Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 7, Issue 3, pp: (423-435), Month: September - December 2020, Available at: www.noveltyjournals.com

Effect of Nursing Management Protocol for Pain and Anxiety associated with Intravenous Cannulation on Nurses and Pediatric Patient's Outcomes

[1]Reham El - Saeed Hashad, [2]Gehan El Nabawy Ahmed, [3]Sahar Farouk Hashem, [4]GhadaGamal Badawy

[1,2,3,4] Pediatric Nursing Department, Faculty of Nursing, Mansoura University, Egypt

Abstract: **One of the most common invasive, painful and stressful processes performed on hospitalized children is the insertion of intravenous cannulation. According to evidence based clinical practice guidelines, most pain and anxiety disorders induced by minor medical procedures can be treated using non pharmacological approaches. Aim of the study: This study aimed to evaluate the effect of nursing management protocol for pain and anxiety associated with intravenous cannulation on nurses and pediatric patient's outcomes. Materials and Method: This study used a quasi-experimental design that was conducted in general pediatric departments affiliated to the University of Mansoura University Children Hospital (MUCH) and Mansoura International Hospital. A convenience sample of nurses (85) children (108) aged 6-12, who were treated in the abovementioned settings, were included and recruited over a six-month period. Tools: Three tools have been used to collect the data. Tool 1: An interview questionnaire to assess nurses' knowledge regarding gum chewing as a non pharmacological method for nursing management for pain and anxiety associated with intravenous cannulation. Tool 2: Observation checklist used to assess nurses' practice in reducing anxiety and pain during intravenous cannulation using gum chewing. Tool 3: Child Anxiety and Pain Scale (CAPS). Results: Nurses' mean knowledge and practice scores improved after the implementation of the program for applying the chewing gum intervention method for children during intravenous cannulation. In addition, there is a reduction in the level of pain and anxiety of children after the implementation of the gum chewing intervention method during intravenous cannulation. Conclusion: The nursing management protocol had a good impact on nurses' knowledge and practice regarding using of chewing gum during intravenous cannulation. In addition, there wasa reduction in the percentage of the studied children that presented with higher level of pain and anxiety immediately post and three months after nursing management protocol implementation. Recommendation: Develop regular and ongoing educational programs for nurses on innovative non-pharmacological methods for pain control in children through various invasive medical and nursing procedures.**

Keywords: **Anxiety, Intravenous cannulation, Nursing management, Nurses, Pain, Pediatric patient's Outcomes, Protocol.**

1. INTRODUCTION

The most common painful techniques used in the diseases' treatment are intravenous (IV) cannulation. It can be perceived by children as frightening, even though it tends to be an essential and minor intervention for skilled health practitioners**(Martin, Maxtin, Smalling & Park, 2018).**The precise incidence of acute pain and anxiety cannot be generalized, as in each clinical setting their incidence is changed. The American Society for Nursing of Pain Management (ASNPM) reported that the prevalence rates of acute pain related to painful needle procedures in the United States reach 90.2% in the department of general pediatrics **(Aydin, Yüksel, Ergil, Polat, Akelma, Ekici & Odabas, 2017).**

International Journal of Novel Research in Healthcare and Nursing
Vol. 7, Issue 3, pp: (423-435), Month: September - December 2020, Available at: www.noveltyjournals.com

Pain is a factor that negatively affects the patient's comfort and makes it difficult for the child to cope with the current situation,is described as "an unpleasant sensory and emotional experiences associated with tissue damage, real or potential **(Atzori, Hoffman, Vagnoli, Messeri & Grotto, (2019).** Anxiety is a life reaction to a danger, it is an emotion marked by tension and anxiety. In addition, pain acts an essential role in the anxiety, which increasing with the pain, adversely affecting the pain endured by the patient as well as the physiological changes associated with pain further increase anxiety, creating a vicious circle **(Birnie, Noel, Chambers, Uman, & Parker, 2018).**

Pain can be one of the conditions that cause major psychological and physiological consequences in the children's life, and it is usually first experienced in childhood **(Şahiner & Türkmen, 2019).**Therefore, American Society for Pain Management Nursing (ASPMN) advocates these minor procedures reduce pain as well as anxiety through the use of distraction and / or coping techniques. However, studies have shown that, nurses don't have a relevant data and less knowledge about interventions that can be used to alleviate painful procedures (**Birnie, Noel, Chambers, Uman, & Parker, (2018); Şahiner& Türkmen, 2019)**.

Many types of pain relief have been shown to be successful in children with the IV cannulation protocol for example; cognitive behavioral approaches such as hypnosis, creativity and relaxation were used **(Palmer, 2016)**. Physical methods include positioning, touch, skin stimulation, massage, and application of heat and cold **(Sahiner, Inal, & Akbay, 2015)**. For several years, distraction methods such as distraction cards, video games, virtual reality, music, buzz and shot-blockers have also been considered to be effective in reducing pain during intravenous' cannulation **(Yamamoto-Hanada, Futamura, Kitazawa, Kobayashi & Kusuda, 2015)**.

