

Effect of an Educational Program through a Lecture versus Multimedia Methods on Pediatric Nurses' Knowledge and Attitude regarding Acute Pain Management

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Abstract

Background: Lack of proper understanding of important pediatric acute pain management concepts can lead to under-treatment of pediatric pain and ultimately impact the quality of child care. Today's multimedia training methods are considered important and necessary for continuous and lifelong education. **Aim:** to evaluate the effect of an educational program through a lecture versus multimedia methods on pediatric nurses' knowledge and attitude regarding acute pain management. **Subjects and Methods: Design:** A quasi-experimental design is used in this study. **Setting:** The study was conducted in pediatric wards in Sohag, Egypt. **Sample:** A convenient sample included 45 pediatric nurses are randomly divided into two groups. **The tool used for data collection** consists of two parts: Part I deals with the demographic characteristics of nurses as designed by the researchers. Part II is based on the pediatric nurses' knowledge and attitudes survey (PNKAS) on pain; it was designed by Manworren (2001). **Results:** The study showed that the multimedia group showed an improvement in their knowledge compared to the lecture group, the majority of them after program implementation was satisfactory level regarding the knowledge and attitude on pain management with highly significant differences ($p < 0.001$). The pediatric nurses' total knowledge means scores showed improvement in the multimedia group compared to the lecture group immediately, one week, and one month after program implementation. A significant improvement is observed in pediatric nurses' knowledge retention one month after educational program implementation. **Conclusion:** Both lecture and multimedia methods of education improved the level of knowledge and attitude of pediatric nurses in pediatric acute pain management by the PNKAS scale. However, the nurses' level of knowledge and attitude in the multimedia group was higher than that in the lecture group. **Recommendations:** Future multimedia studies should examine the pediatric nurses' improvement in their knowledge, attitudes and practices as well as retention of knowledge over an extended period.

Keywords: Educational Program, Lecture and Multimedia Methods, Pediatric Nurses' Knowledge and Attitudes, Pain Management.

Introduction

One educational method is the use of multimedia. Multimedia means communicating and transferring topics and concepts using several media such as speech, music, images, text, animation, and interactive and user-friendly interfaces. Besides textbooks, many resources can be used as adjuncts to teach nursing skills, for example, multimedia such as DVDs and

videos (Valizadeh, Poorkaremi, Ezbarami, & Ghojzadeh, 2020). Therefore, high-quality instructions can be provided very effectively by integrating video clips with multimedia lecture presentations. This method may increase the nurses' perception of important information and motivation for learning (Ljubojevic, Vaskovic, Stankovic, & Vaskovic, 2014).

Today's multimedia training methods are considered important and necessary for

continuous and lifelong education. Multimedia educational methods represent the integration of multiple media elements (audio, video, graphics, text, animation, etc.) into one synergetic and symbiotic whole, which is more beneficial to foster meaningful learning for the end-users than any one of the media elements individually (Reddi & Mishra, 2011).

For the effective treatment of a child experiencing an array of pain characteristics and needing unique intervention, the nurse's knowledge and assessment of pain are crucial factors (Beecham, Howard, McCulloch, Candy, Laddie, Rees, & Jones, 2015). Managing the pain of hospitalized children effectively is an important part of pediatric healthcare for which the first step is to examine and evaluate the pain (Clark, 2011). Once the type of pain is diagnosed and its effective factors ascertained, the treatment plan can be provided, the medication and non-pharmacological interventions appropriate to the child's condition carried out, and the effectiveness of the methods evaluated (Mondol, Muhammad, & Chowdhury, 2018).

Pediatric nurses need to be trained in the effective management of pediatric pain. A common, fast, simple, and inexpensive teaching method is a material presented in lectures (Ramlogan, Raman, & Sweet, 2014). However, 80% of education provided through lectures is normally forgotten within eight weeks. Therefore, other methods are now being considered along with lectures. Appropriate audiovisual equipment can improve the efficiency of lectures. In this regard, e-learning is a form of multimedia approach. It can be used in video or compact disc (CD) form to present the basic concepts of training in a shorter time (Miller & Metz, 2014).

Pediatric nurses should be able to combine pharmacological and non-pharmacological interventions for better management of pediatric pain. These treatment options often overlap with one another. Pediatric nurses should consider several factors before choosing an option, such as appropriateness of a specific approach to an individual patient, the relationship between pharmacological and non-pharmacological intervention, previous experience of children, and how the children accept the approach (Vasquenza, Ruble, Chen, & Kost-Byerly, 2014).

Pediatric pain may be a neglected topic in nursing. Good acute pain management depends on the nurses' attitude to pain developed through a sound understanding of the concept of pain and its treatment. Lack of proper understanding of important pediatric acute pain management concepts as described above can lead to under-treatment of pediatric pain and ultimately impact the quality of child care. From the literature, pediatric nurses generally have a knowledge deficit in acute pain management, especially concerning post-operative pain care. The areas where nurses lack knowledge and attitude include pain assessment and pharmacological and non-pharmacological pain management should be improved (Van Hulle Vincent, 2017).

