

## Upgrading Nurses' Knowledge, Attitude and Self-Efficacy Toward Pharmacological and Non-Pharmacological Pain Management in Children.

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### Abstract

**Background:** Every child has the right to be free from pain; nursing staff have a crucial responsibility in the care of children suffering from pain. **The study aimed to** upgrade nurses' knowledge, attitude and self-efficacy toward pharmacological and non-pharmacological pain management in children. **Subjects and Method: Design:** A quasi- experimental research design was utilized in this study. **Subjects:** A convenience sampling of two hundred nurses in Pediatric Medical, Surgical departments, Hematology and oncology unit at Tanta University Main Hospital and Surgical department at Tanta Universal Teaching Hospital. **Three Tools** were used for data collection: **Tool I:** Nurses' knowledge structured questionnaire sheet, **Tool II** Nurses' attitude regarding pain management in children. **Tool III:** Nurses' Self-efficacy Scale. **The results** found that nurses' knowledge, attitude and self-efficacy regarding pharmacological and non-pharmacological pain management had improved immediately after and one month after conducting the program with positive significant correlation between total knowledge and total attitude scores. The study **concluded** that nurses' knowledge, attitudes and self-efficacy about pharmacological and non-pharmacological pain management improved both immediately after the program and one month later. The study **recommended** that periodic in-service training program should be carried out for all nurses in various pediatric departments for proper management of pain in children.

**Keywords:** Nurses' attitude, Nurses' Knowledge, Pharmacological and Non-Pharmacological Pain management, self-efficacy.

### Introduction

Children of all ages are exposed to many sorts of pain while receiving treatment, such as medical and surgical procedures, invasive treatments, lab investigations, vaccinations, and hospitalization. <sup>(1)</sup> Children who experience persistent and frequent pain without alleviation will suffer short- and long-term negative effects that are unrelated to their age, gender, race, ethnicity, or socioeconomic situation. Physically, emotionally, behaviorally, and psychologically are just a few of the ways that it can be affected by pain. <sup>(2)</sup>

Nurses are usually in direct contact with children, and they are significant keys in assessing and dealing with a child's suffering and pain. Positive-thinking nurses are more motivated to care for children who are in pain. Nurses who believe that treating children's suffering is one of their rights employ pain management approaches. <sup>(3)</sup> Nurses serve as the child's primary decision-maker when it comes to evaluating and treating their discomfort. They are an integral part of the medical team that cares for them. Consequently, to effectively treat pediatric pain, they require good understanding, an

appropriate attitude, and high self-efficacy.<sup>(4)</sup>

Nurses' primary responsibility is to assist in pain management techniques, educate the child, family, and caregivers about various pain management techniques, both pharmacological and non-pharmacological. Then, they will reevaluate how the child is responding to pain management interventions. Both non-pharmacological and pharmacological techniques must be understood for effective pain management in children.<sup>(5)</sup>

Non-opioid analgesics such as paracetamol and non-steroidal anti-inflammatory drugs, as well as opioid analgesics such as morphine and codeine, are examples of pharmacological therapies. Also, local anesthetics, and adjuvants; nevertheless, the use of all these drugs results in a number of undesirable effects.<sup>(6)</sup>

Non-pharmacological techniques that can be used depending on the age of the child like music, hypnosis, guided imagery, massage, thermal therapy, distraction, and relaxation, are frequently employed to manage pain in children of all ages. Other non-pharmacological techniques include thermal, and transcutaneous electrical nerve stimulation<sup>(7)</sup>

Children themselves prefer to utilize both cognitive and physical non-pharmacological therapies, as diversion, imagery, hot baths, hot packs, and massage. Additionally, recently developed non pharmacological interventions like cryotherapy, aromatherapy (lavender inhalation), and acupuncture are applied to decrease moderate to severe pain in children and adolescents during painful procedures like the insertion of an arteriovenous fistula and while receiving chemotherapy.<sup>(8)</sup> To enhance the overall

evaluation of pediatric pain, healthcare workers must have sufficient information and a good attitude. Pediatric nurses and future nurses still need to be educated, as they may not be happy with their educational experience and still struggle to understand the actions and negative effects of medications.<sup>(9)</sup>

Self-efficacy is a valid indication of a nurse's clinical competence, and it refers to confidence in every one capacity to execute a particular task efficiently. Self-efficacy is composed primarily on knowledge. Effective pain education must provide caregivers with appropriate information about children's pain management and boost their confidence in detecting and treating pain. In the early stages of a nurse's employment, an efficient education program for pain may provide them with the information and skills necessary to administer appropriate pain management.<sup>(10)</sup>

