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EFFECTS OF EDUCATIONAL PROGRAM ON NURSES' KNOWLEDGE REGARDING PAIN MANAGEMENT FOR PATIENTS WITH CANCER AT THE NATIONAL CANCER INSTITUTE OF GEZIRA UNIVERSITY

Hayat Fadllalah Mukhtar*[1] and Mohammed Abdelkrim Adam Abdelmalik[2]

[1]Associate Professor of Medical-Surgical Nursing, Karrari University, Sudan.
[2]Assistant Professor of Medical-Surgical Nursing, College of Applied Medical Sciences, Shaqra University, Riyadh, Saudi Arabia.

***Corresponding Author: Hayat Fadllalah Mukhtar**

Associate Professor of Medical-Surgical Nursing, Karrari University, Sudan.

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ABSTRACT

Background: Pain is one of the most common symptoms in cancer patients. Nurses play an essential role in assessment and management of pain. Lack of nurses' knowledge about pain concepts is one of the barriers to effective pain management. Ineffective pain management has adverse effects on a patient's life, such as physiological, psychological and social, increasing the cost burden, prolonging the patient's stay within the hospital and poor health outcomes. **Objective:** To assess effectiveness of training program on nurses' knowledge regarding pain management for patients with cancer. **Methodology:** A quasi-experimental study was carried out before and after the training program for one group of nurses at the National Cancer Institute of the University of Gezira in Wadmadani City from 2014 to 2018. The study included sixty-one nurses selected by total coverage. The intended educational program was designed for two weeks duration. The program contained various aspects of pain management such as basic knowledge of pain concepts, assessment, and approaches. The program was well executed in a total of 32 hours by conducting 4 hours per day and four days in week. To evaluate effects of the educational program on nurses' knowledge which was assessed at three phases, pretest, posttest one and posttest two of the educational program. Data were collected through a self-administered questionnaire before and after educational program. The data were analyzed by SPSS program (version 23). **Results**: The results revealed that the overall mean score of nurses' knowledge at pretest was low (47.99 ± 5.83). After the education program, the overall mean score of nurses' knowledge increased at posttest one (81.53 ±5.75); and after 3 months at posttest two also increased (94.41 ±5.67). There were high significant differences between the mean scores of pre-test, post-test one and post-test two at p-value ($p < 0.000$). **Conclusion:** The study concluded that the training program that applied has a significant effect on the improving of nurses' knowledge regarding cancer pain concepts, assessment and management. **Recommendation:** Continuous training program need to be provided for nurses working in oncology units to upgrade their knowledge regarding cancer pain management.

KEYWORDS: Cancer pain management, nurses, knowledge, educational program.

1. INTRODUCTION

Cancer is a group of cells that grows out of control, taking over the function of the affected organ. It is a chronic disease that includes more than 100 different conditions characterized by uncontrolled growth, spread of abnormal and unregulated growth of cells.[1] Pain is considered one of the most common symptoms related to cancer diseases.[2,3] It is universally the most common reason that drives people to look for medical care in the hospital. It is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.[4] It is considered "whatever the person says it is, existing whenever the experiencing person says it does".[5-7]

Pain is highly subjective nature since patient reports of pain is the most reliable confirmation of the presence of pain.[8] It occurs as the result of many disorders, diagnostic tests, and treatments. Also, more people are disabled and distressed by pain than any single disease. Cancer pain may be caused by direct tumor penetration of bones, nerves, as well as viscera and soft tissue or due to treatment measures such as surgery and radiation.[9] Pain is considered as "the fifth vital sign" by American Pain Society (APS) that highlights its importance and to increase the awareness among health care specialists of the significance of effective pain management.[10] Also, American Pain Society suggests that assessment of pain should be routinely measured as assessing vital signs. It should be assessed and documented routinely by nurses.

Nowadays, documentation of pain assessment becomes essential as documenting of the "traditional" vital signs. The Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) has integrated pain assessment and management into its standards which clearly state that "pain is assessed in all patients" and that "patients have the right to proper assessment and management of pain, and that it is the healthcare worker 's responsibility to respect and support each patient's right to pain management.[11] Nurses are accountable in an appropriate pain assessment and management. Also, nurses are required by the most institutions to document assessment of the patient's pain in the appropriate medical record. These standards measures reveal to significance of pain management.[12]

Problem Statement

Pain is the most common symptom associated with cancer.[13] It is often most feared symptom by cancer patients.[14] The majority of patients with cancer experience pain by 30% to 50% of cancer patients during receiving treatment and by 70% to 90% of patients with metastatic or advanced disease.[11] Although major progress in pain management in recent decades, cancer pain continues to be a significant international public health concern.[15] The World Health Organization reported that 6 million people die from cancer without sufficient analgesia or often without any pain management.[16] The prevalence of pain in cancer patients increases with development of disease and studies report the incidence from 14% to 100% of all patients with cancer in their life span. Systematic reviews of research literatures have revealed that cancer pain is common and its occurrence is associated to the phase of illness as following: 48% of patients with early disease, 59% undergoing cancer treatment and 64-74% of cancer pain due to advanced disease.[17] Pain has a high incidence in particular cancer types such as pancreatic (44%) and head and neck cancer (40%).[18]

Cancer patients frequently complain more than 73 % of constant pain that result from inadequate pain management.[19,20] Most under-treatment of pain is due to lack of assessment.[21] In addition, patients' pain management is being inadequately managed and documented by nurses accordingly.[11] Research evidences show that, there is lack of knowledge among nurses, negative attitude and beliefs about pain assessment and management globally, similarly the clinicians confront challenges in pain assessment and management.[22] Studies revealed that one of the barriers on behalf of cancer pain management is the lack of nurse's knowledge and other healthcare providers.[23] Ineffective pain management is proven to have an adverse effects on whole aspect of patients' life such as physiologic, psychological, social, increase burden of cost and can prolong a patient's length of stay and contributes to poor health outcomes.[24,25]

