

Pain Intensity after an Ice Pack Application Prior to Venipuncture among School-age Children: An experimental Study

Fadeelah Mansour Ahmed Alalo
Pediatric Nursing Specialist. EL-Qtif Central Hospital, Kingdom of Saudi Arabia

Awatef El Sayed Ahmad
Professor of Pediatric Nursing, College of Nursing, University of Dammam, Kingdom of Saudi Arabia

Hoda Mohamed Nafee El Sayed*
Assistant professor of pediatric nursing, College of Nursing, Dammam University, Kingdom of Saudi Arabia ,
lecturer in pediatric nursing, College of Nursing, El-Mansoura University, Egypt

Abstract

Venipuncture and other invasive procedures as blood draws, intramuscular injections or heel pricks are the most commonly performed painful procedures in children. These can be a terrifying and painful experience for children and their families. The present study aimed to identify Pain intensity after an ice pack application prior to venipuncture among school-age children. Fifty (50) school-age children aged from 6-12 years whom ordered to vein-puncture were included in the study, and they are chosen by simple random sample from the pediatric medical, surgical wards and pediatric emergency department in King Fahd Hospital of the University (KFUH) at the Al-Khobar city, Kingdom of Saudi Arabia. They divided equally into 2 groups, the study group who received an ice pack application for three minutes prior to venipuncture procedure over the insertion site while the control group received routine hospital care. A structured interview questionnaire sheet was used included age, gender, venipuncture procedure data and log table for recorded child's blood pressure, pulse rate and oxygen saturation as well as Wong-Baker (FACES) Self-report Pain Rating Scale, to assess pain intensity during the venipuncture among children in both groups. Results of the study revealed that, during venipuncture procedure, mean self-report pain score was lower among children in the study group than those in the control group with statistically significant difference, Mean \pm SD (1.92 \pm 0.316 and 4.40 \pm 0.490) respectively $P < 0.001$. Self-reported pain intensity was decreased in older school-age children than the younger ones and was higher among male's children than females. The study concluded that the application of an ice pack prior to vein puncture procedure was effective in reducing pain intensity among school age children and it recommended that application of an ice pack has to be a part of the routine care of all children admitted to venipuncture procedure, so educational course related the ice back storage, uses and its application time over the vein puncture site should be conducted.

Introduction

The International Association for the study of Pain (IASP) defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage"⁽¹⁾. The American pain society created the phrase "pain: as the fifth vital signs" to increase awareness of pain assessment among the health care professionals especially nurses. The rationale is that if pain were assessed the seriousness as other vital signs, it would more likely to be treated perfectly⁽²⁾. The pain response is individual (subjective) and is learned through social learning and experience, moreover the experience of pain is quite complex. *Silkman (2008)* described the multi-dimensional complexity of pain in physiological, sensory, behavioral, socio-cultural, cognitive and affective. **The physiological dimension** includes; the patient perception of pain and body's reaction to the stimulus. **The sensory dimension** concerns the quality of the pain and how severe the pain is perceived to be. This dimension includes: patient perception of pain's location, intensity and quality. **The behavioral dimension** refers to the verbal and nonverbal behavioral that the patient response to the pain. **The social-cultural dimension** concerns the influence of the social context and cultural background on the patient pain's experience. **The cognitive dimension** concern 'beliefs, attitude, intention and motivation related to pain and its management. **The affective dimension** concerns with feeling and emotion related to pain experience⁽³⁾.

Venipuncture is the one of the most commonly experienced procedures by hospitalized children; millions of children experience these procedures which cause considerable distress. Children requiring needle sticks (intramuscular injections, intravenous catheters, blood sampling) view this procedure as frightening and a significant source of pain^(4,5). It is estimated that 200 million peripheral intravenous catheters are used annually in the United States, while according to the Scottish National Prevalence Survey, one in three UK inpatients have at least one peripheral venous catheter in situ^(1,2).

Measurement of pain in the pediatric population can be a challenge for nurses. Before one can proceed with adequate pain management, adequate pain assessment is required. There are three standard dimensions of pain assessment that are used as a self-report of pain intensity, behavioral reactions, and physiological reactions⁽⁶⁾.

Pain assessment is an evaluation of the reported pain and the factors that alleviate or exacerbate it, as well as the response to treatment of pain. Responses to pain vary widely among individuals, depending on many different physical and psychological factors, such as specific diseases and injuries and the health, pain threshold, fear, anxiety, and cultural background of the individual were involved⁽⁷⁾.