### **Significance of the study**

A critical component of child care is pain management, and nurses have a significant role in pain evaluation and management in acute care settings. Effective pain management is frequently impeded by deficient knowledge about the characteristics of pain. Ineffective nursing techniques include ineffective pain management techniques and a reluctance to accept various perspectives on pain. Nurses do not believe children's reports of pain because they believe children's perception of pain is poor. Although the availability of an alternative and trustworthy pain assessment method, caregivers continue to doubt children's responses.<sup>(11)</sup> So, the aim of this research was to upgrade nurses' knowledge, attitudes, and self-efficacy toward

pharmacological and non-pharmacological pain management in children.

#### **Aim of the study**

The study was conducted to upgrade Nurses' knowledge, attitudes, and self-efficacy toward pharmacological and non-pharmacological pain management in children.

#### **Research Hypothesis:**

Nurses' knowledge, attitude and self-efficacy are expected to be improved after implementation of the educational program about pharmacological and non-pharmacological pain management.

#### **Subjects and method**

##### **Research design:**

In the current study, a quasi-experimental research design with a single group was used to collect data before, immediately after, and one month later.

##### **Setting:**

The study was carried out at Pediatric Medical, Surgical Departments Hematology and Oncology Unit at Tanta Main University Hospital and Surgical department at Tanta Universal Teaching Hospital. The pediatric medical department consists of three floors; each floor contains four rooms, while surgical department includes two large wards with more than ten beds in each ward. As regards Hematology and Oncology Unit, it has two floors. The first one includes two wards while the second one contains only one ward.

##### **Subjects:**

A convenience sample of two hundred nurses in the aforementioned settings was included. A power analysis using the Epi Info program based on the study's 80 % power, 80 % level of significance, and 5 % error margin was utilized to calculate the sample size.

Whereas number of pediatric nurses at medical department was 60 nurses while they were 50 at surgical department divided between main department at Tanta University and Tanta Universal Teaching Hospital. At the same time, their number was 90 at Hematology and oncology unit including rehydration unit.

##### **Data Collection Tools:**

Data was gathered using three different tools:

##### **Tool I: Nurses' knowledge structured questionnaire sheet:**

The researchers developed this after evaluating the most recent literatures<sup>(12,13)</sup> It involved two parts:

##### **Part 1: Sociodemographic characteristics of the nurses:**

It included age, educational qualifications, residence, work setting, years of experience, marital status and attending training courses related to pain management in children.

**Part 2:** It covered nurses' knowledge about pain as definition, causes, pathophysiology, types, indicators of pain, pain assessment scales to various ages and various methods for pain management (pharmacological and non-pharmacological). It consisted of 27 questions included 16 binary (true or false) response type questions about both non-pharmacological and pharmacological pain management, and 11 multiple choice questions (MCQs) concerning pain assessment and methods of pain management.

##### **The scores for the nurses' knowledge were as follows:**

- Correct and complete answer was scored (2)
- In complete answer was scored (1)

- Wrong answer or didn't know was scored (0)

**Nurses' knowledge total scores were as follows:**

- Less than 60% was regarded low level of knowledge.
- From 60 to less than 80 % was regarded moderate level of knowledge.
- From 80 to 100 % was regarded high level of knowledge.

**Tool II: Nurses' attitude regarding pain management in children.**

It was constructed by Onarıcı et al. (2015)<sup>(14)</sup> and Emine (2019)<sup>(15)</sup> and modified by the researchers in order to evaluate pediatric nurses' attitudes towards pain. There were five continuums on the attitude scale:

highly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1). It consisted of 20 statements with a total score of 100 degrees.

- Positive Attitude: 75– 100%.
- Neutral Attitude: 65 – 74%.
- Negative Attitude: 0 – 64%.

**Tool III Nurses' Self-efficacy Scale:** This scale was adapted by the researchers from Schwarzer and Jerusalem (1995)<sup>(16)</sup>. A ten-item scale was used to assess perceived self-efficacy. Self-efficacy was rated on a Likert scale from one to four as:

one = not at all,  
two = hardly true,  
three = moderately true,  
four = exactly true.