Justification

Nurses play an essential role in pain assessment and management.[26] Because they spend more time with cancer patients who suffering from pain than other health care workers.[5] Nurses' knowledge and attitude are crucial elements in achieving optimal cancer pain management.[27] Therefore , they must have basic knowledge of pathophysiology, psychological consequences of acute and chronic pain, and the methods used to assessment and treatment of pain.[8] Because an acquiring knowledge in nursing is essential for the delivery quality of nursing care for patient and his family. In addition, the quality of nursing practice depends on the quality of the knowledge that is acquired.[28] Studies confirmed that, effective pain management depends on nurse's knowledge, attitudes and skills.[29]

However, there are very limited studies conducted in the oncology hospitals in the Sudan to evaluate existing nurses' knowledge, attitude towards effective pain assessment and management which left a large gap in the literature of data base in the Sudan. Filling this gap, the researcher wants to carry out this study to assess pretest and posttest level of nurse's knowledge, attitude regarding pain management for patients with cancer in oncology hospitals in Sudan. Therefore, the findings of this study will provide evidence-based data about current nurses' knowledge, attitudes regarding cancer pain management that can be used for additional development of nursing curricula for both undergraduate and postgraduate level, beside continuous educational training programs in the hospitals. In addition, the researcher will implement educational program that will improve knowledge and change attitude of nurses towards positively that will improve whole patient's quality of life. Applying an educational program will provide nurses with knowledge to assess, management and document pain appropriately.[25]

OBJECTIVES

General objective

The general objective of this study is to assess the effects of educational program on nurses' knowledge regarding pain management for patients with cancer admitted to oncology hospital.

Specific objectives

The specific objectives will be:

1. To determine basic nurses' knowledge about pain concepts, assessment and management strategies.
2. Design and execute educational program for nurses about pain concepts, assessment and management strategies.
3. To evaluate effects of the educational program on nurses' knowledge about pain concepts, assessment and management for patients with cancer.

Hypothesis

- **Null hypothesis (H_0):** There will be no significant difference between the pre-test and post-test of nurses' knowledge scores about pain concepts, assessment and management for patients with cancer.
- **Alternative hypothesis (H a):** There will be significant difference between the pre-test and post-test of nurses' knowledge scores about pain concepts, assessment and management for patients with cancer.

2. MATERIALS AND METHODS

Study design

This quasi-experimental design of pretest and posttest was applied in one group of nurses working in oncology units to assess the effect of an educational program on their knowledge regarding pain assessment and management for patient with cancer, from 2014 to 2018. The quasi-experimental research design is the experimental design that tests causal hypotheses.[30]

Study area

Setting is the physical location and conditions in which data collection takes place in a study.[31] Setting in this study was conducted at the National cancer institute of Gezira University hospital. The National Cancer Institute, University of Gezira (NCI-UG), is a special center established in 1994 by the University of Gezira (UG) in Wad Medani, Sudan.[32] University of Gezira is a community oriented university was established in 1975, with a main objective of rural development. UG is located in the center of Sudan in Gezira state, the most heavily populated state, which harbors the Blue Nile-irrigated Gezira Scheme.[32] NCI-UG is the only cancer institute outside the capital Khartoum. It began to treat cancer patients in 1999.[33] NCI-UG was established to meet the community's needs in the fields of Oncology, Nuclear Medicine, Medical Imaging and Molecular Biology, integrating activities of research, service and training programs.[32] The oncology sector of the National cancer institute (NCI) of Gezira University serves around 4 million citizens of Gezira State and patients from neighboring states, such as Sennar, Alqadarif and Kassala, which are connected to Wad Medani city by a highway that runs between these states and Khartoum. NCI-UG has main cancer treatment modalities such as radiotherapy, chemotherapy and palliative.[33]

Study population

All nurses, working in oncology unit of the National Cancer Institute at Gezira University, were invited to participate in educational training program regarding pain management for patient with cancer.

Inclusion criteria

The inclusion criterion that is eligible in this study:

1. Nurses who had diploma, bachelor, master and doctorate degrees.
2. Nurses who agreed to be included in this study.

Exclusion criteria

The exclusion criteria in this study:

1. Nurses have not completed the program.
2. Nurses who had been working less than six months in oncology unit.

Sampling technique and size

A sample is the subset or portion of a population, selected to participate in a study.[31]

Sampling technique

The subjects of the study were selected by census of total coverage of the all numbers of nurses who were available at the time of the study. A census refers to gathering information about every individual in the population.[34] A census of total coverage is applicable and attractive for small populations (200 or less). It eliminates sampling error and provides data on all the individuals in the population.[35,36]

Sample size

The sample size was sixty one of nurses (n=61) obtained by census of total coverage for the all number of nurses who were available at the time of the study and those who met inclusion or eligibility criteria in the previous mentioned study population.

Study variables

A variable is a characteristic or quality that takes on different values for example it varies from one person or object to another.[31]

Independent variables

Independent variable refers to the variable that is believed to cause or influence the dependent variable.[31] The independent variable in this study was designed educational program regarding cancer pain management for nurses working in oncology unit.

Dependent variables

Dependent variable means the variable hypothesized to depend on or be caused by another variable (the independent variable).[31] In this study, the dependent variables were nurse's knowledge regarding cancer pain management.

Demographic variables of the nurses

Gender, age, education level, experience and attending training course.

Data collection instrument

A self-administered questionnaire has two sections were used.

Section one (1)

The first part of the tool has five questions related to demographic and professional characteristics of the nurses such as gender, age, level of education, years of

experience, and attendance of training program on cancer pain management.

Section two

The second part of the tool has thirty questions of knowledge; each question had four choices (a,b,c,d) that interval from 0 to 4 of true or false statements that inquired from each respondent to answer .It included questions that measure nurses' knowledge about concepts of pain (items 1-8), types and symptoms of pain (items 9 - 14), assessment of pain (items 15-17), pharmacological management (items 18-27), non-pharmacological management of pain(items 28- 30).