Latest advances in the field of both pediatric procedural pain and control of children's pain and anxiety have focused on the application of non-pharmacological interventions and education **(Yamamoto-Hanada, Futamura, Kitazawa, Kobayashi & Kusuda, 2015)**. Chewing sugary or unsweetened gum has been implicated as a way to relieve stress and anxiety, as well as provide relaxation **(Allen & Smith, 2015)**. Therefore, chewing gum may also be an efficient intervention to break the link between anxiety and pain by enhancing the mood of children, as there is a relationship between chewing gum and increased cerebral blood flows and therefore, increases mental stamina for anxiety. Additionally, the increased cerebral blood flow after chewing gum reduces anxiety and stress through an increased cerebral supply of oxygenated blood and glucose, and hence the rhythmic oral movements that occur when chewing gum increases the release of serotonin which can reduce the level of anxiety **(Tick, Nielsen, Pelletier, Bonakdar, Simmons, Glick & Zador, 2018)**. Therefore, pediatric nurses should be educated on chewing gum' interventions to control children's pain as well as anxiety before and at some stage in pediatric' procedures to get a positives patient outcomes**(Yamamoto-Hanada, Futamura, Kitazawa, Kobayashi & Kusuda, 2015)**.

Aim of the study:

This study aimed to evaluate the effect of nursing management protocol for pain and anxiety associated with intravenous cannulation on nurses' and pediatric patient's outcomes

Operational definitions:

Nurses' outcomes: it means an improvement in their knowledge and practice regarding application of nursing management protocol in the form of using of gum chewing as a non pharmacological method for reducing pain and anxiety in children during intravenous cannulation.

Pediatric patients' outcomes: it related to a reduction of the level of pain and anxiety in children after application of nursing management protocol in the form of using of gum chewing as a non pharmacological method during intravenous cannulation.

Research hypotheses:

a) The average knowledge scores of nurses will be improved after implementation of nursing management protocol in the form of using of gum chewing method as a non pharmacological method for children during intravenous cannulation.

b) There would be a major increase in the average score of nursing practices after implementation of nursing management protocol in the form of using of gum chewing intervention method as a non pharmacological method for children during intravenous cannulation.

c) There will be a substantial decrease in the level of pain and anxiety in children after implementation of nursing management protocol in the form of using of gum chewing method as a non pharmacological method for children during intravenous cannulation.

2. MATERIALS AND METHODS

Design:

In this study, quasi-experimental research design was used.

Setting:

The study was conducted in general pediatrics departments affiliated with Mansoura University Children Hospital (MUCH) and Mansoura International Hospital.

Subjects:

A convenience sample of **85** nurses employed in the study setting described above, irrespective of their age as well as qualifications or experience's years. A purposive sample of 108 children of both gender, who were admitted to the above mentioned setting and received intravenous cannulation for blood tests and treatment. The inclusion criteria are the children who were treated in the above-mentioned settings, their age were between 6 and 12 years, not having delayed verbal, auditory or visual difficulties in neurological development, as well as not having taken analgesic or sedative drugs in the last 24 hours.

Data collection tools:

Tool 1: nurses' structured interview's questionnaires (pre, post and follow-up format):

After reviewing relevant literature, **Allen & Smith, (2015)**; **Lewkowski, et al., (2017);Bergomi, Scudeller, Pintaldi & Dal Molin (2018)**, researchers created it in a simple Arabic language. It consisted of 41 multiple-choice questions obtained by the researchers via interviewing nurses to test their information of gum chewing intervention method to control children's pain and anxiety during intravenous cannulation. It consisted of the following parts:

Part (1): Characteristics of nurses being studied , such as ages , gender, educational levels, years of experience in general pediatric units and prior involvement in a training' program on non-drug pain management, especially the chewing gum method of intervention.

Part (2): Concerned about the nurse's knowledge of chewing gum and procedural pain, as well as anxiety. It consisted of 41 options of multiple questions, which include the followings elements:

a) Definitions of chewing gum as well as its positions to be applied. Importance of gum chewing for children.

b) Mechanism of gum chewing on cognitive functioning.

c) Common types of gum pieces.

d) Risks or problems related to chewing in children.

e) Definition of pain related to procedures

f) Aggravating factors of minor procedural pain.

g) Negative effects of minor procedural pain on children.

h) Levels or categories of minor procedural pain.

i) Definition of anxiety.

j) Causes of anxiety during minor procedures.

k) Levels or categories of minor procedural pain.

l) Children's anxiety and pain assessment methods.

m) Non pharmacological pain management methods for the intravenous cannulation procedure.

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 7, Issue 3, pp: (423-435), Month: September - December 2020, Available at: www.noveltyjournals.com

Scoring system of tool (I):

The questionnaire scoring system was established as follows: the correct answers completed were scored two, while the correct answers were scored one and zero for the incorrect answers, omitted or uncertain. If the percentage scores were < 60 percent, in sufficient knowledge was considered sufficient knowledge from 60 to less than 80 percents well as outstanding sufficient knowledge when the percentage scores were 80 percent-100 percent.

Tool II: Observation checklist for nurses (pre, posts and follow-ups formats):

It was adopted by **Weijenberg & Lobbezoo, (2015)** as well as translated into a plain Arabic language by researchers to evaluate the performances of nurses in reducing anxiety and pain during intravenous cannulation using chewing gum. It consists of four main sub-elements such as:

a) Positions for chewing (e.g., reposition child in fowler position or semi-fowler position).

b) Mouth' checking (e.g., ensure oral cavity' free of any problems or problems related to chewing).

c) Gum administration (e.g., give sweetened and unsweetened gum to children).

d) Chewing time (ex: assessing the chewing time in which the child was asked to continue chewing until the end of the IV cannulation procedure).