Because pain is always subjective so its measurement should utilize a valid scale based on the child's age, cognitive level, type of pain, and situation. No single scale is useful for all children with all types of pain⁽⁶⁾. Self-report faces scales are widely used to evaluate pain intensity in children over the age of 3 years despite concerns regarding interpretability. The faces range from a smiling face to a sad, crying face. A numerical rating is assigned to each face (from 0, "no hurt" to 10, "hurts worst")^(8,9). It is also has adequate psychometric properties (reliability and validity), and it is easy, quick and given the consistent finding that it was preferred by children, parents, and practitioners when compared with other faces pain scales⁽¹⁰⁾. Relief of pain is a basic need and right of all children, effective pain management requires health professionals, including nurses, is willing to try a number of interventions to achieve optimal results. Basically, pain-reducing methods can be grouped into two categories, non-pharmacologic and pharmacologic. Whenever possible, both should be used; however, non-pharmacologic measures are substitutes for analgesics as behavioral- cognitive strategies such as distraction, relaxation, biofeedback, thought stopping, positive self-talk, guided imagery and biophysical interventions as massage, pressure, transcutaneous electrical nerve stimulation (TENS), and heat and cold application^(11,12,13). Cooling by cold water, spray, air, ice cubes and frozen gel pack are often used to reduce discomfort and mild pain from a variety of sources, such as acute soft-tissue injury, injections, nerve blocks, insertion of intravenous catheters and laser therapy. Only a few local and no systemic side-effects have been reported⁽¹⁴⁾. Non-pharmacologic pain management based on the association of Nursing actions and therapeutic techniques decreases costs, in addition to avoiding the presence of potential adverse effects related to the use of drugs and invasive interventions⁽¹⁵⁾.

Aim of the Study

This study aimed to: identify Pain intensity after an ice pack application prior to venipuncture among school-age children

Research Hypothesis:

Children with age 6 - 12 year- old who exposed to 3 minutes local ice pack application prior venipuncture would experience a decrease in pain response during the procedure than those who are not exposed.

Materials and Method

Research design: A randomized Controlled Trial

Setting:

The study was conducted in the pediatric medical, surgical wards and pediatric emergency department in King Fahd Hospital of the University (KFUH) at the Al-Khobar city, Kingdom of Saudi Arabia.

Subjects:

The study subjects included (50) school-age children aged from 6-12 years whom ordered to vein-puncture and chosen by simple random sample and divided equally into 2 groups, the study group who received an ice pack application for three minutes prior to venipuncture procedure over the insertion site while, the control group received routine hospital care.

Inclusion criteria: school-age children free from pain (acute or chronic) and mental handicap.

Tools of the study: three tools were used to collect data

The first tool, a structured interview questionnaire sheet was developed by the researchers to collect the data related to the child included, socio-demographic data as age, gender and medical diagnosis; and log table for recording child's physiological measurements data as systolic and diastolic blood pressure, pulse rate and oxygen saturation by **DINAMAP PRO 300**.

The second tool: Wong-Baker (FACES)⁽¹⁶⁾. Pain Rating Scale, developed by Baker and Wong, (1983). It was a self-report pain scale to assess pain intensity in children aged from 6 to 12 years. The child was asked to choose the face that best described the intensity of pain being experienced. Each face was rated by number to determine the intensity of pain which (0-10) coding as the following: (Face 0 = No hurt, **Face 2** = Hurts a little bit, **Face 4** = Hurts a little more, **Face 6** = Hurts even more, **Face 8** = Hurt whole lot and **Face 10** = Hurts worst)

The third tool: Medi-flex Reusable Cold packs application that used prior to venipuncture among children in the study group. It was a dual-purpose compress that provided icy cool. It was contained a state of the art gel which provided soothing cold for extended periods of time. It was an economical product that can be used over and over again on any part of the body. It is ideal as a drug-free therapy for minor pain⁽¹⁷⁾. The used ice gel

packs were frozen for 24 hours in the freezer and they were carried in the Gint Cooler Box containing ice cubes to keep their gel's consistency cold^(18, 19). Its size was modified to be 5×5 cm and the cover was designed in an attractive way using Sponge Bob Stamps by the researchers whom called it (Sponge Bob Ice Gel Pack)

Method of data collection:

- **An official permission** were taken from the Biomedical Ethics Committee at University of Dammam, chairmen of the pediatric departments at King Fahd Hospital of the University and also written consent was obtained from the mothers, fathers, children, or other's relatives to be included in the study after the purpose and time of application were explained. They reassured that the information obtained will be confidential and used on the purpose of the study. As well as Permission for using Wong-Baker (FACES) Pain Rating Scale was obtained from the scale authors' through their websites

A pilot study: It was carried out on five children for testing the clarity of the sheet and to estimate the time needed to apply the scale and fulfill the sheet. Children included in the pilot study were excluded from the study.