Scoring of knowledge

The present study utilized 5 interval scale for scoring purpose that ranged from (0-4). A correct response was given one score in each choices in the question, so the maximum score of each question equal 4 scores. Wrong response was given a zero score. The maximum nurses' knowledge assessment score was computed out of (30x4=120 score).

Grading of knowledge study

The grading of knowledge was categorized in to five level based on McDonald's standard of learning outcome measured criteria. It was developed in order to measure the actual performance of students' learning in the educational institution.[37] The grading of the knowledge categorized as following:

Very low knowledge (0-0.8) = 0-24 score (< 0-20%).
Low knowledge (0.8-1.6) = 24-48 score (20-40%).
Moderate knowledge (1.6-2.4) = 48-72score (40 - 60%).
High knowledge (2.4-3.2) =72-96 score (60- 80%).
Very high knowledge (3.2-4.00) = 96-120 score (80-100%).

Items number 1, 3, 6, 8, 10, 13, 18, 20, 22, and 24 were negative questions and the rest of them were positive questions.

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Procedure of the study

The study conducted through preparatory stage which included (validity and reliability of tools, educational program and pilot study), and field work of data collecting procedure (process).

Preparatory stage

After extensively review of literature, the researcher become familiar with an actual dimension and magnitude of the problem that guided the researcher to develop tools of data collection and prepared technical materials that used in the study. The preparatory stage included validity, pilot study and reliability of the tool.

Validity of tools and educational program

Validity is the degree to which an instrument measures what it is intended to measure.[31,38] The tool and educational program were developed by the researcher after extensive literature review, some questions of tool that related attitude were selected and adopted by researcher after approval had obtained to use all or part of the tool.[39] The tools and educational program were reviewed, modified and approved by experts in the field of study to test their content validity before collecting data. The experts were three oncologists in Khartoum oncology hospital, one of them a specialist on pain management and palliative care and two experts of pain and palliative care trainers from national Cancer Institute of Gezira University. The experts have a membership in Internal Association for the Study of Pain (IASP), American Society for Clinical Oncology, African palliative care Association research network.

The educational program was designed, developed by the researcher after the extensive studying of the best current related literate review, reviewed, modification and validity was approved by experts in the field of pain management and palliative care. The objective of the program is to change, upgrade nurse's knowledge through providing with the best current basic knowledge of pain concepts, assessment and pain management approaches including pharmacological non-pharmacological methods and discuss and remove barriers and Myths about pain management to improve their knowledge that is aim to improve cancer patient with pain health outcome.

Pilot study

A pilot study was conducted on 10 % of nurses who were working in oncology unit for testing clarity, content applicability and time consuming, bedside arrangement of items, feasibility before starting the data collection phase. According to the pilot study results, necessary modifications were done, and each item in the tool was refined and put it in appropriate setting. The time required to fill the questionnaire was about 20-30 minutes. Finally the researcher assured that tool items accomplished the purpose of the study. The participants in the pilot study were excluded from the main study.

Reliability of tools

Reliability is concerned with the ability of an instrument to measure consistently.[38] It refers to the accuracy and consistency of information obtained in a study.[31] The ratability of the tool based on Cronbach's alpha (α) to measure the internal consistency of the all questionnaire items, it was found (α= 0.83) which indicated that the tool was reliable.it was shown in the below table (3.1).

Table (3.1) Reliability analysis of the questionnaire.

Variables	Number of items	Cronbach's Alpha
Knowledge items	30	0.83
Total of items	30	0.83

Phases (process) of data collection

Phase one (Pretest)

Initially, before implementation of educational program in stage one. Nurses who met the inclusion criteria given invitation, scheduled by the Matron (head of nursing staff) in two groups according to their convenient time to participate in the program. Then researcher obtained verbal consent from the participants after explaining the purpose of the study, objectives and contents of the program.

A self-administrative questionnaire was distributed to the participants and asked to complete before the educational program intervention. They were given an identification number to facilitate analysis in matching each participant's pretest with post test scores. The Confidentiality maintained in all process of data collection. Then the data was collected preliminary by researcher and two the assistants through self-administrative questionnaire for pretest as base line data about demographic, the existing knowledge of participants regarding cancer pain assessment and management shown in annex. Time given to each participant to complete answering tool questions around 20-30 minutes which considered suitable time to answer the questions in the tool.

Intervention phase

Before starting day of the program, the researcher prepared the meeting room for convenience (e.g., conference room organization, seating, tables, lighting, blank papers, and presentation material plus meals, tea, water coffee for break time). The study subjects were divided into two groups according to the suitable time for them. Each group was attended in the training hall room separately.

In the opening day of the program the researcher warmly welcomed all the participants, thanked them for their attendance, and introduced himself to them, then explained purpose of the study again, objectives and contents of the program.

Then the researcher applied designed training program in two groups of nurses separately. The program included pain definitions, incidence of cancer pain, theories, pathophysiology, causes, classification, and harmful effects of pain and factors influencing pain response, comprehensive pain assessment using pain different scales, approaches of pain management including pharmacological and non-pharmacological approaches common barrier to effective pain assessment and management were discussed. Different teaching methodologies such as lectures, group discussion and visual aids in the form of showed, pictures, posters and handouts were used. Each group of nurses in the study received printed learning materials with guidelines after each session.

During the session, nurses were encouraged to ask questions and the researcher was receiving feedback from them. Before ending of each the session, the researcher had been summarizing for the main points of the session. Two weekdays were scheduled to conduct the program that consisted of 16 sessions and each session conducted in 4 hours per day, the total hours of program around 30 hours that delivered all topics of program for each groups of participants separately in eight days.

At the end of the whole program, the researcher thanked all nurses for their participation and gave each of them attendance certificate and a booklets, Pamphlets which included all contents of program, guidelines delivered in the program.