Significance of the study:

A novel approach to education is the use of multimedia methods. Multimedia use increases the clarity in education, makes the educational content more understandable and interesting, enhances the permanence of learning, and allows for proper feedback (Sayadi, Varaei, Faghihzadeh, & Ahmadkhani, 2018). Pain management training programs need to be held regularly for all healthcare staff. The training of healthcare professionals should focus on enhancing their communication and teamwork skills. Particularly, the communication and collaboration of doctors and pediatric nurses should be strengthened so that they work as a homogenous team (Al-Mahrezi, 2017). Therefore, the purpose of this study was to evaluate the effect of an educational program through a lecture versus multimedia methods on pediatric nurses' knowledge and attitude regarding acute pain management.

Aim of the study:

To evaluate the effect of an educational program through a lecture versus multimedia methods on pediatric nurses' knowledge and attitude regarding acute pain management through:

- 1- Assessing pediatric nurses' knowledge regarding acute pain management.
- 2- Assessing pediatric nurses' attitude regarding acute pain management.
- 3- Investigate the relationship between socio-demographic characteristics of the pediatric

nurses and their knowledge and attitudes on pain management

- 4- Comparing the effect of education through multimedia versus lecture on improving the pediatric nurses' knowledge and their attitudes regarding acute pain management.

Research Hypotheses:

- H 1: Pediatric nurses' knowledge and attitudes regarding pain management will be improved in both multimedia and lecturing groups after implementing the educational program.
- H 2: Education through multimedia will be more effective in improving the pediatric nurses' knowledge and attitudes regarding pain management than the lecture group.
- H 3: Socio-demographic characteristics of the pediatric nurses will be significantly impacted their knowledge and attitudes on pain management.

Subjects and methods:

Research design:

A quasi-experimental research design is utilized in this study (pre-and post-intervention between control and study groups). This design is important to the nature of the study issue, having one or more group subjects observed on pre and post manipulations (Creswell, 2012).

Research Setting:

These settings included Pediatric Wards (23 nurses in the Pediatric Medical Ward at Sohag University Hospital, 10 in ICU, 8 in the Premature Unit, and 4 in the Outpatient Clinic). These settings were selected due to the high prevalence of children in the selected settings suffering from acute pain and also it serves the biggest region of the population from both rural and urban areas. The important need to improve pediatric nurses' knowledge regarding acute pain among children admitted to these settings.

Subjects:

The type of sample in this study was a convenient sample, composed of all pediatric nurses (45 nurses) who worked at the previously selected setting, divided randomly into two groups (22 nurses for lecture method of education and 23 nurses for multimedia method).

Pediatric nurses in each unit were divided randomly using the simple random table, lottery method. In this method each nurse was marked with a specific number (nurses were numbered from 1 to N in each unit) then the researchers drew a number from the box randomly to choose samples in each group, the first number drawn was considered for the lecturing group and the second for the multimedia group and so on.

Nurses in the lecturing group received three-hour educational sessions about pain assessment and management through PowerPoint presentations.

Pediatric nurses in the multimedia group (online teaching through WhatsApp group) were educated using the same educational content as in the lecturing group but using YouTube film presentation, audio, animation; figures demonstrate the pain assessment and CD contain the educational material. Pediatric nurses can access software on an android phone or laptop (distant or individual education at home or their workplace).

Before the multimedia group enrolled in the study, the researchers sure that they know how to use the computer and multimedia CDs and having to access computers and YouTube both at home and work. Nurses who work in the pediatric units that do not access computers, YouTube, and multimedia CDs were excluded from the multimedia group.

Pediatric nurses who were currently working at the pediatric ward, providing care for children, had a diploma or bachelor degree of science in nursing, who had at least 6-month work experience in the pediatric ward, Arabic and English language readers and writers are included.

Dependent and independent variables:

A- Independent variable:

In this experimental research, the researchers manipulated an educational program using two methods of education (Lecture versus Multimedia Method) as an independent variable.

B- Dependent variables:

In this research, the pediatric nurses' knowledge and attitudes toward pediatric pain management were the dependent variables. These

dependent variables were the variables that changed as predicted in the research hypotheses in response to the independent variable (the educational program).

The researchers evaluate and compare the effect of the lecture method vs. multimedia method throughout the educational program (independent variable) on the pediatric nurses' knowledge and attitudes (dependent variables) to clarify the effect of the independent variable on dependent variables.

Tool of the study:

The tool used for data collection has two parts as follows:

Part I deals with the demographic characteristics of pediatric nurses as designed by the researchers, such as nurses' age, gender, educational level, and years of experience, and whether they have attended any workshop or read any book on pain management.

Part II is based on the pediatric nurses' knowledge and attitudes survey (PNKAS) on pain, it reflects the standards of pain management in pediatric and aimed to measure the knowledge and attitude of pediatric nurses on pain assessment, pain management and pharmacologic and non-pharmacologic intervention. This tool was developed by (Manwarren, 2001) from the nurses' knowledge and attitudes survey (NKAS) on pain originally developed by (McCaffery & Ferrell, 1997). Modifications fall into four categories: modification of medication dosage, removal of meperidine and aspirin, the addition of procedural pain management items, and categorization of patients as infants, children, and adolescents. The PNKAS is a self-administered questionnaire comprising 39 questions; 19 multiple choice and 22 true-and-false questions, with the answer keys attached. Each participant takes approximately 30–40 minutes to answer the questions.