Procedure of the study: data collection for this study was started as the following steps by the researchers:

- Before the vein puncture procedure an interview was conducted to each child and his/her family member who is accompanying at the time of the procedure after explaining the purpose and content of the sheet, reassuring them that the procedure is safe, and a written informed consent was taken.
- Each child in the study or the control groups was connected with DINAMAP to measure his physiological measurements as blood pressure, pulse rate and oxygen saturation during the vein-puncture procedure.
- The techniques of ice back application were discussed with the responsible nurse to gain her cooperation and safe time and effort.
- The ice pack was applied over the chosen insertion site for children in the study group 3 minutes by the researchers and stopwatch was used to perform an alarm sound at the end of the time.
- After the time was finished, the ice pack was removed, the tourniquet was securely tied and the vein-puncture site was wiped quickly with an alcohol swab, and the needle was inserted by the nurse.
- At the time of the needle insertion into the vein, physiological measurements were recorded for children in the study and the control groups. Each child was asked to choose the face that represented his/her pain intensity.
- The Child self-report pain scores during venipuncture for both groups were interpreted according to Wong-Baker (FACES) rating score.⁽¹⁶⁾

<i>Pain Scores</i>	<i>Child Rating No.</i>
No pain	0
Mild	2
Moderate	4&6
Severe	8&10

- Interpreting the physiological measurements with the normal range for systolic, diastolic, pulse rate and oxygen saturation for school-age children⁽²⁰⁾

Physiological Measurements	Normal range
Systolic blood pressure	60-100 MM Hg
Diastolic blood pressure	65-70 MM Hg
Pulse rate	60-95 Beats/Minute
Oxygen saturation	95-100%

Results:

Table (1): Comparison between school age children in the study and the control groups related to their age and gender.

Items	Study group N= 25		Control group N= 25		Test	P. Value
	No.	%	No.	%		
Age of the child/ year					Z= - 0.374 P=0. 7	
6-	8	32%	8	32%		
8-	5	20%	6	24%		
10 to 12 years	12	48%	11	44%		
Mean ±SD	8.96±0.422		8.76±0.401			
Gender of the child					X ² 1.333	P=0. 2
Males	12	48%	8	32%		
Females	13	52%	17	68%		

This table revealed that **no statistically significant differences** were found between children in the study and the control groups related to their age and gender ($p>0.05$), 48% of children in the study group compared to 44% of them in the control group their age ranged from 10-12 years. Females children constituted in 52% of the study group while 68% in the control group.

Table (2): Comparison between school-age children in the study and the control groups concerning to their self-report pain intensity during the venipuncture procedure.

Pain intensity	Study group N=25		Control group =25		Test
	No	%	No	%	
No pain (score 0)	8	32%	0	0%	Man Whitney Test Z=3.527 P< 0.001*
Mild (score 2)	10	40%	9	36%	
Moderate (score 4&6)	7	28%	9	36%	
Severe (score 8%10)	0	0%	7	28%	
Mean ±SD	1.92±0.316		4.40±0.490		

* Statistically significant difference

Regarding children' self-report pain scores during the venipuncture procedure, the mean self-report pain scores was lower among children in the study group than those in the control group with **statistically significant difference** , Mean ±SD (1.92±0.316 and 4.40±0.490) respectively P<0.001 .