**The total score for self-efficacy was classified as the following:**

High self-efficacy  $\geq 60\%$   
Low self-efficacy  $< 60\%$

**Method:**

**1. Administrative process:** Administrators in charge of the settings at Tanta

University Main Hospital granted permission for collecting data.

- Obtaining approval from the faculty of nursing ethics committee before conducting the research with number 85-9-22.

**2. Ethical and legal considerations:**

- a. The study's design ensured that every member of the sample experienced no pain or injury.
- b. Regarding the data collection, confidentiality and privacy were considered.
- c. Nurses gave their approval to participate in the study.

3. **Tools validity:** An experienced panel of pediatric nursing professionals ensured the study tools' content validity.

4. **Content reliability:** The pilot subjects put the research tools to the test during the first session to ascertain the Cronbach's Alpha, which was 0.89 for the knowledge questionnaire and 0.87 for the Nurses' attitude questionnaire.

5. **A pilot study:** An evaluation of the tool's clarity, applicability, and practicability, 10% of nurses involved in a pilot study and excluded from the study population.

**Field work:** The research was conducted through four stages:

1- **Assessment stage:**

The researchers held a meeting with the nurses to specify the study's objectives, collect data about them, and assess their knowledge and attitude towards pain management in children.

2- **Planning phase: depending on** the results of needs analysis, the following components were incorporated into a training program for nurses:

- a. Setting specified educational program objectives.

- b. Preparation of educational program content.
  - c. Nurses were educated utilizing a wide variety of approaches and resources, such as interactive lectures and discussions in groups., power point, and poster presentation.
- 3- **Implementation phase** included the following steps:
- Prior to data collection, the researchers interviewed nurses in the locations, described the study's goal and obtained consent from them to participate.
  - Every researcher was attending to one setting of the before mentioned settings two days per week for data collection.
  - Pediatric nurses in each setting were classified into subgroups according to their number.
  - The teaching program was delivered to every small group via the execution of following sessions based on needs assessment of the nurses who were assessed.
  - Five sessions of the educational program were held, two sessions per week. Each session lasted between 45 and 60 minutes.
  - The educational session was conducted using lectures, power point and group discussion.
  - The goals of the new topic were introduced at the start of each session.
  - Feedback and reinforcement of designed nursing education were done.
  - The nurses' knowledge, attitude, self-efficacy were assessed before program implementation by using tool **I, II, III**.
  - All nurses were met in the morning shift.

- Collecting data began in early November 2022 and completed with the end of February 2023.

**The program contained the following:**

**The first session:** An introduction outlining the goal of the program.

**The second session:** It addressed the definition, classifications, pathophysiology, and impact of pain on children.

**The third session:** It contained teaching regarding pain sources and pain markers in children.

**The fourth session:** It involved teaching age-appropriate pain assessment tools and pharmaceutical methods to pain treatment.

**The fifth session:** It contained instruction on non-pharmacological pain management techniques for children and a summary of the program.

**4-Evaluation Phase:**

Following the educational program (Tool I, II, and III) were used to evaluate nurses' knowledge, attitude, and self-efficacy regarding pharmacological and non-pharmacological pain management in children prior to, immediately after, and one month from the program.

**Statistical Analysis**

The one-way ANOVA test, T-test, Pearson correlation analysis, and mean and standard deviation (SD) were used to evaluate the associations among the quantitative variables. Data were presented using the SPSS program (version 22) in numbers and percentages. The P value of <0.05 was chosen as the significant level.

**White (2019)<sup>(17)</sup>**

**Results:**

**Table (1)** presents percentage distribution of the studied nurses according to their socio-demographic characteristics, 47 % of them were obviously between 30 and 40

years old with their age mean  $\pm$  SD=39.910  $\pm$  6.143, and they were all female. Regarding their place of residence, it was determined that 86 % of them were from rural regions. Regarding their education, it was evident that 75% of them had completed their secondary school. In addition, 67% of them did not attend any pain-related training sessions.

**Table (2)** Displays nurses' levels of total knowledge scores about the management of children pain. It was noted that 82 % of nurses had a low level of general knowledge of pharmacological and non-pharmacological pain treatment prior to the implementation of the program, but their knowledge improved to 97 % immediately after and 90 % one month later. In addition, the table reveals that 80% of nurses possessed a low level of general knowledge about non-pharmacological pain management prior to the implementation of the program, whereas immediately after and one month after the program, 93% and 90% of nurses possessed a high level of knowledge, respectively.