Scoring system of tool (II):

The observation checklist scoring system was developed where each step in the checklist was coded as complete, incomplete, or not done. A score (2) was given to each fully made choice, a score (1) was given to the incomplete choice, and a score (0) was given to the item not done, and thus the standard of practice of the nurses was measured as unsatisfactory if their practice score was less than 60 percent, good practice considered from 60 percent to 80 percent and competent satisfactory practice skilled considered from 80 percent to 100 percent

Tool (III): Children's Anxiety and Pain Scale (CAPS) (pre, post and follow-up format):

It consisted of two parts such as the following:

Part (1): The demographics and health features of the children surveyed, such as age, gender, experience of children with previous IV cannulation, IV cannulations numbers in the past year, as well as medical data relating to the child's status, such as diagnosis and disease types.

Part (2): Anxiety and pain scale of the children was adopted by **De Castro Goncalves, Mónica Oliveira, Cunha Batalha, etal., (2014) ; McMurtry, Noel, Chambers, & McGrath, (2011)**.It is a self-reporting scale containing expressions of the face and two sections to measure children's pain and anxiety during intravenous cannulation.

Scoring system of tool (III / part 2):

Scores were distributed between 0 and 4 for each section to measure the severity of pain and anxiety, the first part of the pain assessment ranges from smiling expressions (0-no pain) to crying' expressions (4-severe pain). The second part of the anxiety assessment ranges from a neutral expression (0- no anxiety) to a frightened face (4- Severe anxiety)

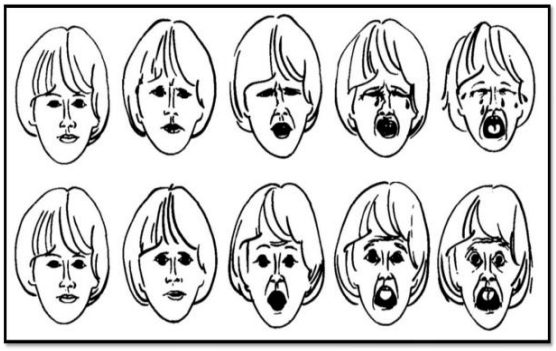

Figure (1). Scale of Children's Anxiety and Pains CAPS

METHOD:

The official permission to perform the study was obtained after explaining the purposes of the study. After reviewing the relevant literature, the researchers created the tools.

- The produced instruments have been submitted to a panel of pediatric nursing' experts for the validity of their contents.

- A pilot's study was performed to assess the effectiveness, applicability and clarity of the tools at 10 percent of the overall sample size and no adjustments were made.

- The required changes have been made. The tools' reliability was achieved by using the Alpha Cronbach coefficient to calculate the internal consistency of their items. For the three tools, the Alpha reliability: was r = 0.776 for toll 1, r = 0.976 for tool II and it was r = 0.876 for tool III.

- The collection of data and the implementation of the nursing intervention protocol were applied over six months in the period from November 2019 to the ends of April 2020.

- Researchers designed the nursing intervention protocol centered on the evaluation for the real needs of nurses as well as throughout the reviews of the associated literatures.

- Nursing intervention protocol aimed to enhance the knowledge and practices of the nurses regarding using of chewing gum as a non pharmacological method for reducing pain and anxiety in children during intravenous cannulation.

- The protocol contains theoretical and practical skills related to using of gum chewing during intravenous cannulation.

- The nurses were grouped into small groups; (6-8 in each group) to facilitate group discussion. Two theoretical sessions and two practical sessions were taught in four sessions.

- There were 30-60 minutes of each didactic session and 45-90 minutes of each practice session in two nursing shifts (morning shift and afternoon shift).

- Distinct teaching approaches were carried out in a variety of seminars, discussion for groups of nurses, demonstrations as well as re-demonstrations.

- Colored brochure, power point display, videos as well as handout guides, instructional' program have been presented in various ways have been used. Nurses' knowledge and practice was assessed three times before, immediately after as well as three months after the completion of the nursing intervention protocol, using the above mentioned tools of the study.

- Children anxiety and pain scale was used pre, immediately post and 3 months after using of gum chewing during intravenous cannulation.

- Assessment of the studied children as regard to pain and anxiety by using Anxiety and Pain Scale of the children' (CAPS) assessment tool pre-protocol on 36 children.

- While the immediate post tests, it was performed on 49 children, on whom 13 of them were excluded because some of them were discharged. As well as after 3 months of protocol implementation (follow-up) the Children Anxiety and Pain Scale (CAPS) assessment tool in all children attended (n = 78) in which 38 of them were excluded as some died and others were discharged to become 40 in their number. Therefore, according to the statistical analysis, when the post-test risk of loss is greater than 10%, the sample size is fixed to be as similar as to the pre-protocol sample number (36) to maintain the confidence level.

Ethical Considerations

- An informed consent was obtained from the parents of children and the nurses after explaining the aim of the study. They were assured that their participation in the study is voluntary and they have the right to withdraw from the study at any time without giving any reason and the collected data would be kept confidential and these were to be used only for the research purpose. The rights, privacy and safety of the study sample were secured.

Statistical Analysis:

Using statistics Packages of Social Science (SPSS) versions, the data had been implied as well as entered into the data-based file (22) To define principal variable, descriptive statistics (numbers, percentages, means and SDs) were used. Using the Chi-square test, the associations between categorical variables were tested. All tests were conducted at a 5 percent significance level ($P < 0.05$).

3. RESULTS

Table (1) illustrates characteristics of the studied pediatric patients. It was found that more than half of the studied sample was in the 10-12 year age group. In relation to sex, 67.6% were male. Most of them (60.2%) had chronic diseases. Furthermore, more than two-thirds of the children studied had experienced previous intravenous cannulation and, therefore, 53.3% of them were cannulated intravenously in the past year between 4 and less than 8 times.