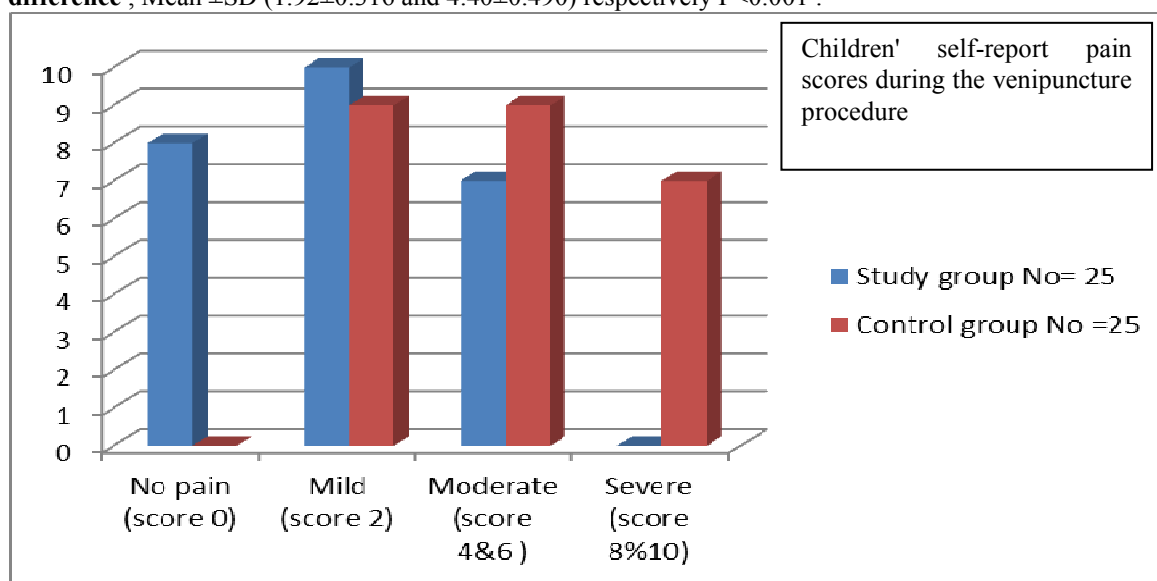


Figure (1) shows no sever self-report pain intensity score was reported in the study group compared to seven in the control group.

Table (3): Correlation between school age children in the study and the control groups regarding their self-report pain intensity and age during the venipuncture procedure.

Self-reported pain intensity	Study group N=25			Control group N=25		
	Age /years 6<8 years N=8	8<10 years N=5	10-12 years N=12	6<8 years N=8	8<10 years N=6	10-12 years N=11
No pain (score 0)	37.5%	60%	16.7%	0%	0%	0%
Mild pain (Score 2)	12.5%	20%	66.6%	12.5%	33.3%	54.5%
Moderate pain (Score 4&6)	50%	20%	16.7%	12.5%	66.7%	36.4%
Severe pain (Score 8&10)	0%	0%	0%	75%	0%	9.1%
Test P. Value	r = 0.026 P= 0.903			r =0.549 P= 0.004*		

**Statistically significant difference*

Regarding self-reported pain intensity during the venipuncture procedure and children's age, Self-reported pain score was moderate in (36.4%) of older control group children compared to 16.7% of them in the study group. No any children in the study group reporting severe pain score whatever their age with no statistically significant correlation value =0.903, while in the control group(75%) of the younger children and (9.1%) of the older ones reported severe pain intensity with statistically significant differences, **P= 0.004**.

Table (4): Correlation between school age children in the study and the control groups regarding their self-report pain intensity and gender during the venipuncture procedure.

Self-report pain intensity	Study group N=25		Control group N=25	
	Male N= 12	Female N=13	Male N=8	Female N=17
No pain (score 0)	16.7%	46.2%	0	0
Mild pain (Score 2)	50%	30.8%	25%	41.2%
Moderate pain (Score 4&6)	33.3%	23%	50%	29.4%
Severe pain (Score 8&10)	0	0	25%	29.4%
Test P. Value	r=0.206 P=0.209		r=0.076 P= 0.719	

Table (4): It was observed that the self-report pain intensity was increased among males than females' children in the study and the control groups with no statistically significant difference. In the study group only (16.7%) of males compared with 46.2% of females children reported no pain during the vein puncture procedure, self-report mild and moderate pain intensity were constituted in (83.3% and 53.8%) of males and females children (respectively) during the vein-puncture procedure, P=0.209. While in the control group (75% and 70.6%) of males and females children reported mild and moderate pain intensity respectively, p=0.719.

Table (5): Correlation between school age children in the study and the control groups regarding their self-report pain intensity and systolic blood pressure during the venipuncture procedure.

Self-report pain intensity	Study group N=25			Control group N=25		
	Systolic blood pressure Normal 60-100mmhg N=7	Below the normal <60mmhg N=3	Above the normal >100mmhg N=15	Systolic blood pressure Normal 60-100mmhg N=4	Below the normal <60mmhg N=2	Above the normal >100mmhg N=19
No pain (score 0)	28.6%	100%	20%	0%	0%	0%
Mild pain (Score 2)	14.3%	0%	60%	75%	0%	31.6%
Moderate pain (Score 4&6)	57.1%	0%	20%	25%	50%	36.8%
Severe pain (Score 8&10)	0%	0%	0%	0%	50%	31.6%
Test P. Value	r= 0.312 P= 0.129			r= -0.404 P= 0.045*		

**Statistically significant difference*

Table (5): Demonstrated that no statistically significant correlation was found between self-report pain intensity and systolic blood pressure among children in the study group, 100% of children with below the normal range of systolic blood pressure reported no pain and nobody (0%) reported severe pain score, P=0.129. As for children in the control group, the table denoted that (75%) of children with normal systolic blood pressure reported mild pain intensity, while(50% and 31.6%) of them with both below and above the normal range of systolic blood pressure respectively reported severe pain intensity during the vein puncture procedure with statistically significant correlation, P=0.045.

Table (6): Correlation between school age children in the study and the control groups regarding their self-report pain intensity and diastolic blood pressure during the venipuncture procedure.