Concerning general knowledge about pharmacological pain management, 96% of nurses had low level of knowledge prior to the implementation of the program; however, their knowledge increased to a high level among 97 % and 91 %, immediately after and one month after the program implementation respectively.

The table also demonstrated that the majority (97%) of the studied nurses had a low level of knowledge regarding pain management in children, although their total levels of knowledge improved to a high level 96% and 90%, respectively, immediately after, and one month after program, and also indicates that there was

a very statistically significant difference in the knowledge of nurses before, immediately after, and one month after the program.

The table also introduced mean scores of total nurses' knowledge regarding pain management as the mean  $\pm$  SD was 12.48  $\pm$  2.032 before the program implementation and improved to 24.22  $\pm$  1.762, 23.94  $\pm$  2.009 immediately after and following program implementation with one month respectively.

**Table (3)** illustrates levels and mean scores of the total attitudes of the studied nurses regarding pain management in children. It was determined that 88% of nurses had a negative attitude prior to program implementation, while 100% of them and 92% of them had a positive attitude immediately after and one month after program implementation respectively, with a highly statistically significant difference in the mean scores of total nurses' attitudes before, immediately after, and one month after program implementation. In addition, the mean scores of total nurses' attitudes regarding pain management, was 53.33  $\pm$  8.156 before the program and improved to 84.71  $\pm$  6.060, 81.85  $\pm$  8.764 immediately after and one month after program implementation respectively.

**A table (4)** illustrates the level and mean scores of total self-efficacy in pain management in children among the studied nurses. It was evident that 87 % of nurses had a low level of self-efficacy prior to program implementation, whereas their self-efficacy increased to (100 %) and 96 % of them had high self-efficacy immediately after and after one month of program implementation, respectively, with a highly statistically significant

difference in the mean scores of total nurses' self-efficacy before, immediately after, and one month after program implementation

Also, it was found that the mean of nurses' self-efficacy about pain management was  $15.27 \pm 2.942$  before the program and improved to  $33.97 \pm 4.250$ ,  $31.11 \pm 3.624$  respectively, immediately after and one month following program implementation.

**Table (5)** describes the correlation between the total scores of nurses' knowledge, attitudes, and self-efficacy about pain management in children before, immediately after, and one month after program implementation. It was established that there was a positive correlation between the total knowledge scores of nurses and the total attitudes scores before, immediately after and one month after the program implementation with highly statistically significant difference in total knowledge and total attitudes one month after the program implementation.

Also, the table describes that there was positive correlation between total nurses' knowledge scores, total self-efficacy scores before, immediately after and one month after the program implementation and statistically significant difference in total knowledge and self-efficacy scores immediately after and one month after the program implementation.

**Table (1): Percentage distribution of the studied nurses according to their socio-demographic characteristics (n=200)**

Socio-demographic characteristics	The studied nurses (n=200)	
	No.	%
<b>Age (in years)</b>		
< 30	8	4.0
30 - < 40	94	47.0
40 - < 50	82	41.0
≥ 50	16	8.0
<b>Range</b>	<b>28 - 55</b>	
<b>Mean ± SD</b>	<b>39.910 ± 6.143</b>	
<b>Gender</b>		
Female	200	100.0
<b>Residence</b>		
Rural	172	86.0
Urban	28	14.0
<b>Educational level</b>		
General Secondary School	150	75.0
Technical Institute of Health or Nursing	50	25.0
<b>Attending training courses about pediatric pain management</b>		
Yes	134	67.0
No	66	33.0

Table (2): Levels of total knowledge scores of the studied nurses regarding pain management in children (n=200)

