes of patients post-cataract surgery" at Tanta University Hospital of Ophthalmology, who revealed that the teaching program's implementation led to significant improvements in nurses' knowledge. The finding agrees with *Abid et al. (2018),* who demonstrated that post implementing the guideline, there was a marked improvement in nurses' knowledge as most nurses had a high level of knowledge in all tested areas. This finding indicated the positive effect of the guideline on nurses' knowledge and reflected that nurses could learn and improve their knowledge. Similar findings were presented by *Taha and Abd Elaziz (2015); Mafwiri et al. (2014).* They demonstrated a similar success of the planned teaching in improving nurses' knowledge regarding ophthalmic care.

The current study's results validated the second hypothesis, in which the mean practice scores of the study group nurses improved significantly immediately post implementing nursing intervention protocol. This finding may be attributed to several factors, such as enlightening the nurse to memorize how to be concerned for eye and administering eye drugs using the painted booklet; enhanced contact with them, and illuminating how to carry out eye care and how to apply eye drops. In agreement with these study findings, *Abid et al. (2018)* reported that, concerning nurses' post-operative practice, the study found that, pre-implementation of the guideline, nurses' post-operative practice was generally unsatisfactory, and there was a significant improvement in their post-operative practice post-implementation.

These results agree with *El Shafaey et al. (2018)*, who found that the execution of the teaching program led to important improvements in nurses' practice. *Taha and Abd Elaziz (2015)* also illustrated that the nurses' practice after implementing guidelines demonstrated significant improvement.

Disagreement to these study findings, *Fashafsheh et al. (2013)* in the study entitled "Impact of a designed eye care protocol on nurses' knowledge, practices, and the health status of unconscious mechanically ventilated patients," at North Palestine Hospital. They reported that the highest percentage of the nurses had a major deficiency in their practices regarding eye care after the intervention. Also, *Ahmed (2007)*, in a study at Zagazig University Hospital, reported that more than three-quarters of the nurses performed eye care incorrectly.

The relationship between nurse's knowledge and selected demographic variables. The current study reveals that head nurse, had offspring's, widowed, and bachelor degree and those attended a previous training course, obtained high knowledge mean scores in the three different assessment periods with statistically significant differences**.** This finding might explain that baccalaureate degree education and attending training courses have great positive indicators for improving nurses' knowledge.

Contradiction to these studies, *Fashafsheh et al. (2013)* found no statistically significant differences between single and married nurses in total scores of knowledge and practice regarding eye care in pre-test, post-test, and after two months following protocol application. This finding also disagrees with *Ceber et al. (2010)*, who reported no statistically significant correlation between nurses' marital status, graduation, and professions and presented training programs.

Correlation between nurse's knowledge, practice, age, and years of experience; findings of the present study show that knowledge was correlated with practice scores among nurses. This result may be explained because knowledge is a significant positive predictor of the practice, and they explained together approximately all the nurses' development.

The present finding was in the same context with *Abid et al. (2018)*, who found that post implementing the guideline, there were statistically significant correlations

between nurses' knowledge and post-operative practice. This finding in the same line with *Taha and Abd Elaziz (2015)*, who found a strong positive correlation between nurses' awareness and practice scores, highlighting the value of the guidelines' theoretical aspect once again. *Hunter (2010)* also concluded that nurses' level of knowledge influences nurses' practice level.

Also, age and years of experience were positively interrelated with knowledge immediately post and one month after implementing the nursing intervention protocol. In contradiction to these study findings, *Taha and Abd Elaziz (2015)* discovered that the age of nurses was a negative indicator of their information ranking, implying that younger nurses benefit more from the guidelines than older nurses.

The current study reports that age was positively correlated with the practice of nurses with a highly statistically significant difference at the three intervention phases. In agreement with these findings, *El Shafaey et al. (2018); Suchitra and Devi (2007)* revealed that nurses' knowledge and practice increased with greater years of experience. In contrast to these study findings, *Abid et al. (2018); Fashafsheh et al. (2013)* demonstrated no statistically significant difference between nurse's ages and years of experience to nurse's knowledge and practice.