Evaluation phase

In evaluation phase, the educational program was evaluated through data collection two timely by the same questionnaire of pretest was used in posttests as following:

- **Posttest 1:** was carried out after one month from the educational program was implemented.
- **Posttest 2:** was carried out after three months after the educational program was accomplished.

Data analysis

All data were collected, coded, and processed to statistical analysis. The Statistical Product and Service Solutions (SPSS, version 23) package was used to analyze these data. The statistical methods were used for analysis data were the following:

Descriptive statistics

Frequency and percentage distribution were used to describe the demographic characteristics. Mean and standard deviation were used to assess the pretest and posttests level of knowledge and attitude of the nurses.

Inferential statistics

- Paired "t" test was used to compare means of pre and posttests knowledge scores to evaluate effectiveness of educational program.
- The results were considered to be statistically significant when P value was less than or equal to 0.05 with confidence level 95% for all analyses.
- The hypotheses were tested at P value was less than or equal to 0.05 with confidence level 95% that was considered statistically significant.

Table (3.2): Plan for data analysis.

NO	Type of statistics	Methods	Description
1	Descriptive statistics	Frequency, Percentage	Frequency and percentage distribution were used to describe the demographic characteristics.
		Mea, Standard deviation	To assess the pretest and posttests level of knowledge of the nurses.
2	Inferential statistics	Paired "t" test	To compare means scores of pre and posttests of knowledge to evaluate effectiveness of educational program.

Ethical clearance of the study

The ethical clearance of approval was obtained before data collection and analyses from the following:

- Ethical approval was obtained from the research ethics committee of faculty of graduate studies and scientific research of the National Ribat University, Nursing College and Department of Medical surgical nursing specialty.
- An official permission was obtained from the administrations of Oncology hospital (the Dean and Matron of national cancer institute of Gezira University) see Annex (F).
- Verbal consent was obtained from each nurse individually after explaining the purpose of the study, there was no harm or costs to participate.
- Each nurse was informed to have right to accept to be included or refuse to participate and withdraw at any time.
- Privacy and confidentiality of the collected data was assured and maintained throughout the study.

3. RESULTS

This chapter deals with the analysis and interpretation of data collected in order to assess the effectiveness of educational program on nurses' knowledge regarding pain assessment and management for patients with cancer. The collected data was coded, analyzed, and organized in the form of tables, graphs then interpreted findings according to the research objectives and hypothesis as following:

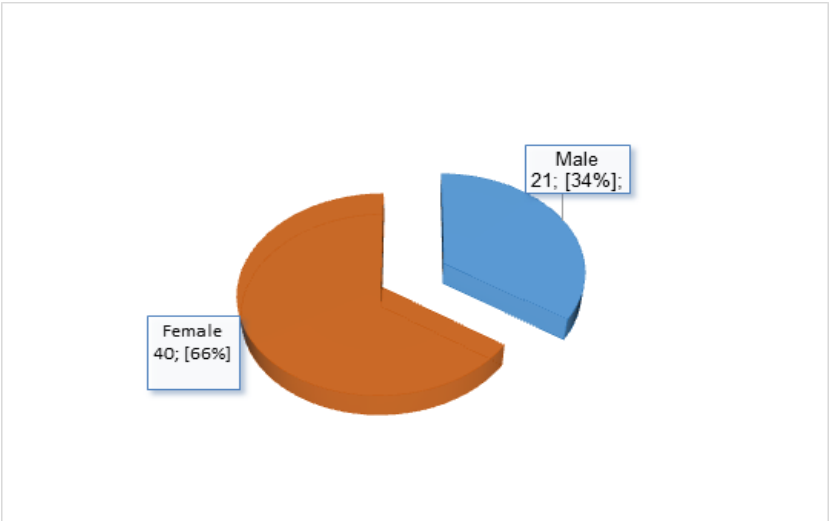

Figure (4.1) Frequency and percentage of gender in the study sample (n=61).

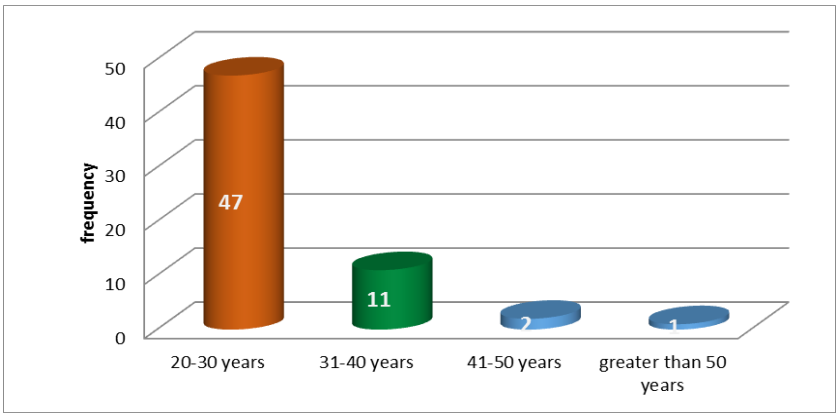

Figure (4.2) Frequency and percentage of age in the study sample (n=61).