Regarding the studied nurses' characteristics, **table (2)** shown that 28.2 percent of the nurses were between 20 and less than 25 years of age. One thirds of nurses had between five and less than ten years of experiences. Furthermore, the vast majority of nurses studied (94.11%) did not receive any training programs on procedural pain and anxiety management.

Figure (2); was concerned about the educational level of the studied nurses. This figure illustrated that 40.5% of them had a diploma certificate of nursing. In relation to the total level of knowledge of nurses about gum chewing intervention for pain and anxiety' management in children during intravenous' cannulation, **table (3)** clarified that extra than one third of the qualified nurses had insufficiency of knowledge. While it improved to good sufficient knowledge immediately after and three months after nursing intervention protocol completion, with very high differences in statistical significance at $p < 0.001$.

As regards to the overall level of nurses' practices about gum chewing intervention during intravenous cannulation, **table (4)** showed that there were highly statistically significant' variation between pre- and immediately post-implementation, as well as $p<0.001$ between immediately post-implementation as well as three months after nursing intervention protocol. It was noted that before and three months after the implementation of the nursing intervention protocol, extra than half of nurses studied had an unsatisfactory practices, which decreased to 8.23 percent immediately after nursing intervention protocol implementation, while 32.9% of them had satisfactory good practice before implementation of the nursing intervention protocol, which improved to 54.11% and 31.76% immediately posts and after three months of the nursing intervention protocol implementations, respectively.

In relation to levels of anxiety and pain assessment in percentage distribution among the studied children pre, immediately post and three months after implementation of nursing intervention protocol in the form of gum chewing intervention during intravenous cannulation, **table (5)** demonstrated that, more than three quarters of the children surveyed had a high pain and anxiety' level before implementing of nursing intervention protocol, dropping to 12.96 percent and 37.96 percent immediately after and three months later, respectively, with a very high statistically significant difference between before, immediate after and 3 months later at $p < 0.001$.

In relation relationships between nurses' characteristics as well as their total knowledge' scores about gum chewing intervention and procedural pain as well as anxiety pre, immediately post and 3 months after implementing the nursing intervention protocol, **table (6)** revealed that, there was a s negative' relations between the studied nurses' characteristics and their total knowledge representing minor medical procedural pain and anxiety as well as gums chewing interventions pre, immediately posts and three months after implementing the nursing intervention protocol, except age of nurses, in which there was a positive relations between age of nurses and their totals knowledge representing minor medical procedural pain and anxiety as well as gum chewing intervention at the immediately after implementation of the nursing intervention protocol at $p< 0.05$.

Concerning, associations between the knowledge and practice of nurses before, immediately after and three months after nursing intervention protocol application, **table (7)** showed that there were a positive associations between the knowledge as well as practice of nurses before, immediately after and three months later with highly statistical differences at $p<0.001$.

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 7, Issue 3, pp: (423-435), Month: September - December 2020, Available at: www.noveltyjournals.com

Table (1); Characteristics of the studied children (eN=108)

Items	Number	%
Age in years		
▪ 6-< 8	19	17.6
▪ 8-< 10	28	26
▪ 10 - 12	61	56.5
X ± SD	29.40 ± 5.82	
Gender		
▪ Boys	73	67.6
▪ Girls	35	32.4
Children' disease types		
▪ Acute	43	39.8
▪ Chronic	65	60.2
Experienced a previous intravenous cannulations		
▪ Yes	74	68.5
▪ No	26	31.5
Numbers of intravenous cannulation in the pasts years		
▪ 1– 4 Times	22	20.37
▪ 4 < 8 times	58	53.7
▪ 8 <12 times	17	15.7
▪ >12 times	7	6.5
▪ No	4	3.7
Diagnosis		
▪ CNS diseases	35	32.4
▪ Gastrointestinal diseases	6	5.5
▪ Renal diseases	40	37
▪ Cardiovascular diseases	8	7.41
▪ Endocrine diseases	9	8.3
▪ Respiratory system diseases	10	9.3

Table (2); Characteristics of the studied nurses (N=85)

Items	Number	%
Age in years		
▪ 20 < 25	24	28.2
▪ 25 < 30	20	23.5
▪ 30 <35	23	27.1
▪ 35 and more	18	21.2
Xf ±g SDde	333028.40 ± 53.820	
Experience's years dein intravenous cannulation		
▪ < 11	5	35.8
▪ 1 < 5	24	28.2
▪ 5 < 10	28	33.3
▪ 10 and more	28	32.9
X ± SD	7.71 ± 5.0	
Attending of training programs about pain management methods		
▪ Yes	5	5.89
▪ No	80	94.11

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 7, Issue 3, pp: (423-435), Month: September - December 2020, Available at: www.noveltyjournals.com