Diastolic blood Pressure \ Self-report pain intensity	Study group N=25 Diastolic blood pressure			Control group N=25 Diastolic blood pressure		
	Normal 65-70mmhg N=13	Below the normal <65mmhg N= 2	Above the normal >70mmhg N=10	Normal 65-70mmhg N=8	Below the normal <65mmhg N=2	Above the normal >70mmhg N=15
No pain (score 0)	7.7%	100%	50%	0%	0%	0%
Mild pain (Score 2)	53.8%	0%	30%	62.5%	0%	26.7%
Moderate pain (Score 4&6)	38.5%	0%	20%	25%	50%	40%
Severe pain (Score 8&10)	0%	0%	0%	12.5%	50%	33.3%
Test P. Value	r= 0.516 P= 0.080			r= -0.394 P= 0.051*		

***Statistical significant difference**

The table indicated that no statistically significant correlation was found between self-report pain intensity and diastolic blood pressure among children in the study group= 0.080. While statistically significant was found in the control group= 0.051. In the study group more than fifty percent (53.8%) of children with normal diastolic blood pressure reported moderate pain intensity, (100%) of them with below the normal range of diastolic blood pressure reported no pain, and no one (0%) reported severe pain. Regarding children in the control group the table revealed that (62.5%) of them with normal diastolic blood pressure reported mild pain intensity while (50%) and (33.3%) of them below and above the normal range of diastolic blood pressure their pain intensity was severe.

Table 7: Correlation between school age children in the study and the control groups regarding their self-report pain intensity and pulse rate during the venipuncture procedure.

Pulse rate \ Self-reported pain intensity	Study group N=25		Control group N=25	
	Normal 60-95 Beats/Minute N= 8	Tachycardia >95 Beats/Minute N= 17	Normal 60-95 Beats/Minute N= 2	Tachycardia >95 Beats/Minute N=23
No pain (score 0)	50%	23.5%	0%	0%
Mild pain (Score 2)	25%	47.1%	0%	39.1%
Moderate pain (Score 4&6)	25%	29.5%	50%	34.8%
Severe pain (Score 8&10)	0%	0%	50%	26.1%
Test P. Value	r=0.190 P=0.363		r= 0.297 P= 0.219	

Regarding self-report pain intensity during the venipuncture procedure and pulse rate, the table illustrated that 26.1% of children in the control group had severe pain with tachycardia while no severe pain score or tachycardia was reported by those in the study group. No statistically significant correlations were found either in the study or in the control groups. P=0.363 and P= 0.21 respectively

Table 8: Correlation between school age children in the study and the control groups regarding their self-report pain intensity and oxygen saturation during the venipuncture procedure.

Oxygen saturation \ Self-reported pain intensity	Study group N=25		Control group N=25	
	Normal 95%-100% N= 24	Below normal >95% N= 1	Normal 95%-100% N=23	Below normal >95% N=2
No pain (score 0)	33.3%	0	0%	0%
Mild pain (Score 2)	41.7%	0	34.8%	50%
Moderate pain (Score 4&6)	25%	100%	39.1%	0
Severe pain (Score 8&10)	0%	0%	26.1%	50%
Test P. Value	r= 0.271 P= 0.190		r= 0.026 P= 0.903	

The table showed that self-report pain intensity during the venipuncture procedure and oxygen saturation, 50% of children in the control group had severe pain intensity with low Oxygen saturation compared to 0% of them in the study group. No statistically significant correlations were found in the study and control groups, where, P=0.363 and P= 0.219 respectively.

Discussion

Venipuncture is the most painful and frequently performed invasive procedures by nurses. It can be classified as a

minor invasive procedure but for children, it is accompanied by pain, fear and anxiety. For this reason, an effort should be made to assess, manage acute pain, improve children outcomes, and shorten hospital stays⁽²¹⁾.

Application of an ice over the insertion site is one method of the cutaneous stimulation that considered as non-pharmacological pain management method which utilized by the researchers in this study to assess the effect of an ice pack application prior to venipuncture on pain intensity among school-age children.

Findings of this present study revealed that no statistical significant difference between the study and the control groups of the children in relation to their age and gender. (table1)

Regarding children' self-report pain scores, the present study indicated that mean self-report pain score was lower among children in the study group than those in the control group with statistically significant difference, Mean \pm SD (1.92 \pm 0.316 and 4.40 \pm 0.490) respectively $P < 0.001$. In addition, about one third percentages of children in the study group compared to zero percentages of them in the control group were reported no pain, while no children reported sever pain in the study group compared with 28% of them in the control group as well as mild, moderate pain intensity were reported by 68% of children in the study group compared with 72% of those in the study group with statistically significant differences $P < 0.001$ as shown in (table2). Findings of the present study were in the line of that obtained by *Kiran et al. (2013)*⁽²²⁾ in their study which conducted to evaluate the effect of an ice pack application at the site prior to venipuncture on the intensity of pain that reported by children, they showed that a statistically significant reduction in pain during venipuncture among children in the experimental group than others.