Knowledge levels	The studied nurses (n=200)								
	Pre Program		Immediately after		After one month		I	II	III
	No.	%	No.	%	No.	%	$\chi^2$ P	$\chi^2$ P	$\chi^2$ P
<b>Pediatric nurses' general knowledge about pharmacologic and non-pharmacologic pain management.</b>									
Low level of knowledge (0 – 6)	164	82.0	2	1.0	4	2.0	<b>354.6</b> <b>0.0001**</b>	<b>319.42</b> <b>0.0001**</b>	8.391 0.154
Moderate level of knowledge (7 – 8)	30	15.0	4	2.0	16	8.0			
High level of knowledge (9 – 11)	6	3.0	194	97.0	180	90.0			
<b>Range</b>	3 - 9		1 – 11		6 - 11		<b>F value = 658.25</b>		
<b>Mean ± SD</b>	5.47 ± 1.333		10.11 ± 1.251		9.99 ± 1.414		<b>P= 0.0001**</b>		
<b>General knowledge about non-pharmacologic pain management</b>									
Low level of knowledge (0 – 5)	160	80.0	0	0.0	0	0.0	<b>358.5</b> <b>0.0001**</b>	<b>346.66</b> <b>0.0001**</b>	1.157 0.282
Moderate level of knowledge (6 – 7)	40	20.0	14	7.0	20	10.0			
High level of knowledge (8 – 10)	0	0.0	186	93.0	180	90.0			
<b>Range</b>	2 - 7		7 – 10		7 - 10		<b>F value = 1044.04</b>		
<b>Mean ± SD</b>	4.70 ± 1.046		9.04 ± 0.971		8.87 ± 1.048		<b>P= 0.0001**</b>		
<b>General knowledge about pharmacologic pain management</b>									
Low level of knowledge (0 – 3)	192	96.0	0	0.0	4	2.0	<b>380.0</b> <b>0.0001**</b>	<b>359.61</b> <b>0.0001**</b>	7.583 0.068
Moderate level of knowledge (4)	6	3.0	6	3.0	14	7.0			
High level of knowledge (5 – 6)	2	1.0	194	97.0	182	91.0			
<b>Range</b>	1 - 5		2 – 6		2 - 6		<b>F value = 638.41</b>		
<b>Mean ± SD</b>	2.30 ± 0.822		5.07 ± 0.853		5.01 ± 0.802		<b>P= 0.0001**</b>		
<b>Total knowledge levels</b>									
Low level of knowledge (0 – 16)	194	97.0	0	0.0	2	1.0	<b>386.3</b> <b>0.0001**</b>	<b>374.08</b> <b>0.0001**</b>	6.233 0.098
Moderate level of knowledge (17 – 21)	6	3.0	8	4.0	18	9.0			
High level of knowledge (22 – 27)	0	0.0	192	96.0	180	90.0			
<b>Range</b>	8 - 18		15 – 27		15 - 26		<b>F value = 2062.43</b>		
<b>Mean ± SD</b>	12.48 ± 2.032		24.22 ± 1.762		23.94 ± 2.009		<b>P= 0.0001**</b>		

\* Statistically significant difference at (P&lt;0.05)

I Pre-Program Vs Immediately after

II Pre-Program Vs after one month

III Immediately after Vs after one month

\*\* Highly Statistically significant difference at (P&lt;0.01)

**Table (3): Levels and mean scores of total attitudes of the studied nurses regarding pain management in children (n=200)**

Attitude levels	The studied nurses (n=200)							I $\chi^2$ P	II $\chi^2$ P	III $\chi^2$ P
	Pre Program		Immediately after		After one month					
	No.	%	No.	%	No.	%				
<b>Levels of Pediatric nurses' attitude</b>										
Positive Attitude (75 – 100)	12	6.0	200	100.0	184	92.0	<b>354.7</b> <b>0.0001</b> <b>**</b>	<b>327.5</b> <b>0.0001</b> <b>**</b>	16.66 0.249	
Neutral Attitude (65 – 74)	12	6.0	0	0.0	16	8.0				
Negative Attitude (0 – 64)	176	88.0	0	0.0	0	0.0				
<b>Total Pediatric nurses' attitude scores</b>										
<b>Range</b>	33 - 70		76 – 98		70 - 98		<b>F value = 1003.06</b>			
<b>Mean ± SD</b>	53.33 ± 8.156		84.71 ± 6.060		81.85 ± 8.764		<b>P= 0.0001**</b>			

**\*\* Highly Statistically significant difference at (P<0.01)**

**I Pre-Program Vs Immediately after**

**II Pre-Program Vs after one month**

**III Immediately after Vs after one month**

**Table (4): Levels and mean of total scores of self-efficacies of the studied nurses regarding pain management in children (n=200)**

Self-efficacy levels	The studied nurses (n=200)							I $\chi^2$ P	II $\chi^2$ P	III $\chi^2$ P
	Pre Program		Immediately after		After one month					
	No.	%	No.	%	No.	%				
<b>Levels of Pediatric nurses' self-efficacy</b>										
High self-efficacy (24 – 40)	26	13	200	100.0	192	96.0	<b>361.32</b> <b>0.0001</b> <b>**</b>	<b>392.07</b> <b>0.0001</b> <b>**</b>	8.163 0.115	
Low self-efficacy (10 – 23)	174	87.0	0	0.0	8	4.0				
<b>Total Pediatric nurses' self-efficacy scores</b>										
<b>Range</b>	11 - 26		22 – 40		25 - 40		<b>F value = 1597.23</b>			
<b>Mean ± SD</b>	15.27 ± 2.942		33.97± 4.250		31.11 ± 3.624		<b>P= 0.0001**</b>			