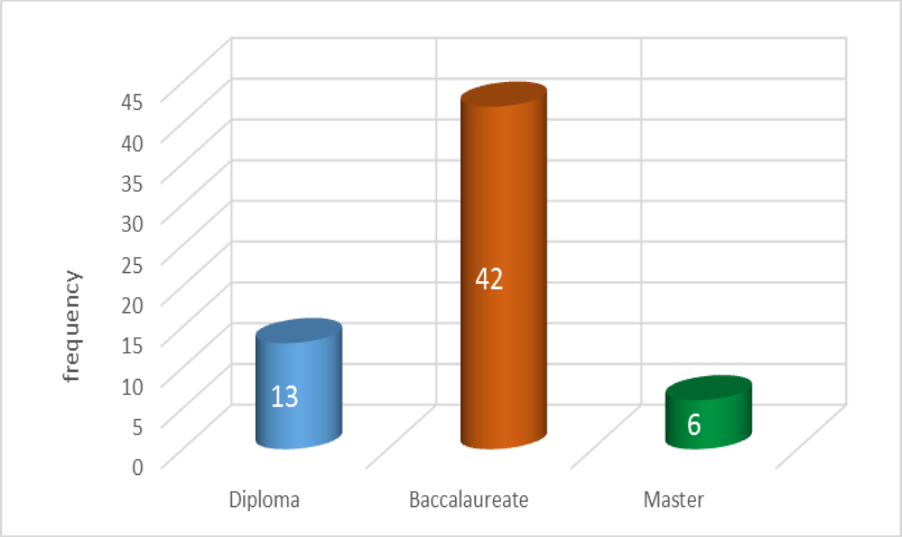

Figure (4.3) Frequency and percentage of educational Level of nurses in the study sample (n=61).

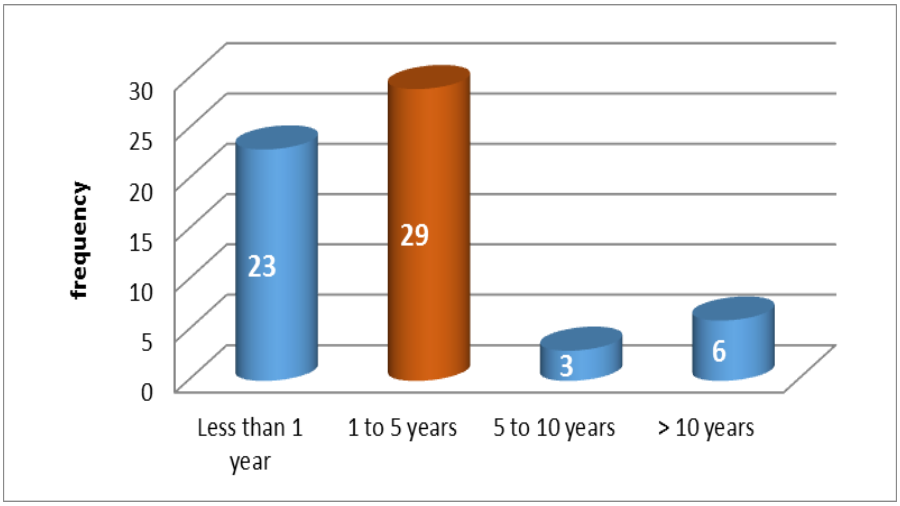

Figure (4.4) Frequency and percentage of the experience in years of nurses in the study sample (61).

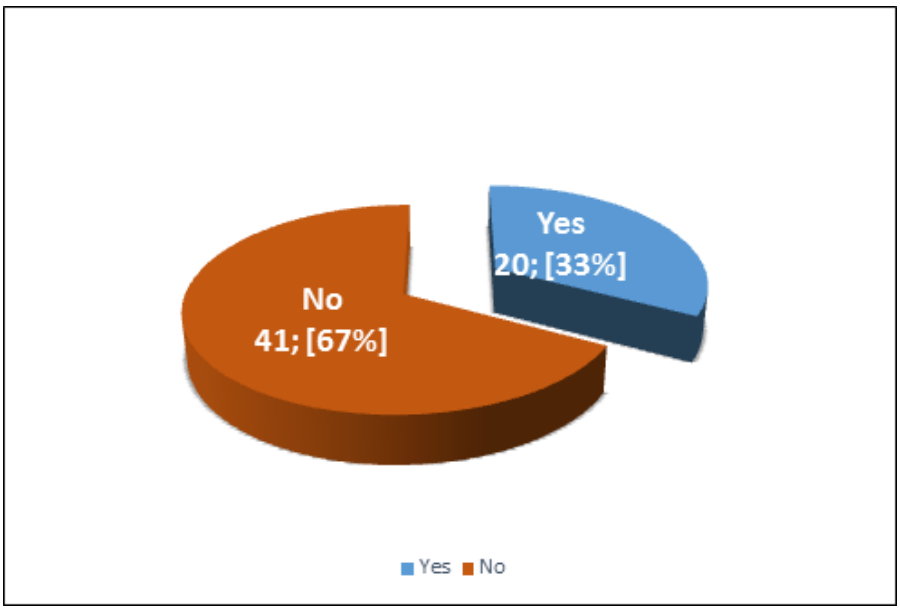

Figure (4.5) Frequency and percentage of training courses regarding cancer pain management in the study sample (n=61).

Table 4.1: Comparison of nurses' knowledge about pain concepts at pretest and posttest. Covers questions: 1 to 8.

Variable tested		Pretest		Post-test 1		Post-test 2		95% Confidence Interval	t	P
	Max Score	Mean Score	SD	Mean Score	SD	Mean Score	SD			
Definition of pain	4	1.8	1.28	2.44	1.19	3.14	0.9	95%	26.78	0.000
Pain and cancer	4	2.1	1.37	2.72	1.15	3.37	0.91	95%	28.54	0.000
Control of pain by NS	4	1.15	1.34	2.14	1.47	3.07	1.33	95%	17.19	0.000
Nociceptors	4	2	1.33	3.24	1.2	3.14	1.22	95%	19.67	0.000
Mechanism of pain experience	4	0.55	0.95	2.42	1.36	3.22	0.09	95%	9.05	0.000
Pain transmission	4	1.9	1.34	2.96	1.32	3.03	0.16	95%	20.1	0.000
Algogenic (perception) substances	4	2.08	1.35	2.66	1.27	2.97	1.3	95%	17.53	0.000
Inhibitory substances	4	2.04	1.31	3.24	1.34	2.92	0.7	95%	17.18	0.000
Overall concepts knowledge	**32**	**13.62**	**1.37**	**21.82**	**1.47**	**24.86**	**1.33**	**95%**	**19.50**	**0.000**

Table 4.2: Comparison of nurses' knowledge about types and symptoms of pain at pretest and posttest. Covers questions: 9 to 14.