Findings of the present study also are compatible with the results of a study conducted by *Mavohedi et al. (2006)*⁽⁵⁾⁽⁷⁾ That carried out to assess the effect of local refrigeration prior to venipuncture on pain related response in school age children; it was found that the average pain intensity in children with local refrigeration group is much less compared to pain intensity of those in the control group. Their results in well-matched with results of the present study where ice pack application at the site prior to venipuncture decreased pain intensity among children in the study group compared to those in the control group.

Furthermore, *Hasanpour et al. (2006)*⁽²³⁾ reported in their study, that the effect of local cold therapy and distraction in pain relief during penicillin intramuscular injection among children by using pain intensity scale, the average pain score in local cold therapy was 26.3, among children in the distraction group and it was 34.3 and among those in the control group, so that local cold was effective in reducing Intramuscular injection related pain and this findings is supported the present study results.

Results of the present study showed that no a significant correlation was found between the pain intensity reported by children and their age in the study group during venipuncture procedure with ice back application (P value > 0.05) but there is a positive significant correlation was observed among them in the control group $P < 0.05$ as shown in (table 3). These findings are in agreement with *Hassan et al. study (2012)*, who found that no correlation between child age and subjective pain scores in the study group⁽²⁴⁾.

Results of the present study showed that almost, as the child age increased, the self-reported pain intensity was decreased half of children in the study group aged from 6<8 years reported mild pain intensity compared with 16.7% of them aged from 10 to 12 years, three quarters of children in the control group aged 6<8 years and (9.1%) of them aged 10-12 years reported severe pain intensity (table 3). Decreased pain intensity reported by older school age children may attribute to the older school age child had mature cognitive ability than the younger ones and previous experience of hospitalization and vein puncture procedure. The results of the present study disagreed with *Sabitha et al. (2008)*⁽²⁵⁾; and *Mansy et al. (2010)*⁽²⁶⁾, who found that no significant difference between age groups regarding pain self-report scores.

Regarding the correlation between pain intensity and gender of children in the study and the control groups during venipuncture procedure, the present study revealed that the self-reported pain intensity was increased among male than female children in the study and the control groups with on significant correlation as shown in (table 4), this result is in the same line with *Ingalls et al. (2010)*⁽²⁷⁾ and *Celik et al. (2011)*⁽²⁸⁾, who found that there was no significant relationship regarding pain score and children' gender. However, the results disagreed with *Parruti et al. (2010)* who reported that intensity of pain score was significantly associated with female gender and older age⁽²⁹⁾.

AL Mutairi et al. (2012)⁽³⁰⁾ stated that many researches indicated that gender is treated as a demographic variable and not as a factor that may significantly affect all aspects of clinical pain experience. The general assumption, that gender is a demographic but not a major independent variable, implies that most of the studies do not have enough statistical power to detect gender differences in pain perception

As for the systolic and the diastolic blood pressure, findings of the present study reported that both children in the study and the control groups, during the vein puncture procedure the mean value of systolic and diastolic blood pressure was decreased among children in the study group and increased among those in the control group with no statistical significant differences as shown in (tables 5&6).

Decreasing systolic and diastolic blood pressure of children in the study group than those in the control group could be related to the effect of ice back application. In contrast the mean value of systolic and diastolic

blood pressure for children in the control group had increased as compared them to before and after the procedure which could be related to that children may had fear and anxiety or it was the first experience of hospitalization and venipuncture procedure.

Results of the present study indicated that children in the study group had lower mean pulse rate than those in the control group as shown in (table7). These findings are consistent with Farion et al ,(2008) ⁽³¹⁾ who noted that school age children requiring urgent intravenous catheterization exposing to vapocoolant spray less pain score and pulse rate compared to the placebo ones .

However, findings of present study related to O₂ Saturation assessment during vein- puncture showed that the values of O₂ saturation among children in the study and the control groups were constituted in the normal range with no significant differences were observed as shown in (table 8). Findings of this study are not matched with those obtained by *Abd El-Gawad et al. (2015)* who studied the effect of interactive distraction versus cutaneous stimulation for venipuncture pain relief in school age children and concluded that there were differences in the mean of O₂ Saturation rate between the two groups in general with a lower mean rate in children with interactive distraction group compared with those in the cutaneous stimulation group and interactive distraction group ⁽³²⁾.