Scoring system

The scoring system is as follows: each item in the PNKAS is assigned a score of 1 if correctly answered and 0 otherwise. A respondent's total score ranges from 0 (the lowest possible score) to 41 (the highest possible score) based on the nurses' responses. The total and percentage scores of each participant are then computed. The

nurses' knowledge and attitude on pain management are then graded as satisfactory (more than 60%) and unsatisfactory (less than 60%).

Tool validity:

For assessing the face and contents validity of tools in this study, the questionnaire was submitted to five faculty members of pediatric nursing professors and their corrective suggestions were applied.

Tool reliability:

To assess the reliability of the questionnaires, Cronbach's alpha was used to calculate the internal reliability of the tool. The result was 0.87.

Pilot study:

It was carried out on 10% of the sample size (5 pediatric nurses), clarification, and estimation of the time needed for filling the study tools and testing the feasibility of the research process. To fill in the sheets unclear items were clarified, no modifications were done and fewer number nurses, the pilot study was included in the study.

Methods for data collection:

Operational Design:

The operational design for this study included three phases named; preparatory, implementation, and evaluation phase.

A-Preparatory phase:

It was based on the assessment data was obtained during the interviewing questionnaires, literature review, knowledge, and attitude assessment.

Designed manual booklet about pain management in children:

The booklet was designed by the researchers and written by Arabic language, printed out regarding the pediatric nurses' size, and given after implementing the program. It was distributed to all nurses in lecture group and multimedia group, post assessment and post intervention in the first session. This booklet contained the illustrative colored pictures and the main points of each training session

Aim of the booklet: The general goal is to equip pediatric nurses with knowledge and attitude regarding pain management in children.

Specific objectives:

- To improve the studied pediatric nurses' knowledge and attitude regarding pain management
- To help pediatric nurses to know signs of pain.
- To help nurses in assessing and managing pain management

The contents of the booklet:

- 1- Introduction about pain.
- 2- Definition of pain.
- 3- Types of pain
- 4- Signs and symptoms of pain.
- 5- Role of culture and beliefs in receiving pain
- 6- Pain assessment scales in pediatric
- 7- Pharmacological and non-pharmacological pain management.
- 8- Pediatric nurses' role in pain management.

Administrative and ethical consideration:

Ethical approval was obtained from the Faculty of Nursing Ethical Research Committee to conduct the study. Written permission is obtained from the manager of the Sohag Universities Hospital and the nursing manager at the selected areas before conducting the study. Written informed consent is also obtained from the pediatric nurses about willing to participate in the study before they complete the questionnaires and after explaining to them the purpose of the study. The researchers collect the names of nurses currently working or who have been working in a pediatric ward the previous year from the eligible registered nurses' administrative offices.

All registered nurses are considered eligible for this study. Each pediatric nurse has the ethical right to consent or refuse to participate. The researchers inform them that the information obtained would be confidential and used only for study purposes. Pediatric nurses have the right to withdraw from the study at any point in time during the study. Before the pediatric nurses enroll in the study, the researchers ensure that all of them meet the set criteria, and then explain to

them the purpose of the study and the benefits of the educational program.

B-Implementation phase:

Data collection covers the period from mid-June to mid-August 2020. The researchers distribute the questionnaires directly to the registered nurses and ask them to fill the questionnaires as baseline data. The researchers take care to ensure that all the returned questionnaires are complete. If any questionnaire is found incomplete, the researcher asks the respondent to complete it.

Implementing the educational program: The program is implemented in four stages as follows:

1- Pre-test assessment of pediatric nurses' knowledge and attitude

A pre-test assessment of the pediatric nurses' knowledge level and attitude on pain is carried out before the educational program using the PNKAS tool. The specific educational needs of nurses are assessed before the educational program to ensure that it is well-tailored and appropriate to their demands. The pre-test is in response to this need and forms part of the plans to develop and implement a sustainable short course on pediatric pain management.

The researchers collected all the questionnaires for data analysis. The data collection took two months (from the collection of baseline data to the end of the second post-test) from mid-June to the end of August 2020).

2- Development of educational program content

To design the program and collect educational material for the lectures group, and multimedia group (CDs, YouTube videos, and audio teaching with power point) on pediatric pain management, the researchers first carefully read the related literature and searched the YouTube videos. The content is then collected and the educational program developed.

3- Applying and implementing the educational program

The educational program is carried out in three sessions (6 hrs) for three days in each area. Each session takes one hour and half for discussion of content and thirty minutes for the

conclusion and asking questions. The topics for each day are as follows:

Day 1 (sessions 1): Discuss with pediatric nurses the program introduction (definition, mechanisms of pain), signs and symptoms of pain, types of pain, and the role of culture and beliefs in receiving pain.

Day 2 (sessions 2): demonstrate with nurses how to assess the pain in children using a numerical rating scale, practical exercises, pharmacological and non-pharmacological approaches to pain, and general pain management and treatment.