Variable tested		Pretest		Post-test 1		Post-test 2		95% Confidence Interval	t	P
	Max Score	Mean Score	SD	Mean Score	SD	Mean Score	SD			
Classification	4	1.5	1.36	2.63	1.32	3.19	1.2	95%	20.47	0.000
Acute pain	4	1.5	1.35	2.22	1.16	3.1	1.26	95%	18.98	0.000
Chronic pain	4	1.5	1.35	2.54	1.33	3.19	1.21	95%	20.22	0.000
Cancer pain	4	1.5	1.37	2.76	1.34	3.27	1.2	95%	20.92	0.000
Effects of pain	4	1.5	1.44	3.24	1.1	3.57	1.06	95%	25.61	0.000
Response to pain	4	1.21	1.4	2.67	1.23	3.39	1.19	95%	21.89	0.000
Overall symptom knowledge	**24**	**8.71**	**1.44**	**16.06**	**1.34**	**19.71**	**1.26**	**95%**	**21.35**	0.000

Table 4.3: Comparison of nurses' knowledge about assessment of pain at pretest and posttest. Covers questions: 15 to 17.

Variable tested		Pretest		Post-test 1		Post-test 2		95% Confidence Interval	t	P
	Max Score	Mean Score	SD	Mean Score	SD	Mean Score	SD			
Comprehensive assessment	4	1.2	1.42	3.64	1.19	3.37	0.92	95%	22.66	0.00
How do you start assessment	4	0.9	1.41	2.54	1.25	3.19	0.91	95%	19.33	0.00
Intensity scales	4	1.8	1.45	2.23	1.42	2.97	1.43	95%	15.98	0.00
Overall assessment knowledge	**12**	**3.9**	**1.45**	**8.41**	**1.42**	**9.53**	**1.43**	**95%**	**19.32**	0.000

Table 4.4: Comparison of nurses' knowledge about pharmacological management of pain at pretest and posttest: Covers questions 18 to 27.

Variable		Pretest		Post-test 1		Post-test 2		95% Confidence Interval	t	P
	Max Score	Mean Score	SD	Mean Score	SD	Mean Score	SD			
Inadequate management is due to	4	2	1.41	2.79	1.31	3.37	1.14	95%	21.01	0.000
Agents used to in treatment are	4	1.4	1.35	2.74	1.23	3.19	1.27	95%	11.78	0.000
Routes of analgesic admin	4	1.2	1.27	3.34	1.47	2.97	1.43	95%	20.58	0.000
Adverse effects of opioids	4	2.1	1.39	2.51	1.25	2.81	1.57	95%	14.89	0.000
Prolonged opioids use lead to	4	2	1.35	2.58	1.32	3.2	1.17	95%	17.35	0.000
Concept of sedation	4	1.8	1.34	2.43	1.45	2.61	1.7	95%	14.57	0.000
Concept of tolerance	4	2.1	1.36	2.98	1.36	3.24	1.21	95%	19.28	0.000
Approaches for using analgesics	4	1.3	1.45	2.38	1.39	2.66	1.37	95%	19.33	0.000
Concept of Balanced analgesia	4	1.8	1.45	3.12	1.44	3.09	1.35	95%	17.63	0.000
Concept of Pro Re Nata approach	4	1.15	1.44	2.86	1.39	2.93	1.53	95%	21.9	0.000
Overallpharmacological knowledge	**40**	**16.85**	**1.45**	**27.73**	**1.39**	**30.07**	**1.7**	**95%**	**17.832**	0.000

Table 4.5: Comparison of nurses' knowledge about non-pharmacological management of pain at pretest and posttest. Covers questions: 28 to 30.

Variable tested		Pretest		Post-test 1		Post-test 2		95% Confidence Interval	t	P
	Max Score	Mean Score	SD	Mean Score	SD	Mean Score	SD			
Types	4	1.2	1.49	2.42	1.47	3.34	1.16	95%	21.9	0.00
Distraction	4	2.11	1.46	2.61	1.59	3.57	1.09	95%	24.84	0.00
Physical care	4	1.6	1.41	2.48	1.6	3.33	1.28	95%	19.86	0.00
Overall non-pharmacological knowledge	**12**	**4.91**	**1.49**	**7.51**	**1.6**	**10.24**	**1.28**	95%	**22.2**	0.00

Table 4.6: Summary of the overall in the 5 areas of nurses' knowledge scores at pretest and posttest.

Variable tested		Pretest		Post-test 1		Post-test 2		95% Confidence Interval	t	P
	Max Score	Mean Score	SD	Mean Score	SD	Mean Score	SD			
Knowledge of pain concepts	32	13.62	1.37	21.82	1.47	24.86	1.33	95%	19.5	0.00
Types and symptoms	24	8.71	1.44	16.06	1.34	19.71	1.26	95%	21.3	0.00
Assessment of pain	12	3.9	1.45	8.41	1.42	9.53	1.43	95%	19.3	0.000
Pharmacological management	40	16.85	1.45	27.73	1.39	30.07	1.7	95%	17.8	0.000
Non-pharmacological management	12	4.91	1.49	7.51	1.6	10.24	1.28	95%	22.2	0.000
Overall knowledge scores in the 5 areas	**120**	**47.99**	**5.83**	**81.53**	**5.75**	**94.41**	**5.67**	95%	**20.0**	0.000