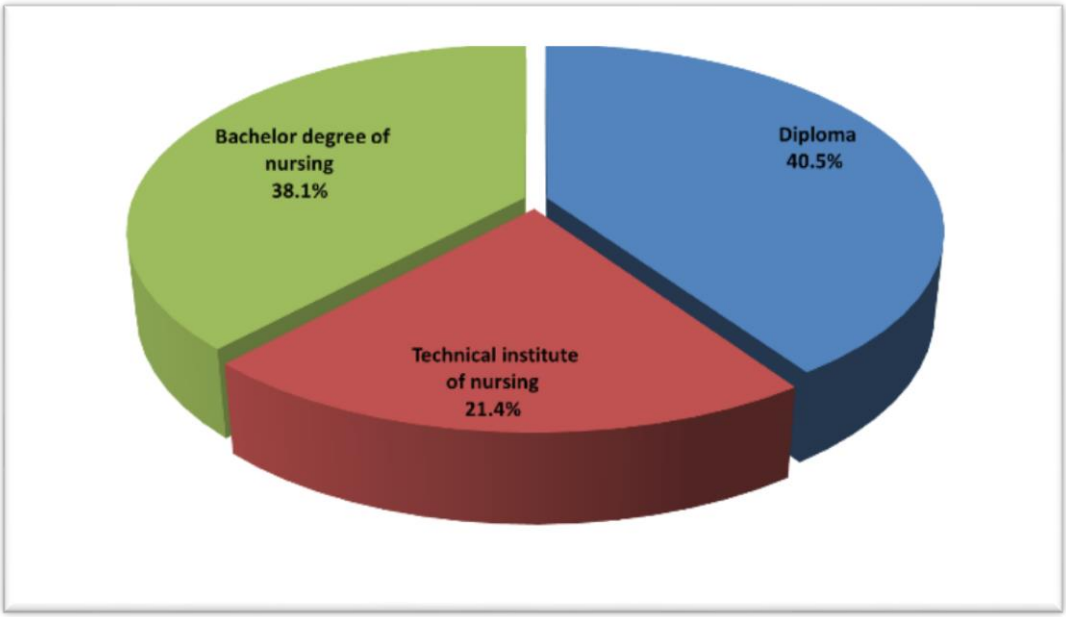

Figure (2); Distribution of the nurses, who are studied according to their level of education (N=85)

Table (3): The total level of nurses' knowledge about gum chewing intervention for managing painds and anxiety of children seduringf intravenouss cannulationss (N=85).

Nurse's knowledge	Pre		Immediate post		Post 3 months		Wilcoxon signed rank test		
							Z1	Z2	Z3
	N	%	N	%	N	%			
Insufficient	30	35.29	9	10,6	46	54.11	Z1= -2.8050 P1q<0.0001*	Z2= -33.4220 rP2= 0.0026*	Z3= -34.1108 P3ee<0.001*
Good sufficient	46	54.11	60	70.58	29	34.11			
Excellent sufficient	9	10.6	16	18.82	10	11.76			

Table (4): The total level of nurses' practice about gum chewing intervention during intravenous cannulation (N=85).

Nurse's practice	Pre		Immediate post		Post 3 months		Wilcoxon signed rank test		
							Z1	Z2	Z3
	N	%	N	%	N	%			
Unsatisfactory	50	58.8	7	8.23	42	49.4	eZ11=-3.027 jP11< 0.001*	Z22= -0.485 sP2= 00.635	fZ33= -5.471 dP3<0.0001*
Good satisfactory	28	32.9	46	54.11	27	31.76			
Competent satisfactory	7	8.23	32	37.6	16	18.8			

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 7, Issue 3, pp: (423-435), Month: September - December 2020, Available at: www.noveltyjournals.com

Table (5): Anxiety and Pain Assessment' levels in percentage's distributions among t studied children pre, immediately post and three months after gum chewing intervention during intravenous cannulation (N= 108).

Anxiety and pain assessment levels	Pre		Immediate post		Post 3 months		Wilcoxon signed rank test		
	N	%	N	%	N	%			
Mild	7	6.48	46	42.59	23	21.29	P1 <0.001*	P2 <0.002*	P3 <0.001*
Moderate	16	14.81	48	44.4	35	32.4			
Severe	85	78.70	14	12.96	41	37.96			
No pain & anxiety	0.00	0.00	0.00	0.00	9	8.3			

Tables (6): The relationships between studied nurses' characteristics and their total knowledge' score s about gum chewing and procedural pain as well as anxiety pre, immediately post and 3 months after nursing management protocol implementation (N= 85)

Variables	Total knowledge											
	Before			Immediately after			Post 3 months			Test of significance		
	Insufficient	Good sufficient	Excellent sufficient	Insufficient	Good sufficient	Excellent sufficient	Insufficient	Good sufficient	Excellent sufficient	χ^2_1& P	χ^2_2& P	χ^2_3& P
Age in years												
▪ 20 < 25	38.7	22.7	22.2	50.0	20.0	50.0	27.3	33.3	40.0	5.516	13.540	3.747
▪ 25 < 30	22.6	20.5	44.4	25.0	21.7	31.3	20.5	30.0	20.0	0.480	0.035	0.711
▪ 30 <35	19.4	32	22.2	25.0	28.3	18.8	25.1	23.3	20.0			
▪ 35 and more	19.4	25.0	11.1	1.0	30.0	0.0	27.3	1.3	20.0			
Educational level												
▪ Diploma	51.6	36.4	22.2	37.5	40.0	43.8	45.5	36.7	30.0	3.614	3.837	4.953
▪ Technical institute of nursing	19.4	20.5	33.3	37.5	23.3	6.3	22.7	13.3	40.0	0.461	0.429	0.292
▪ Bachelor degree of nursing	29.0	43.2	44.4	25.0	36.7	50.0	31.8	50.0	30.0			
Years of experience in administering of intravenous cannulation												
▪ < 1	0.0	6.8	11.1	0.0	5.0	6.3	4.5	3.3	10.0	7.195	9.150	2.191
▪ < 5	35.5	34.1	22.2	37.5	35.0	25.0	29.5	36.7	40.0	0.303	0.165	0.901
▪ 5 < 10	25.8	25.0	55.6	50.0	20.0	50.0	27.3	30.0	30.0			
▪ 10 & more	38.7	34.1	11.1	12.5	40.0	18.8	38.6	30.0	20.0			
Attending of training programs about gum chewing method												
▪ No	94.9	88.5	77.8	87.5	80.0	81.3	88.6	66.7	90.0	0.867	0.879	0.045