Day 3 (sessions 3): Discuss the role of pediatric nurses regarding pain assessment and management; conclusion and end of the session.

C- Evaluation of educational program

The program is assessed through three post-test evaluations. The first post-test evaluation is carried out immediately after the program, the second after one week, and the third after one month. This is to assess the pediatric nurses' knowledge retention in both groups using the same PNKAS tool.

Statistical analysis

The data collected are coded using the Statistical Package for Social Sciences (SPSS 23.0) software, presented, and analyzed according to the type of data for each parameter. The data are presented as descriptive statistics in the form of frequencies and percentages for categorical variables, and means and standard deviations for continuous quantitative variables. The qualitative categorical variables are compared using the chi-square (χ^2) test, but when more than 20% of cells show the expected count less than 5, Fisher's Exact Test is used. Pearson's and Spearman's correlations are used to identify the relationship between quantitative and qualitative variables. Statistical significance is considered when the P-value is < 0.05 .

Results

Table (1): Distribution of pediatric nurses in the lecture and multimedia groups relating to socio-demographic characteristics

Characteristics of nurses	Lecture group		Multimedia group		p-value
	No=22	%	No=23	%	
1- Age(years)					
- 20-24	8	35.0	3	14.5	.756
- 25-29	9	40	12	50.5	
- 30-34	4	20.9	6	28.0	
- 35-39	1	5.1	2	7.0	
Place of work					
• Pediatric medical ward	11	50.0	12	52.0	.695
• ICU	5	22.7	5	21.8	
• Outpatient clinic	2	9.0	2	8.7	
• Premature unit	4	18.3	4	17.5	
Experience' year:					
- 6 months- less than1 a year	2	10.0	8	35.7	.734
- 1 – less than 5years	9	45.0	5	21.4	
- 5- less than 10 years	7	27.0	3	14.3	
- 10- less than 15 years	3	14.0	5	21.4	
- Above 15 years	1	4.0	2	7.1	
There is a protocol for pain management					
- Yes	0	0.0	0	0.0	.184
- No	22	100.0	23	100.0	
There is a committee for pain management					
- Yes	0	0.0	0	0.0	.516
- No	22	100.0	23	100.0	
Attendance workshop about pain management:					
- Yes	0	0.0	0	0.0	.967
- No	22	100.0	23	100.0	
Reading articles and books about pain management:					
-Yes	1	3.0	2	7,1	.457
-No	21	97.0	21	92,9	
Numbers of using pain management scale during pain assessment:					
Never	16	72.0	17	71.0	.431
Rarely	6	28.0	3	14.3	
Always	0	0.0	3	14.3	
All of the times	0	0.0	0	0.0	

Table 1 shows that (40.0% and 50.0%) of pediatric nurses in the lecture group in the multimedia group are mostly aged between 25 and 29 years. As regards the place of work, it was observed that half of the pediatric nurses (50.0%) in the lecture group and 52% in the multimedia group work in the pediatric medical ward. Additionally, nearly half of them (45.0%) in the lecture group have 1 to less than 5 years and 37.0% have 5 to 10 years of pediatric experience. Similarly, (35.7%) of the pediatric nurses in multimedia group have 6 months to 1 year and 20.0% have 5 to 10 years of pediatric experience.

All pediatric nurses (100%) in both groups reported no pediatric pain management protocols in their hospitals. None of them had attended any workshop on pain management. As regards reading articles and books on pain management, only 3.0% of pediatric nurses in the lecture group and 7.1% in the multimedia group reported having read them, with the majority (97.0% in the lecture

group and 92.9% in the multimedia group) of pediatric nurses not having read articles and books on pain management. More than two-thirds (72.0%) of nurses in the lecture group and 71.0% in the multimedia group have never used the pain management scale in pain assessment. No statistically significant differences in both studied groups were found.

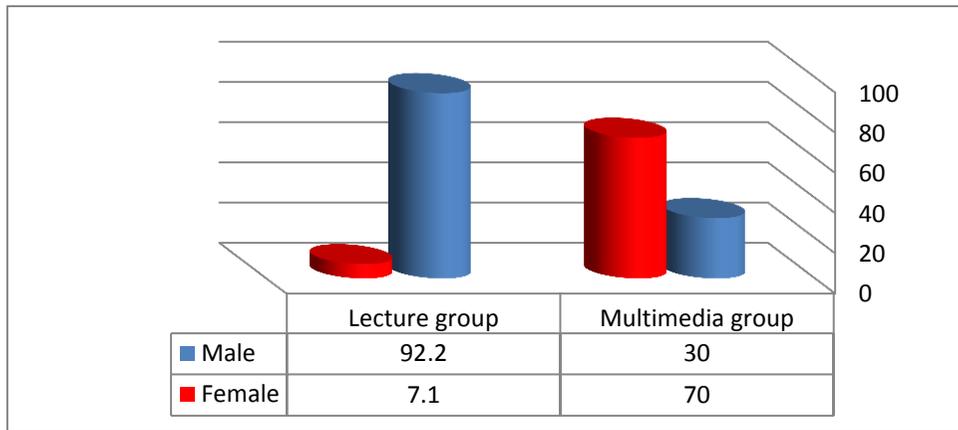


Figure (1): Distribution of pediatric nurses by sex in the lecture and multimedia groups

As Figure 1 shows that, the majority of pediatric nurses in the lecture group (92.2%) are males. and only 7.1% of them are female. in the multimedia group, 70% of them are females and 30% are males.