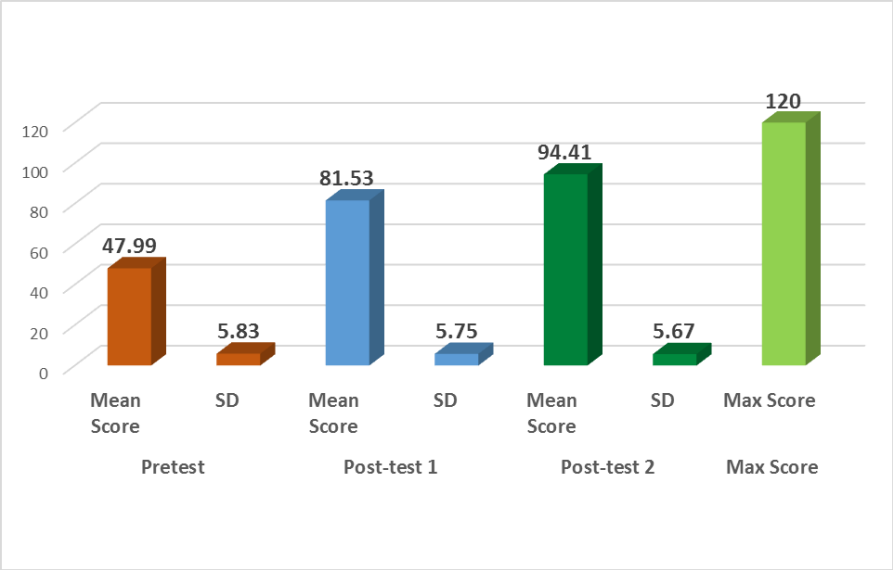

Fig.4.2.1: Overall nurses' knowledge assessment about cancer pain management at pretest and posttest and follow up after 3 months.

4. DISCUSSION

The aim of this study is to assess the effects of educational program on nurses' knowledge about pain assessment and management for patients with cancer. The results of this study revealed that the majority of respondents (66%) were female, most of them (77.0%) belonged to age group between 20-30 years, majority (68.9%) of them have baccalaureate level of education, near a half of them (47.5%) have 1 to 5 years of experience, and (67%) of them in this study did not attend any training course on cancer pain management. In the above results, the most of them were newly graduated and did not get any training program on cancer pain management that may affect their performance but most of them are still in younger ages group that can be possible to improve their knowledge for cancer pain management. It is well documented that lack of continuing training courses for nurses is one of major barriers to provide effective cancer pain management.[5] This finding similar to study conducted by Al Qadire M and his group, they found that the most nurses had a bachelor's degree (90.5%) and 52% of nurses reported no previous pain education in the last five years, in contrast 51.7% of participants were male.[40] This results also

come in line with other study conducted by Bishop DL. It was revealed that the most of the participant their ages group between 21-30 age group.[41]

In the current study showed that the pre-test of overall mean score of nurses' knowledge about concepts of pain was low (13.62 ± 1.37). This may be from lack of continuous training program in the oncology unit to refresh and update nurses' knowledge about pain concepts. It is highlighted that one of the barriers on behalf of cancer pain management is the lack of nurses' knowledge (23). However, after application of training program, the overall mean scores of nurses' knowledge increased in the both measurement of post-test one (21.82± 1.47) and post-test two (24.86 ± 1.33). There was statistically high significance difference between the overall mean scores of pretest, post-test one and post-test two in all items of nurses' knowledge about concepts of pain at p-value (P=0.000 < 0.05). This significant improvement in the nurses' knowledge can be attributed to educational intervention. This results come consistent with study conducted by Marlies E.J. de Rond showed after nurses were educated, the average score on the pain knowledge increased from 69.1% (SD 5 13.2) at pretest to 75.8% (SD 5 11.5) at post-test (P <, 0.001).[42]

Finding of the present study showed that the pre-test of overall mean scores of nurses' knowledge about types and symptoms of pain was (8.71± 1.44) which has increased in post-test one (16.06±1.34) and post-test two was (19.71±1.26). Paired't' test was used to find the significant difference between means of pre-test and post-test knowledge scores. It was showed that, there was statistically high significant difference between the overall mean scores of pretest and posttests on nurses' knowledge about types and symptoms of pain at p-value (P=0.000< 0.05). This highly significant improvement in the knowledge about types and symptoms of pain can be attributed to educational intervention. This gained knowledge about types and symptoms of pain can assist nurses to differentiate varies types of pain in any setting of care plan and treatment of pain.

Regarding pain assessment, the findings of this study showed that the overall mean scores of nurses' knowledge about pain assessment was lower in pretest (3.9 ± 1.45) compared to posttests. However after the educational program the overall mean score of nurses' knowledge increased apparently in post-test 1 (8.41±1.42) and post-test 2 (9.53±1.43) respectively. There was statistically high significant difference between the overall mean scores of pretest and posttests in all items of nurses' knowledge about pain assessment at p-value (P=0.000< 0.05). These significant differences on enhancement of nurses' knowledge about pain assessment in posttests can be attributed to education program. This may enable them to carry out pain assessments accurately and more confidently. Also it is the basis for the diagnosis and setting plan to suitable nursing interventions of the cancer pain. This comes agree with study conducted by Patiraki EI and his group they found that pre-intervention scores revealed various limitations in pain assessment and management. They found that the pre-test, the average number of correct answers was 17.58±7.58. After educational intervention they exhibited significantly improved post-test scores compared to controls (26.49±5.24 vs. 18.75±4.48; P<0.0001).[43]

In the current study showed that, the pre-test of overall mean score of nurses' knowledge about pharmacological management of pain was lower (16.85 ± 1.45) than posttests. This lower level of nurses' knowledge could be from lack of training program to update their knowledge about new protocols of different groups of pharmacological agents used to pain management. However, after application of educational program, the overall mean scores of nurses' knowledge score about pharmacological management of pain increased clearly higher in post-test 1 was (27.73± 1.39) and post-test 2 was (30.07± 1.7) respectively. There was statistically high significant difference between the overall mean scores of pretest and posttests in all items of nurses' knowledge about pharmacological management of pain at p-value (P=0.000< 0.05). This significant improvement in the overall mean scores of nurses' knowledge about pharmacological management of pain in posttests can be attributed to education program and could aid in effective pain management. Because to administer safely pharmacological agents of pain, nurses need to be well knowledgeable about pharmacological management and side effects of opioids. This findings similar to study carried out by Shahriary S, et al noted that, there was knowledge deficits regard pharmacological management of pain and it also attributed to limited training program about pharmacological management of pain.[23] Also this results similarly comes in line with another study conducted by Salim N, et al revealed that nurses have poor knowledge of analgesic drugs pharmacology of pain.[44]