The present study findings demonstrate that nearly two-thirds of their age was between 50 years and more. This finding may be because as a person ages, the lens gradually loses water and increases in size and density. Supporting these study findings, *El gazar (2017)* studied "Developing post-operative self-care guideline for the patient undergoing cataract surgery" at Benha University Hospital and reported that two-thirds of the studied subjects fall in the age group between 50-60 years old. *Naeem and Khan (2012)*, in a study in tertiary care hospital, stated that with advanced age, the development of cataracts is increased and found that the age of cataract patients in their study ranged between 50 years and more.

Also, nearly two-thirds of the studied patients were females. This finding may be because the decrease in estrogen at menopause cause increased risk of cataract in women. This finding agrees with *El gazar (2017); Lie et al. (2009)* stated that the female gender was associated with a higher prevalence of bilateral cataracts. In contrast to these findings, *Hegazy et al. (2012)* studied "Health needs management among patients undergoing day-case cataract surgery" and found that more than half of studied the patients in their study were males.

The current study reports that less than half of the studied patients cannot read and write, and more than half were married. This finding may be because a lower level of education is associated with a higher risk of cataracts due to the ignorance about the hazardous effect of smoking, sunlight, and healthy nutrition. This finding agrees with *El gazar (2017); Taha and Abdel Aziz (2015)* mentioned that more than half of patients in their study could not read and write and married. Simultaneously, the result is not in agreement with *Hegazy et al. (2012),* who mentioned that more than one-third of the patients in their study were

highly educated. This finding was consistent with *Wei et al. (2012)*, who reported that their study that four-fifth of the patients were married.

Regarding medical history, the current study result discovers that most of the study patients had a preceding cataract in the other eye. This finding may be explained due to attendance of hazard feature that causes cataract on both eyes, e.g., diabetes mellitus. In agreement with this study results, *El gazar (2017)* reported that most of the study patients had the previous cataract in the other eye, and this in line with *El-sayed (2013)*, who studied "Assess nurses' knowledge, practice, patient needs, and problem after cataract surgery" at Zagazige University Hospital. They reported that nearly one-third of the study patients had a previous cataract in the other eye. Also, the current result shows that nearly two-thirds of study subjects had a family history of cataracts. This finding may be due to cataract tends to run in families. Supporting these study findings, *El gazar (2017); Sobti and Sahni (2013)* found that two-thirds of the studied patients had a positive family history of cataracts.

The current study's results confirmed the third hypothesis, in which self-care activities mean scores of patients cared for by nurses exposed to nursing intervention protocol implementation improved immediately post and after one month at follow-up than before. A statistically significant positive correlation was revealed between nurses' knowledge and patient self-care activities immediately post-intervention. Additionally, a statistically significant positive correlation was revealed between nurses' practice and patients' self-care activities immediately post and after one month of intervention. These statistically positive correlations were evidencing the positive reflection of the improved nursing knowledge and caring practice on the improved patients' self-care activities.

This finding is in line with *El Shafaey et al. (2018)*. They demonstrated that most of the studied patients had good practice regarding eye care and medication administration in immediately post and first-month post-teaching program implementation for nurses that reflected positively on the clinical outcomes of patients. This finding is in line with *Rho and Cho (2012)*. The study entitled " Effect of individualized post-operative education on anxiety level and self-care compliance after one-day cataract surgery" and illustrated that post-operative self-care fulfillment study demonstrated a higher level of achievement, especially in terms of grooming, eye drop, and eye ointment care.

7. Conclusion

In light of the findings of this study, it can be concluded that nurses' knowledge and practices were improved significantly post nursing intervention protocol concerning one of the most important areas of nursing care provided for the cataract patients at ophthalmological areas, which reflected positively on patient self-care activities post-cataract surgery.

8. Recommendations

Based on the findings of the current study, the following recommendations are proposed.

Recommendations related to nurses:

- Ophthalmic nurses should receive periodic in-service training programs to improve, update, refreshing their knowledge and practice regarding cataracts.

Recommendations related to patients:

- The health education program should be prepared for the patients undergoing cataract surgery and their families about the disease, managing post-operative care, and preventing cataract surgery complications.

Recommendations for further researches:

- Replication of the research on a greater statistical sample drawn from various Egyptian regions and long-term follow-up is recommended to obtain more generalizable results.
- Further studies are suggested to investigate the outcome of implementing nursing intervention protocol to decrease complications following cataract surgery.

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