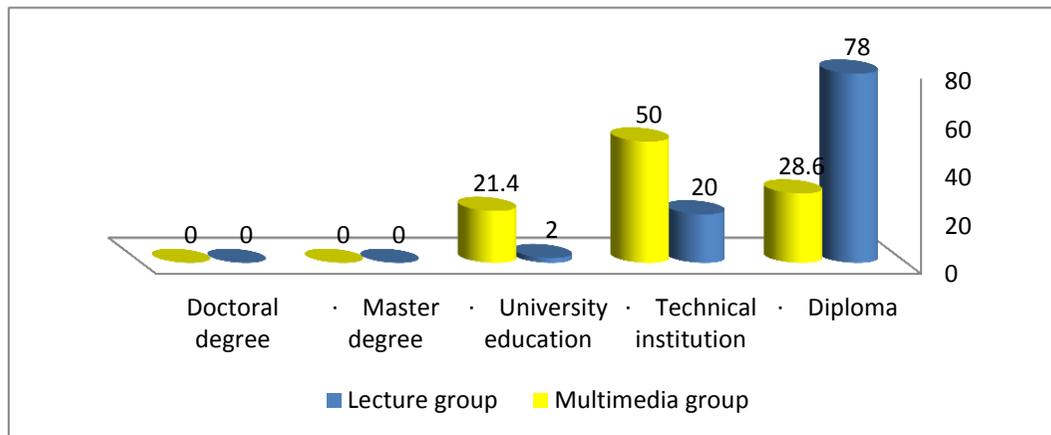


Figure (2): Distribution of pediatric nurses by educational level in the lecture and multimedia groups

As illustrated in Figure 2, more than three-fourths of pediatric nurses in the lecture group had a diploma degree (78.0%), 20.0% attended a technical institution, 2.0% had a bachelor's degree, and no one had a master degree or doctoral degree. In the multimedia group, half of them (50.0%) had attended a technical institution, 28.6% had a diploma degree, 21.4% had a bachelor's degree, and no one had a master's degree or doctoral degree.

Table (2): Frequency and percentage distribution of top five correct pediatric nurses' answers in the lecture and multimedia groups

Items	Lecture group (22)		Multimedia group (23)		p-value
	No.	%	No.	%	
Always administer saline for children and adolescent is a sufficient test if the pain is real.	16	72.7	19	82.6	.665
Subsequent doses of opioid analgesics are adjusted according to the child's response after the first dose.	17	77.3	19	82.6	.634
Non-drug interventions (e.g. heat, music, imagery, etc.) are very effective for mild-moderate pain control but are rarely helpful for more severe pain	16	72.7	18	78.3	.403
The presence of parents is not necessary during painful procedures.	14	63.6	17	73.9	.813
Infant they are less 6 months don't administer of opioid analgesics for pain relief	15	68.2	17	73.9	.685

Table 2 illustrates the frequency and percentage distribution of the top five correct pediatric nurses' answers in the lecture and multimedia groups; the highest percentage (82.6%) of correct answers in the multimedia group related to question on subsequent opioid analgesic doses adjusted to the child's response after the first dose (77.3%) in lecture group. Followed by (82.6%) answer correctly the question related to whether always administering saline to children and adolescents is a sufficient test for real pain in the multimedia group and (72.7%) answer correctly in the lecture group. Also, the table indicated that no statistically significant differences in both studied groups were found.

Table (3): Frequency and percentage distribution of top five incorrect pediatric nurses' answers in the lecture and multimedia groups

Items	Lecture group (22)		Multimedia group (23)		p-value
	No.	%	No.	%	
The recommended route of administration of opioid analgesics for patients with persistent cancer-related pain	21	98.0	23	100.0	.234
A child with chronic cancer pain has been receiving daily opioid analgesics for 2 months. The likelihood of the patient developing clinically significant respiratory depression.	22	100.0	23	100.0	.945
Definition of Narcotic/opioid addiction.	22	100.0	23	100.0	.403
Oral acetaminophen 650 mg orally is equal in analgesic effect to codeine 32 mg orally.	22	100.0	23	100.0	.643
Comparable stimuli in different people produce the same intensity of pain	22	100.0	23	100.0	.765

Table 3 presents the frequency and percentage distribution of the top five incorrect pediatric nurses' answers in the lecture and multimedia groups; all the nurses (100%) in both the lecture and multimedia groups answered incorrectly the questions related to pharmacological pain management such as the recommended route of administration of opioid analgesics, a child with chronic cancer pain receiving daily opioid analgesics, the likelihood of patients developing clinically significant respiratory depression, the definition of narcotic/opioid addiction, and oral acetaminophen 650 mg being equal in analgesic effect to codeine 32 mg orally. Also, the table highlighted that no statistically significant differences in both studied groups were found.