The findings in this study revealed that the overall mean score of nurses' knowledge about non-pharmacological management was low (4.91± 1.49) in pretest. However, after educational program, the overall mean score of nurses' knowledge increased in post-test 1 (7.51±1.6) and post-test 2 (10.24±1.6). There was statistically high significant difference between the overall mean scores of pretest and posttests in all items of nurses' knowledge about non-pharmacological management at p-value (P=0.000< 0.05). These significant differences on improvement of nurses' knowledge about pain non-pharmacological management in posttests can be attributed to education intervention and can aid in effective pain management. Because non-pharmacological therapy is complementary and integrative therapy in relieving the pain. It is highlighted that nurses play fundamental and important role in the non-pharmacological pain management in cancer

patients. Their knowledge about non-pharmacological pain management is essential to effective cancer pain management.[45]

The result of the current study showed that the pretest of overall mean scores of nurses' knowledge in the five areas were lower (47.99±5.83) than posttests. These lower overall mean score of nurses' knowledge in all five areas attributed to absence of training courses and workshops to upgrade their knowledge, alongside most of participant are newly graduated and have not been attended any training course about pain assessment and management. This lower level of overall mean scores of nurses' knowledge score in five areas may contribute to ineffective cancer pain management if not changed through educational program. As shown previously lack of nurses' knowledge is one of the barriers to effective pain management.[23] In addition, ineffective management of pain has proven to have adverse effects on all aspects of a patient's life, such as physiological, psychological and social, increasing the cost burden, prolonging the patient's stay within the hospital and contributing to poor health outcomes.[5,24,46]

However, after training program intervention, the overall mean score of nurses' knowledge in the five areas has increased apparently in all posttests of one was (81.53±5.75) and in the follow up after 3 months of posttest two was (94.41±5.67) respectively. There was statistically high significant difference between the mean scores of pretest and posttests in all five areas of overall nurses' knowledge score at p-value (P=0.000 < 0.05). This clearly enhancement gained on all five areas of overall mean scores of nurses' knowledge in posttests compared to pretest can be attributed to education intervention which could be contributed to effective pain assessment and management. Therefore, the null hypothesis (H_0) was rejected and research hypothesis (Ha) was accepted.

These findings indicate that training program that applied is effective on improving nurse's knowledge regarding cancer pain assessment and management. These study results come in line with study conducted by Onianwa PO et al to evaluate the impact of nurses' pain educational program on nurses' knowledge of pain management. It revealed that in pre-test mean score was 2.6 ± 0.05 while in the post test score was 4.0 ± 0.04, there was improvement in knowledge of nurses and statistically significant (P < 0.000).[47] Also this results supported by another study was conducted by Machira G and his group. Their study results revealed that, there was deficit in knowledge related to pain management at baseline (pretest), but after educational pain management programme, the mean scores of nurses become significantly higher than base line test.[48] This results of current study come consistent with another study conducted by Dongara AR, et al found that there was significant improvement was observed between pretest and post-test total scores of knowledge at p < .001).[49] Also agree with another study conducted by Onianwa PO et al to evaluate the impact of nurses' pain educational program on nurses' knowledge of pain management. Their results revealed an improvement in knowledge that was statistically significant (P < 0.000). The pre-test mean score was 2.6 ± 0.05 while that of the post test score was 4.0 ± 0.04 which indicated nurses' pain educational program had a positive effect on nurses' knowledge of pain assessment and pain management.[47]

5.2. Limitations of the study

- This study limited to the nurses working in oncology unit at the National Cancer Institute of Gerzira University.
- The study the researcher faced difficulties to find all nurses in one time because most of them work in different shift.
- The researcher faced difficulties in collecting related literature on cancer pain management in Sudan because most studies were conducted in Sudan were very limited to pain management.

CONCLUSION

According to the findings of the present study, the following can be concluded:

- The overall mean scores of nurses' knowledge in all areas of pretest were low (47.99±5.83) compared to posttests about pain concepts, types, and symptoms of pain, assessment, pharmacological and non-pharmacological management of pain for patient with cancer before application of training program.
- After implementation of training program, there is clearly improvement on the overall mean scores of nurses' knowledge in all areas of the posttest one was (81.53±5.75) and posttest two was (94.41±5.67) compared to pre-test mean score.
- There is statistically high significant difference between the overall mean scores of the pre-test and posttests of nurses' knowledge scores at p-value (p < .000) that attributed to training program.
- This concludes that the training program is effective on improving nurses' knowledge of pain concepts, types, symptoms, assessment, pharmacological management and non-pharmacological management.
- This enhancement in the overall mean scores of nurses' knowledge can be contributed to effective pain management and improve cancer patient health outcome.

Recommendations

According to the basis of the findings of the present study, the following are recommended:

- Continuous training programs are requested to be done periodically for the developing all staff of nurses who working in oncology unit to upgrade their knowledge for cancer pain management.
- Hospital authority and nursing administration need to motivate, support, encourage the nursing staff to attend training programs, workshops related to

cancer pain management by providing all facilitates to them.

- Hospital authority and nursing administration need to provide nursing up-to-date guidelines, protocols and other materials related to cancer pain management in each oncology department to enhance nurses' knowledge about cancer pain management.
- The cancer pain needs to be given more consideration in the curriculum of nursing program.

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