Feedback of nurses was taken by the researchers related to the effect of ice Pack application on needle's insertion such as interfering with vein, causing constriction and making the insertion difficult, all nurses said that there was not any difficulties and the procedure had succeed rate from the first attempt. This findings corresponded with those of *Waterhouse (2013)*, who compared ice and vapocoolant spray as topical analgesic agents for IV catheter placement in children 9–18 years of age said 83% of IV catheters were successfully placed on the first attempt, and 70% of all IVs were classified as “easy” to start in opposite and 26% overall expressed a negative concern, citing potential vasoconstriction and effects on visibility of veins. Despite nurses' concerns regarding vasoconstriction, IV insertion success rates were above average, and most IVs were easily placed ⁽³³⁾.

Finally, this study demonstrates that non- pharmacological methods of pain management include cutaneous stimulation have been found to be an effective, safe and simple adjunctive methods for the control and relief of school-age children pain prior to vein-puncture.

Conclusion

Based on the study findings, it could be concluded that pain intensity reported by school age children induced by a venipuncture procedure were affected by application of an ice pack over the site of insertion. During the venipuncture procedure; children in the study group whom had ice back application experienced no pain, mild and moderate pain, while children in the control group whom treated with routine care experienced mild, moderate and severe pain intensity; as the child's age is increased, pain intensity is decreased as reported by them. During the vein puncture mean systolic and diastolic blood pressure was decreased among children in the study group than those in the control group. Children in the study group had lower mean pulse rate than those in the control group, with no statistical significant differences. No statistical significant differences were found between the mean oxygen saturation of children in the study group and those in the control group during venipuncture procedure but mean oxygen saturation of children in the study group was higher than the mean oxygen saturation of them in the control group. So, an ice pack application had a positive effect to decrease pain induced by a venipuncture procedure among school age children.

Recommendations:

The present study recommended the following:

1. Educational course about the application of an ice pack and its effect on minimizing the pain should be conducted for nursing staff.
2. Application an ice pack has to be a part of the routine care of all children admitted to venipuncture procedure.
3. Inform and advise health care providers especially, pediatric nurses on the need to accept and assess a child's pain correctly, especially during painful procedures so nurses need to expand their knowledge and increase their responsibility.
4. The hospital should supply various sizes of an ice pack application.
5. Further studies must be done in various other age groups of the pediatric population and on other painful procedures.

References

1. International Association for the Study of Pain [Internet].IASP Curriculum Outline on Pain for Nursing, 2012a. Last Updated June 02, 2015. Available from <http://www.iasppain.org/>
2. Drendel Al, Kelly Bt, Ali S. Pain assessment for children: overcoming challenges and optimizing care. *PediatrEmerg Care* 2011; 27: 773-781.
3. Silkman, C. Assessing the seventh dimension of pain, *American Nurse Today*; 2008: 3 (2) 12-15