Table (4): Comparison of the lecture and multimedia groups on the pediatric nurses' knowledge level and attitude on pain management in pre-test and one month after program implementation

Items	Lecture group				Multimedia group				P-value
	Pre educational intervention		After one month of educational intervention		Pre educational intervention		After one month of educational intervention		
	No.	%	No.	%	No.	%	No.	%	
Unsatisfactory < 60	16	76%	5	20.0	19	83.0	3	10.0	0.001
Satisfactory ≥ 60	6	24.0	17	80.0	4	17.0	20	90%	

Table (4) shows a significant difference ($p < 0.001$) between the lecture and multimedia groups on the pediatric nurses' knowledge level and attitude on pain management in one month after program implementation. More than two-thirds of nurses in both the lecture and multimedia groups (76% and 83%, respectively) show unsatisfactory knowledge and attitude on pain management before program implementation. In addition, the multimedia group showed an improvement compared to the lecture group, with the majority becoming satisfactory (90% vs. 80.0%, respectively) about the nurses' knowledge level and attitude on pain management one month after program implementation.

Table (5): Comparison of pediatric nurses' mean and standard deviation scores between the lecture and multimedia groups regarding knowledge about acute pain management before and immediately, one week, and one month after program implementation

Items	Pre-program	Immediate-post program	After one week program	After one month's program	P-value
Lecture group	14.68±0.49	50.17±3.1	70.04±1.64	64.04±2.64	<0.001
Multimedia group	15.68±0.69	62.17±2.1	76.04±1.64	77.04±2.64	<0.001

Table (5) shows a highly statistically significant difference between pediatric nurses' knowledge before and immediately, one week, and one month after program implementation on pain management between the lecture and multimedia groups ($P < 0.001$). The nurses' mean knowledge scores and attitudes according to PNKAs in the lecture group were 14.68 ± 0.49 before the program, whereas the mean score increased immediately, one week, and one month after program implementation to 50.17 ± 3.1 , 70.04 ± 1.64 , and 64.04 ± 2.64 , respectively. In the multimedia group, the score was 15.68 ± 0.69 before program implementation, but after the educational program, the mean score increased immediately, one week, and one month after program implementation to 62.17 ± 2.1 , 76.04 ± 1.64 , and 77.04 ± 2.64 , respectively. The pediatric nurses' total knowledge mean scores showed improvement in the multimedia group compared to the lecture group immediately, one week, and one month after program implementation.

Table (6): The relationship between the socio-demographic characteristics of the pediatricnurses in the lecture and multimedia groups and their total knowledge level and attitude on pain management

Socio-demographic characteristics	Total level nurses' knowledge and attitudes																	
	Lecture group								Multimedia group									
	Pre				Post				Pre				Post					
	Poor		Good		Poor		Good		Poor		Good		Poor		Good			
N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%			
Sex :																		
Male	14	90.0	4	70.0	3	60.0	14	85.0	6	30.0	2	50.0	2	65	16	80		
Female	2	10.0	2	30.0	2	40.0	3	15.0	13	70.0	2	50.0	1	35	4	20		
X²=0.558p-value=0.000**																		
Age(years):																		
- 20-24	5	36.0	5	85.0	5	100.0	4	75.0	7	40.0	8	42.0	3	65.0	1	45.0	11	55.0
- 25-29	7	44.0	1	0.0	1	20.0	1	20.0	6	38.0	7	38.0	1	35.0	2	55.0	3	15.0
- 30-34	2	10.0	0	0.0	0	0.0	0	0.0	1	7.0	1	5.0	0	0.0	0	0.0	4	20.0
- 35-39	2	10.0	0	0.0	0	0.0	0	0.0	3	15.0	2	15.0	0	0.0	0	0.0	2	10.0
X²=0.955p-value=<0.001**																		
Education :																		
Diploma	5	36.0	5	100.0	0	0.0	0	0.0	2	10.0	9	42.0	0	0.0	0	0.0	4	20.0
Technical institution	7	44.0	1	20.0	4	80.0	4	75.0	9	55.0	7	38.0	3	65.0	3	100.0	10	50.0
University education	4	20.0	0	0.0	1	25.0	1	25.0	6	35.0	2	20.0	1	35.0	0	0.0	6	30.0
X²=0.455p-value=<0.001**																		
Experience' year:																		
- 6 months-1 year	4	25.0	0	0.0	0	0.0	5	33.0	3	16.0	0	0.0	0	0.0	0	0.0	7	37.0
- 1 – 5 years	6	35.0	6	100.0	3	70.0	6	35.0	5	25.0	0	0.0	3	100.0	5	23.0	5	23.0
- 5-10 years	4	26.0	0	0.0	0	0.0	4	20.0	5	25.0	0	0.0	0	0.0	0	0.0	3	15.0
- 10-15 years	2	14.0	0	0.0	2	30.0	2	12.0	5	25.0	4	100.0	0	0.0	0	0.0	3	15.0
- Above 15 years	0	0.0	0	0.0	0	0.0	0	0.0	1	9.0	0	0.0	0	0.0	0	0.0	2	10.0
X²=0.545p-value=0.004*																		
Reading articles and books about pain management:																		
Yes	1	3.0	0	0.0	0	0.0	16	95.0	2	8.0	4	100	3	100	18	92.0	2	8.0
No	16	97.0	6	100	5	100	1	5.0	17	92.0	0	0.0	0	0.0	2	8.0	2	8.0
X²=0.411 p-value=0.004*																		

Table (6) shows highly statistically significant differences between the lecture and multimedia groups about their knowledge levels and attitude on pain management and gender, age, years of experience, and education level.