Table (7): Association between nurses' knowledge and practices (pre/post/post 3 months)

Variables	Know pre		Know post		Know post 3 months	
	R	P	R	P	R	P
Practice pre	0.341	0.013*				
practice post			0.383	<0.001*		
practice post 3 months					0.410	<0.001*

4. DISCUSSION

Pain and anxiety in children related to the IV cannulation procedure is a common problem as well as are among the most common reportable iatrogenic incidents associated with medical care, such as subsequent emotions, anxiety, fear, worry, stress, panic and uncertainty, which can impede an efficient healing process **(Li, Chung, Ho & Kwok, 2016).**

Despite notable improvements in healthcare, many procedures may be painful and traumatic. Therefore, the effects of traumatic events in children will extend into adulthood and affect their approach to pathological mechanisms for therapy

and medical care. In addition, adverse feelings following the pain will lead to reluctance for children and their care givers against medical procedures **(Bagnasco, Pezzi, Rosa, Fornonil & Sasso, (2015)**.

In the diagnosis and treatment of pain in infants, nurses play a very significant role in important areas of patient care and nursing education. Therefore, as a strategy of non-pharmacological pain relief, chewing gum in children has an effect on pain relief and anxiety due to its positive impact on human' psychology **(Czarnecki et al., 2018)**.

Furthermore, **Lewkowski et al., (2017)**,reported that rhythmic movements of jaw created by chewing gum increase the release of serotonins, which was agreed with **Keshtgar, Mirzaei, , Kaviani, and Rajaeifard, (2015)**, who found that anxiety levels decreased as serotonins levels increased. Therefore, all nurses need to be at the front of expecting patients at risks for anxiety or other negative emotions. Healthcare professionals must be capable to compare the cares provided alongside the standards that guarantee that the patient gets the best treatment possible **(Czarnecki et al., 2018)**.

Regarding characteristics of studied pediatric patients, the existing study reflected that, more than two thirds of children who are studied were male. This finding was identical to that of **(Yildizeli Topcu, Akgun Kostak and Semerci, 2019)**who conducted a study on "Effect of chewing gum on pain and anxiety in Turkish children during intravenous cannulation" and mentioned that, boys account for higher percentages than girls in PICU, while this finding was not in agreement with **Weijenberg & Lobbezoo, (2015)**who stated that most pediatric patients were girls.

In relation to children' health status, it was found in the present study that, the majority of them had chronic diseases (Table 1). This finding was in contrary to the finding of **Yildizeli Topcu, Akgun Kostak, & Semerci, (2019)** and found that, the majority of the studied children had non-chronic diseases. Furthermore, the present findings demonstrated that, more than two thirds of the studied pediatric patients had an experience of a previous intravenous cannulation. This result was in the same line with **Dijk, (2017)** who studied' 'interventions reducing anxiety in hospitalized children" and reported that, frequency of the hospitalized children who had an experience of a previous intravenous cannulation, was 69%.

Moreover, the existing study indicated that, extra than one third of included children diagnosed by renal and central nervous system diseases**,** which contradicted with **Sadeghiie, Miohammadim, Shiamshirid, Bagherziadehi& Hiossinkhaniv, (2013)**who studied " Effect of distraction on children's pain during intravenous catheter insertion'' and reported that, the most common diagnosis among pediatric patients was a respiratory diseases.

One of the current study findings revealed that, most of the nurses surveyed had not receive any training programs regarding gums chewing intervention for avoidance and management of procedural pain and anxiety, these results were in accordance with **Konno et al., (2016),** who conducted a study about "Relationships between gum-chewing and stress", who reported that, the vast majority of nurses hadn't receive any program about gum-chewing and stress reduction. These results could be due to workload on nurses and shortage in staff may kept them had no more time to attend any training program.

In relation to educational level, the present study found that two fifth of nurses who are studied had a diploma's certificate, while more than one third of them had bachelor degree of nursing**.** This result was in the same line with **Siadeghiv, Moihammadiv, Shaimshiriv, Biagherzadehv & Hiossinkhaniv, (2013)**who studied "Effect of distraction on children's pain during intravenous catheter insertion" and reported that, frequency of the nurses had a diploma certificate in nursing, was 43%, while, this result was contradicted with **Lewkowski, Barr, Sherrard, Lessard, Harris & Young, (2017)**, who conducted study about " Effects of chewing gum on reactions in children's routine painful procedures " and stated that two third of the nurses had bachelor's degree in nursing.

Regarding the overall level of knowledge of nurses about gum chewing intervention for anxiety and pain management of children during intravenous' cannulation, the present study showed that, more than a third of the studied nurses had insufficiency of knowledge and more than half of them had a good knowledge's level before of nursing management protocol in the form of gum chewing intervention. These findings were in accordance with **Bergoimi, Scudieller, Pintalidi and Dtal Miolin, (2018),** who conducted a study on' 'Efficacy of non-pharmacological methods for pain management in children undergoing venipuncture in a pediatric clinic" and showed that most nursing staff lacked sufficient knowledge of gum surgery and confused anxiety with pain assessment prior to the program of trainings that enhanced in the follow-ups of the educational programs. The researchers' view of this finding may be due to the fact that nurses have not received a training program on chewing gum surgery for pain and anxiety management of minor medical

procedures, as well as updated courses on non-pharmacological interventions that were not available to qualified personnel, as a continuous and permanent process. In addition, it may be because some nurses have myths about childhood pain and its management.