4. Hockenberry JM. and Wilson D. Wong's Essentials of pediatric Nursng.8th ed .Mosby Elsevier. 2009,p. 159-71.
5. Movahedi A F, Rostami S, Salsal M. The effect of local refrigeration prior to Venipuncture on pain related responses in school age children. Aust J AdvNurs [Internet]. [Cited 2006 March] 2006 Dec-2007 Feb; 24 (2): 51-55.
6. Young KD: Pediatric procedural pain. Ann Emerg Med 45:160-171,2005
7. Mosby's Dictionary of Medicine, Nursing and Health Professions, 2013. 9th ed, Mosby Inc., Elsevier
8. McGrath P.J., Walco G., Turk D.C., Dworkin R.H., Brown M.T., Davidson K, et al. Core outcome domains and measures for pediatric acute and chronic/recurrent pain clinical trials: Journal of Pain. 2008; 9: 771-783.
9. Stinson, J.N., Kavanagh, T., Yamada, J., Gill, N., & Stevens, B. Systematic review of the psychometric properties, interpretability and feasibility of self-report pain intensity measures for use in clinical trials in children and adolescents. Pain, 2006:125, 143-157.
10. Tomlinson D, von Baeyer CL, Stinson JN, Sung L.. A systematic review of faces scales for the self-report of pain intensity in children. Pediatrics 2010;126(5):e1168–1198
11. Berman, A., Snyder, S., Koziar, B., Erb, G. Fundamentals of Nursing: Concepts, Process, and Practice. 8th ed., Julie Levin Alexander: Prentice Hall Company. 2008; 1187-1230
12. Ricci, S.S., and Kyle, T. Maternity and pediatric nursing. Wolters Kluwer, Lippincott Williams & Wilkins, Philadelphia, New York, 2009, pp 854-861, 878-888,1062-1607,1405-1410.
13. Timby, B.K.Fundamental nursing skills and concepts. 9th ed., Wolter Kluwer, Lippincott Williams & Wilkins, Philadelphia, 2009, pp 435-447.
14. J. Clin. The journal of clinical & aesthetic dermatology. The use of a Contact Cooling Device to reduce pain and ecchymosis associated with Dermal Filler Injections; 2010 March; 3: 29–34.
15. SociedadeBrasileiraparaEstudos da Dor (SBED). Histórico da SBED. [disponívelem www.dor.org.br]
16. Wong, D. & Baker, C. Wong-Baker FACES® Pain Rating Scale [Internet]. Oklahoma City, OK : Wong-Baker FACES Foundation ; 2009-2015. Available from <http://wongbakerfaces.org/>
17. Jan MEDITEKS . Hot and Cold Compress [Internet].MaltepeİbrahimağaCaddesiBayrampaşa / İstanbul ; January 2015 . Available from: <http://www.mediteks.com/eng/sicak-soguk-kompres.asp>
18. Gint. Cooler box [Internet].Hangzhou Zhejiang,China:PingHu Mega Vacuum Flask Industries Co., Ltd. ; January 2015 Available from: <http://www.gintstar.com/>
19. Kliegman, Robert; Nelson, Waldo E editors, Nelson Textbook of Pediatrics, 18th edition Philadelphia: Saunders Elsevier, 2007.
20. Huang C., Tung W., Kuo L. and Chang, Y. Comparison of Pain Responses of Premature Infants to the Heel stick Between Containment And Swaddling Journal of Nursing Research. 2004; 12(1):31-40.
21. kiran N. Kaur S, Marwaha R, Effect of an ice pack application at the site prior to venipuncture on intensity of pain among children. 2013;9(4).
22. MarziehHasanpour, Mina Tootoonchi,FereshtehAein,GhasemYadegarfar, The effects of two non-pharmacologic pain management methods for intramuscular injection pain in children, 2006;8: 7—12
23. Hassan A. , Darwish M. , El-Samman G. , Fadel F. ,The impact of cryotherapy on pain intensity at puncture sites of arteriovenous fistula among children undergoing hemodialysis, Journal of American Science 2012;8(12).
24. Sabitha, P.B., Khakha, D.C., Mahajan, S., Gupta, S., Agarwal, M., and Yadav, S.L. Effect of cryotherapy on arteriovenous fistula puncture-related pain in hemodialysis patients. Indian J Nephrol, 2008; 18:155-8.
25. Mansy, G. E., Zaher, S.R., Waziry, O.G. and Eshak, E.G. The effect of two non-pharmacologic pain management methods on pain-associated with intramuscular injection among rheumatic children. Alexandria Journal of Pediatric,2010;24. 135-142.
26. Lngalls N.K., Horton, Z.A, Bettendorf, M. Randomized, double-blind, placebo-controlled trial using lidocaine patch 5% in traumatic rib fractures. J Am CollSurg, 2010: 205-209.
27. Celik G., zbek O., Yılmaz M., Duman I., Zbek S., and Apiliogullari S. ,Vapocoolant Spray vsLidocaine/Prilocaine Cream for Reducing the Pain of Venipuncture in Hemodialysis Patients: A randomized, Placebo-Controlled, Crossover Study. International Journal of Medical Science. 2011; 8(7):623-627.
28. ParrutiG. ,Tontodonati M. &Rebuzzi C. Predictors of pain intensity and persistence in a prospective Italian cohort of patients with herpes zoster: relevance of smoking, trauma and antiviral therapy. BMC Med. 2010 ; 8:58.
29. AL Mutairi N. , El sayeed A. &Dajani A. The Effect of Kangaroo Care on Neonatal Physiological Response to Pain Induced by Intramuscular Injection, Unpublished project, College of Nursing, University of Dammam,2012
30. McClellan C.B., Jeffrey C., et al. Criterion And Convergent Validity For Four Measures Of Pain In A

- Pediatric Sickle Cell Disease Population, *Clin J Pain*. 2009 February; 25(2): 146-152.
31. Farion, K. J., Splinter, K. L., Newhook, K., Gaboury, I., & Splinter, W. M. (2008). The effect of vapocoolant spray on pain due to intravenous cannulation in children: A randomized controlled trial. *Canadian Medical Association Journal*, 179(1), 31–36. doi:10.1503/cmaj.070874
 32. Abd El-Gawad S and Elsayed L. Effect of interactive distraction versus cutaneous stimulation for venipuncture pain relief in school age children. *Journal of Nursing Education and Practice*. 2015; 5(4).
 33. Waterhouse M, Liu D and Wang V. Cryotherapeutic Topical Analgesics for Pediatric Intravenous Catheter Placement: Ice versus Vapocoolant Spray, *PediatrEmerg Care*. 2013 ; 29 (1): 8–1.