Discussion

One of the major challenges in nursing education programs is to provide an effective learning method to update knowledge and improve performance. However, despite new learning methods based on problem-solving and Internet and computer use, the lecture method continues to remain popular (**Rafii, Amiri, Dehnad, & Haghani, 2016**). In recent decades, the traditional learning approaches based on modern communication and information technologies such as multimedia have undergone major changes. Traditional educational classes are no longer effective because they are tied to a particular place and time, and cannot provide an appropriate context for learning (**Nozari & Siamian, 2015**). Therefore, this study evaluated the effect of education through the lecture and multimedia methods on pediatric nurses' knowledge levels and attitude regarding acute pain management.

All nurses in the lecture and multimedia groups reported no pediatric pain management protocols or pain management committees in their hospitals. None of them had attended any workshop on pain management. The majority of them in both groups do not read articles and books on pain management. These results are similar to the findings of other studies by **Çirik, Çiftcioglu, & Efe, (2019)** who studied "Knowledge, Practice, and Beliefs of Pediatric Nurses about Pain" and **Yava, Çicek, Tosun, ozcan, Yildiz, & Dizer, (2013)** in Turkey who conducted a study about "Knowledge and Attitudes of Nurses about Pain Management" and found that more than half of the nurses have received no training on pain management. A few of them have taken a pain management course and less than one-third have read a book or journal on pain. In addition, the study is similar to **Bajjali, (2019)** stated in a study in West Bank about "Knowledge and Attitudes of Pediatric Nurses Regarding Pain Management in Palestinian Hospitals" that about half of the nurses reported no pediatric pain management protocols in their hospitals. More than half of the nurses reported no pain management committees in their hospitals.

This study finds a highly statistically significant difference between the two groups

in the nurses' knowledge on pain management before and immediately, one week, and one month after program implementation. The nurses' total knowledge mean scores showed a larger improvement in the multimedia than lecture group before and immediately, one week, and one month after program implementation with a highly statistically significant difference. These findings are consistent with the results of **Germossa, Sjetne, & Helles, (2019)** that conducted a study in an Ethiopian University Hospital about "The Impact of an In-service Educational Program on Nurses' Knowledge and Attitudes Regarding Pain Management" and showed a significant improvement in knowledge and attitude scores on pain management following the educational program. This provides important information on the beneficial impacts of educational programs on nurses' knowledge levels and attitude on pain management; 98.2% of the participants increased their KASRP scores after the completion of the educational program.

More than three-fourths of the nurses in both groups answered correctly the questions on whether always administering saline to children and adolescents is sufficient to test for real pain, subsequent dosing of opioid analgesics adjusted according to the child's response after the first dose, and non-drug interventions (e.g., heat, music, imagery, etc.) as very effective for mild-moderate pain control but rarely helpful for more severe pain. These results agree with the findings of **Bajjali, (2019)**, who showed that around 71.9% of nurses answered the questions on non-pharmacological interventions correctly, such as the question on "non-drug interventions (e.g., heat, music, imagery, etc.) being very effective for mild-moderate pain control but rarely helpful for more severe pain."

In this study, all the nurses in both groups answered the questions on pharmacological pain management and opioid addiction incorrectly, such as on the recommended route for administering opioid analgesics, a child with chronic cancer pain receiving daily opioid analgesics, the likelihood of a patient developing clinically significant respiratory depression, the definition of narcotic/opioid addiction, and oral administration of acetaminophen 650 mg having the same

analgesic effect of codeine 32 mg orally. These results are in line with the findings of **Bajjali, (2019)**, who showed that most of the nurses answered the questions on pharmacology and addiction incorrectly. For example, 98.4% of nurses in this study have a misconception on the incidence of opioid addiction, and 94.9% have a knowledge deficit on the incidence of respiratory depression in opioids by 85.2% of nurses.

This study shows a highly statistically significant relationship ($p < 0.001$) between the lecture and multimedia groups on the nurses' knowledge level and pain management attitude before and one month after program implementation. In addition, the multimedia group shows improvement compared to the lecture group on the nurses' knowledge level one month after program implementation. These results agree with the findings of **Germossa, Sjetne, & Helles, (2019)**, which show that educational programs improved the nurses' scores on knowledge level and pain management attitude. The mean rank score of nurses' knowledge level and attitude on pain significantly improved after the educational program ($p < 0.001$).