Regarding the general level of chewing gum nursing practice during intravenous cannulation, the results of the present study showed that more than half of the studied nurses had unsatisfactory practices scores prior and three months after implementation of nursing management protocol in the form of gum chewing intervention, table (4). This finding was consistent with **Smith, (2016)**, who conducted a study on "Chewing gum and stress reduction" and reported that most of them had a bad practice score before program implementation. From the researchers' point of view, this finding could be attributed to a lack of learning resources for nurses to update their knowledge and practice of non-pharmacological methods of pain management in pediatric patients.

Regarding levels of anxiety and pain, the percentage distribution among the studied children before, immediately after and three months after gum chewing intervention during intravenous cannulation, the results of the current study showed that most of the studied children had a high level of pain and anxiety before nursing intervention protocol, which decreased immediately after and 3 months after nursing intervention protocol. This finding was not coordinated with **Yildizeli Topcu, Akgun Kostak and Semerci, (2019) who** found that the vast majority of pediatric patients exhibited a mild level of pain and a higher level of anxiety prior to nursing intervention protocol implementation according to the assessment of the anxiety and pain scale before the application of the nursing intervention protocol. The researchers suggested that the result of the present study may be related to nurses' information deficits as well as lacks of practices on applying the anxiety and pain rating scale in children.

Concerning the relations between the characteristics of the studied nurses as well as their total knowledge' scores on chewing gum intervention and pain of the procedure, as well as anxiety before, immediately after and 3 months after nursing intervention protocol implementation, the result of this study clarified that, there was no relations connecting the nurses' characteristics as well as their total knowledge in $p < 0.025$ before, immediately after and 3 months after the implementation of nursing intervention protocol, except age of nurses, where there was a relations among age of nurse and her totality of knowledge of the pain as well as anxiety, as well as gum chewing intervention at the time of implementation. In contrast, this earlier finding was against **Smith's discovery, (2014)** who investigated "Effects of Chewing Gum on Cognitive Function, Mood, and Physiology in Stressed and Unstressed Children" and reported that there was no relations among age of nurses as well as their totality of knowledge, while there was a significant positive relationship between the nurse's total knowledge and years of experience prior to the training program.

Furthermore, the present study explained that, there was a confirmatory association among nurses' knowledge as well as practices before, immediately after, and three months after nursing intervention protocol implementation. This result corresponded to **Bagnasco et al., (2015)**who conducted a study on "distraction techniques in children during venipuncture" and pointed out that there was a significant positive correlation between knowledge and practice of nurses who protect against the pain and anxiety during the procedure with $r = .41$ and $P < 0.05$ before and after the training program. The existing finding reflects those nurses' information acts as a significant as well as independent issue in the practice of procedural pain and anxiety prevention through chewing gum intervention.

5. CONCLUSION

Nursing intervention protocol had a positive influence on knowledge and practice of nurses regarding using of gum chewing during intravenous cannulation. In addition, there was a reduction in the percentages of the studied children who presented with a higher level of pain and anxiety immediately after and three months later.

6. RECOMMENDATIONS

The study recommended that:

- Including gum chewing interventions and the Children's Anxiety and Pain Scale (CAPS) in the routine care of nurses.
- Developing regular and ongoing educational programs for nurses on innovative non-pharmacological techniques for managing children's pain during different medical procedures.

- Future research should be conducted on a large sample and randomized clinical trials.

- Replication study on children with different characteristics should be performed to increase the possibility of generalization of study findings.

REFERENCES

[1] **Allen,A.P., Smith, A.P. (2015)**. Chewing gum: cognitive performance, mood, well-being and associated physiology. *Biomed Research Internationa*l.; http://www.hindawi.com/journals/ bmri/2015/654806/

[2] **Atzori, B., Hoffman, H. G., Vagnoli, L., Messeri, A., & Grotto, R. L. (2019).** Virtual reality as a distraction technique for pain management in children and adolescents. *Advanced methodologies and technologies in medicine and healthcare* (pp. 483–494). https://doi.org/10.4018/978-1-5225-7489-7.ch038.

[3] **Aydin, G. B., Yüksel, S., Ergil, J., Polat, R., Akelma, F. K., Ekici, M., Odabas, Ö. (2017).** The effect of play distraction on anxiety before premedication administration: a randomized trial. *Journal of Clinical Anesthesia, 36*, 27-31.http://dx.doi.org/10.1016/j.jclinane.2016.04.044

[4] **Bagnasco, A., Pezzi, E., Rosa, F., Fornonil, L., & Sasso, L. (2015).** Distraction techniques in children during venipuncture: An Italian experience. *Journal of Preventive Medicine and Hygiene, 53*(1), 44–48.

[5] **Bergomi, P., Scudeller, L., Pintaldi, S., & Dal Molin, A. (2018).** Efficacy of non pharmacological methods of pain management in children undergoing venipuncture in a pediatric outpatient clinic: A randomized controlled trial of audiovisual distraction and external cold and vibration. *Journal of Pediatric Nursing, 42*, e66–e72.