**\*\* Highly Statistically significant difference at (P<0.01)**

**I Pre-Program Vs Immediately after**

**II Pre-Program Vs after one month**

**III Immediately after Vs after one month**

**Table (5): Correlation between total scores of the studied nurse's knowledge, attitudes, and self-efficacy regarding pain management in children preprogram, immediately and after one month**

Variables	Total knowledge scores (n=200)					
	Pre-Program		Immediately after		After one month	
	r	P	r	P	R	P
Total attitudes scores	0.082	0.246	<b>0.099</b>	<b>0.001**</b>	<b>0.225</b>	<b>0.001**</b>
Total self-efficacy scores	0.062	0.381	<b>0.263</b>	<b>0.0001**</b>	<b>0.160</b>	<b>0.0001**</b>

Statistically significant difference at (P<0.05)

\*\* Highly Statistically significant difference at (P<0.01)

## Discussion

Pain is considered one of typical reasons for children to visit health care facilities. Pain can negatively affect a child's physical, psychological, and social development. Pediatric pain is still unrelieved, and nurses continue to show a lack of understanding and the wrong mindset when it comes to managing it. Thus, for careful assessment and relief of children's pain, nurses and other healthcare workers must have sufficient information and a positive attitude. <sup>(18, 19)</sup> The study found a statistically significant difference in pediatric nurses' general knowledge of pharmacological and non-pharmacological pain management for children before, immediately, and one month following the program. This might be a result of the program's impact on pediatric nurses' awareness of pain management in children, allowing them to work with other members of the healthcare team to manage pain medications. These findings corroborated those of **Gadallah et al. (2017)** <sup>(20)</sup>, who stated that nurses'

pharmacological knowledge was often lacking and that it had improved following pain management training workshops. Also, **AlReshidi (2016)** <sup>(21)</sup>, illustrated that the participants in the pain intervention program experienced statistically considerably more favorable results than those in the control group.

In addition, our findings revealed statistically significant differences in the mean of total attitude scores of nurses throughout program phases. This might be because post-program education had a favorable effect on the nurses' attitudes as their knowledge increased.

This was in line with **Al Omari (2016)** <sup>(22)</sup>, who claimed that the educational program's execution increased the average score for knowledge and attitude <sup>(22)</sup>.

These findings were consistent with **Aymar et al. (2014)** <sup>(23)</sup> and **Dongara et al., (2017)** <sup>(24)</sup>, who revealed that the completion of a pain management training program resulted to a statistically significant increase in nurses' knowledge. In contrast, **Gretarsdottir et al. (2017)** <sup>(25)</sup>

found that completing pain management program wasn't corresponding to obtaining strong knowledge and attitudes towards pain.

The results also declared that before, immediately after, and one month after the program, the mean of pediatric nurses' total self-efficacies scores changed in a statistically significant way. This may be described as; improving nurses' knowledge through the educational program had great impact on nurses' attitudes and self-efficacies regarding children's pain management.

This was consistent with **AlReshidi (2016)**<sup>(21)</sup>, who claimed that the educational program boosted nurses' self-efficacy in treating children's discomfort.

The result was incongruent with **Chiang et al. (2016)**<sup>(26)</sup>, who claimed that after one-month, self-efficacy in the control group improved. Improvements in self-efficacy can be threatening and worrying if not associated with improvements in the knowledge level, as self-efficacy was more significant than the knowledge and attitude mean scores. Also, **Hen et al. (2014)**<sup>(27)</sup> found that mean of self-efficacy was more significant than knowledge and attitude.

### Conclusion

Nurses' knowledge, attitudes and self-efficacy toward pharmacological and non-pharmacological pain management improved both immediately after the program and one month later.

### Recommendations

**The following recommendations can be suggested:**

1- A periodic in-service training program should be carried out for all nurses in various pediatric departments for proper management of pain in children.

2- Pediatric hospitals should be supplied with sufficient facilities to reinforce skills of pain management.

3-Reviewing novel graduated pediatric nurses with pain theoretical knowledge and its implication in practice.

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