In addition, **Salim, Tuffaha, & Brant, (2020)** in the United Arab Emirates showed in their study about the impact of a pain management program on nurses' knowledge and attitude toward the pain that the nurses' knowledge level and attitude continue for over three months. The pain management program proved effective in improving nurses' knowledge levels, attitude on pain, and assessment practices. Nurses in the multimedia group significantly increased their pain scores after the program. In addition, the study result is in the line with **Abdalrahim, Majali, Stomberg, & Bergbom, (2011)** who conducted a study about the effect of postoperative pain management program on improving nurses' knowledge and attitudes toward pain showed that a multimedia pain educational program can enhance the learners' knowledge, attitude, and ability to apply their knowledge to practical use. *From the researcher's point of view*, the multimedia interface can attract learners' attention, thereby boost learning efficiency, and add interaction

practical questions to evaluate the learners' understanding level.

More than two-thirds of nurses in both groups (76% and 83%, respectively) in this study have unsatisfactory knowledge and attitude on pain management before program implementation. This is consistent with the findings of **Qadire & Khalaileh, (2014)**, who conducted a study about the effectiveness of the educational intervention on Jordanian nurses' knowledge and attitude regarding pain management and indicated that nurses had limited knowledge before the educational program.

Similarly, **Salim, Tuffaha, & Brant (2020)** stated in their study in the United Arab Emirates showed in their study about the impact of a pain management program on nurses' knowledge and attitude toward the pain that their most important findings are the low pre-test knowledge scores of nurses and the significant improvement in their knowledge for most items following the educational intervention. *From the researcher's point of view*, this could be because nurses receive inadequate training in pain management, and do not attend any educational program or read any book on pain.

The nurses' knowledge and attitude scores according to PNKAs are limited in both groups before the program but increased significantly immediately one week, and one month after program implementation. The nurses' knowledge and attitude mean score was higher in the multimedia than in the lecture group. This finding is in line with the findings of **Salim, Joshua, AbuBaker, Chehab, & Jose, (2019)**, who conducted a study about "Effect of a Nursing In-Service Education Program on Nurses' Knowledge and Attitudes towards Pain Management in a Governmental Hospital in the United Arab Emirates" and they stated that the nurses' knowledge and attitude on pain improve after implementing the educational session on pain.

Also, the results are similar to **Valizadeh, Taheri, Arzani, & Ghoojzadeh, (2017)** state in their study about "Comparison of the Effect of Multimedia Training and Lecture on Pain Management of Pediatric Nurses and Their Perception of Learning Satisfaction" that the

nurses' learning and retention mean scores increased one week and one month after intervention in both groups, but the nurses' retention score in the multimedia group was significantly higher than that in the lecture group immediately and one month after program implementation ($P < 0.001$). Furthermore, **Arzani, Valizadeh, Poorkaremi, Ezbarami, & Ghojzadeh, (2020)** conducted a study concerning found that the mean attitude scores of the lecturing group were 104.74 one week and 109.40 one month after the study versus 74.72 before the study. These scores in the multimedia group were 112.72 and 115.04, respectively ($p < .001$).

This study shows highly statistically significant differences between the lecture and multimedia groups in their knowledge level and attitudes on pain management and gender, age, years of experience, and educational level. These results are similar to the findings of **Stanley & Pollard, (2013)**, who found in their study regarding "Relationship between Knowledge, Attitudes, and Self-Efficacy of Nurses in the Management of Pediatric Pain" that years of pediatric nursing experience have a positive relationship with the knowledge level and PNKAS scores of nurses. Similarly, **Shaffer, (2019)** conducted a study about "Pediatric Pain Management during Intravenous Line Placement: Nursing Perceptions and Interventions" and found that higher PNKAS scores correlated with increased nursing experience, but results are not similar with **Germossa, Sjetne, & Helles, (2019)** show no statistically significant difference in KASRP scores from nurses' educational level.

Limitations of the study

The current study has a limitation in that some nurses are unable to access the Internet in educational programs and therefore result in biased lecture sampling.

Conclusion

From the results of the current study, the researcher can come to the following conclusions:

Both lecture and multimedia methods of education improved the level of knowledge and

attitude of pediatric nurses in pediatric acute pain management by the PNKAS scale. However, the nurses' level of knowledge and attitude in the multimedia group was higher than that in the lecture group. Moreover, the multimedia educational method resulted in more lasting effects (retention of knowledge) for nurses than the lecture educational method, with improvement in knowledge one month after the implementation of the educational program.

Recommendations

In light of the current study results, the following recommendations are proposed:

- 1- Future multimedia studies should examine the pediatric nurses' improvement in their knowledge, attitudes and practices as well as retention of knowledge over an extended period.
- 2- Hospital regulations must design a committee on acute pain management as a vital protocol relevant to pain assessment and management reflecting the current standards of practice.
- 3- Nurses need to be motivated to attend workshops and read articles and books on acute pain management. All nurses in other settings need to attend in-service training programs designed with multimedia for wider implementation and motivation and to improve their learning outcomes.
- 4- Owing to the shortage of nursing staff, which makes it difficult for them to attend lectures, multimedia training methods need to be used along with other methods to enhance the nurses' understanding and application of relevant knowledge and practices in the clinical field.

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