[6] **Birnie, K. A., Noel, M., Chambers, C. T., Uman, L. S., & Parker, J. A. (2018).** Psychological interventions for needle-related procedural pain and distress in children and adolescents. *Cochrane Database of Systematic Reviews, 10*

[7] **Czarnecki, M. L., Turner, H. N., Collins, P.M., Doellman, D., Wrona, S., & Reynolds, J. (2018).** Procedural pain management: A position statement with clinical practice recommendations. *Pain Management Nursing, 12*(2), 95–111. https://doi.org/10.1016/j.pmn. 2011.02.003.

[8] **De Castro Goncalves, J., Mónica Oliveira, A., Cunha Batalha, L., Fernandes, A.M., Viegas, R., & Duarte Silva, A. (2014)**. A functional measurement approach to the Children's Anxiety and Pain Scale-CAPS: Contributions to its construct validity. *Psicológica, 35*(3), 653–674.

[9] **Dijk, L. (2017).**Interventions reducing anxiety in hospitalized children. *The American Journal of Diseases of Children, 133*(7), 709-712. doi:10.1001/archpedi.1979.02130070045010.

[10] **Konno, M., Takeda, T., Kawakami, Y., Suzuki, Y., Kawano, Y., Nakajima, K., Ozawa, T., Ishigami, K., Takemura, N. &Sakatani, K. (2016).** Relationships between gum-chewing and stress. *Adv Exp Med Biol, 2016, 876*, 343-349.

[11] **Lewkowski, M., Barr, R., Sherrard, A., Lessard, J., Harris, A., &Young, S. (2017)**. Effects of chewing gum on responses to routine painful procedures in children. *Physiology & Behavior, 79*(2), 257–265. https://doi.org/ 10.1016/S0031-9384(03)00098-2.

[12] **Li, W. H. C., Chung, J. O. K., Ho, K. Y., & Kwok, B. M. C. (2016).** Play interventions to reduce anxiety and negative emotions in hospitalized children. *BMC Pediatrics, 16*(36), 1-9. doi: 10.1186/s12887-016-0570-5

[13] **Martin, Maxtin, Smalling & Park, (2018)**. Pain assessment and management in children In Wong's nursing care of infants and children. *Elsevier Health Sciences. (E-book).*

[14] **McMurtry, C. M., Noel, M., Chambers, C. T., & McGrath, P. J. (2011).** Children's fear during procedural pain: Preliminary investigation of the Children's Fear Scale. *Health Psychology, 30*(6), 780–788. https://doi.org/10.1037/ a0024817

[15] **Mirzaei, F., Keshtgar, S., Kaviani, M., & Rajaeifard, A. R. (2015).** The effect of lavender essence smelling during labor on cortisol and serotonin plasma levels and anxiety reduction in nulliparous women. *Journal of Kerman University of Medical Sciences, 16* (3), 245–254.

[16] **Palmer, G. M. (2016)**. Pain management in the acute care setting: Update and debates. *Journal of Pediatrics and Child Health*, *52*(2), 213–220. https://doi.org/10.1111/jpc.13134.

[17] **Sadeghi, T., Mohammadi, N., Shamshiri, M., Bagherzadeh, R., & Hossinkhani, N. (2013).** Effect of distraction on children's pain during intravenous catheter insertion. *Journal for Specialists in Pediatric Nursing*, *18*(2), 109–114. https://doi.org/10.1111/jspn.12018

[18] **Sahiner, N. C., Inal, S., & Akbay, A. S. (2015).** The effect of combined stimulation of external cold and vibration during immunization on pain and anxiety levels in children. *Journal of Peri-anesthesia Nursing*, *30*(3), 228–235.

[19] **Şahiner, N., & Türkmen, A. S. (2019).** The effect of distraction cards on reducing pain and anxiety during intramuscular injection in children. Worldviews on *Evidence-Based Nursing*, *16*(3), 230–235.

[20] **Smith, A. P. (2014).** Effects of chewing gum on cognitive function, mood and physiology in stressed and non-stressed children. *Journal of research Gate.* Available at: https://www.researchgate.net/publication/41407

[21] **Smith, A. P. (2016).** Chewing gum and stress reduction. *Journal of Clinical and Translational Research*, *2*(2).https://doi.org/10.18053/jctres.02.201602.002.

[22] **Tick, H., Nielsen, A., Pelletier, K. R., Bonakdar, R., Simmons, S., Glick, R., Zador, V. (2018)**. Evidence-based non pharmacologic strategies for comprehensive pain care: *The Consortium Pain Task Force white paper. Explore*, *14*(3), 177–211.

[23] **Weijenberg, R. A., & Lobbezoo, F. (2015).** Chew the pain away: Oral habits to cope with pain and stress and to stimulate cognition. *BioMed Research International*, 2015, 149431. https://doi.org/10.1155/2015/149431.

[24] **Yamamoto-Hanada, K., Futamura, M., Kitazawa, H., Ohya, Y., Kobayashi, F., Kusuda, T., Saito, H. (2015)**. Relieving pain and distress during venipuncture: Pilot study of the Japan Environment and Children's Study (JECS). *Pediatrics International*, *57*(5), 1044–1047. https://doi.org/10.1111/ped.12818.

[25] **Yildizeli Topcu, S., Akgun Kostak, M., & Semerci, R. (2019)**. Effect of gum chewing on pain and anxiety in Turkish children during intravenous cannulation: A rand., *Journal of Pediatric Nursing*, https://doi.org/10.1016/ j.pedn.2019.12.007