

Effect of Leg Crossing and Hand Gripping Techniques on Reducing Vasovagal Symptoms Associated with Vein Puncture in Pediatric Patients

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Abstract

Background: Leg crossing and hand gripping techniques appear to have an immediate beneficial effect on decreasing vasovagal symptoms. **Aim of this study:** Was to evaluate the effect of leg crossing and hand gripping techniques on reducing vasovagal symptoms associated with vein puncture in pediatric patients. **Research design:** A quasi experimental design was utilized in this study. **Setting:** This study was conducted at emergency department and inpatient pediatric department at both Benha Teaching Hospital and Benha University Hospital. **Subjects:** Study subjects were consists of purposive sample of children (90). A simple random sample was used to assign the children into three equal groups according to type of intervention: Leg crossing group, Hand gripping group and control group. **Tools of data collection:** I): A structured interviewing questionnaire to assess characteristics of studied children, Their medical data, Physiological measurements and assessment of common vasovagal signs and symptoms associated with vein puncture pre and post intervention), II): Children's Fear Scale III): Children's satisfaction questionnaire sheet. **Results:** There were highly significant differences between groups of the study in relation to total vasovagal signs and symptoms associated with vein puncture and fear assessment in groups of the study pre and post technique implementation ($p < 0.01$). Children in the study groups were satisfied with the implemented techniques for its effect on reducing vasovagal symptoms associated with vein puncture. **Conclusion:** Leg crossing and handgrip techniques were associated with decrease in vasovagal symptoms of children undergoing vein puncture and experienced fewer numbers of vasovagal symptoms as compared to children in control group. Children in study groups were satisfied with the implemented techniques for its effect on reducing vasovagal symptoms associated with vein puncture. **Recommendations:** Leg crossing and hand gripping techniques can be integrated as a part of routine daily care for children who had a past history of vasovagal symptoms associated with vein puncture.

Key words: Leg crossing, Hand gripping techniques, Vasovagal symptoms, Vein puncture, Pediatric patients, Nurses.

Syncope caused by transient ischemia of the brain, is a transient disturbance of consciousness and often accompanied by loss of autonomic muscle tone. As a common disorder in children and adolescents, syncope usually occurs quickly and spontaneously,

lasting from a few seconds to a few minutes. It has been reported that 20%-30% of the children and adolescents aged from 5 to 18 years old have experienced at least one syncope, and about 50% of these syncope children are Vasovagal Syncope (VVS). The

VVS is a temporary loss of consciousness that caused by the dysfunction of autonomic nervous system due to various reasons and it can lead to the decrease of blood pressure, heart rate, hypoxia and cerebral hypo perfusion (**Zhang et al., 2020**).

A sudden loss of consciousness in a child can cause anxiety amongst both parents and clinicians. It presents in various forms, such as fainting, black outs, collapse, and passing out. Vasovagal reflex syncope may occur at all ages, especially in children and adolescents. Some studies indicated that the incidence of syncope in the pediatric age that requires medical intervention is estimated around 1% of toddlers may have a form of vasovagal syncope, the risk increasing with age and peaking at around 15 years old. The incidence of syncope requiring medical attention is 125/ 100,000 that is up to 47 % of adolescent girls and 24 % of adolescent boys. It accounts for 3% of emergency department attendances and 1% of all hospital admissions (**Naganna et al., 2020**).

Vasovagal syncope typically results from a specific trigger that increases parasympathetic tone and decreases sympathetic tone. Common triggers include emotional stress, pain, trauma, being in a crowded or warm environment, or phobias such as to blood or needles. Often, these triggers are potentiated by hunger, exhaustion, intercurrent illness, and orthostatic stress, such as from hypovolemia, prolonged standing, and/or positional changes. Characteristically, there is a prodrome of symptoms lasting seconds to minutes secondary to activation of the autonomic nervous system. Common symptoms include gastrointestinal upset or abdominal pain, nausea, sweating, pallor,

general weakness, lightheadedness, or tunnel vision (**Dalton& Wang, 2017**).

Current practice when pediatric patients report a history of vasovagal symptoms includes having patients lie down and instituting safety precautions in anticipation of possible syncope. While these interventions increase patient safety, they do not attempt to prevent the syncope symptoms from occurring. Many studies have observed interventions to decrease or prevent vasovagal symptoms in adult patients. Increased dietary salt intake and counter-pressure techniques were recommended as one of the first-line non-pharmacological treatment measures (**Fathalla& Ghoneim, 2018**).

The pediatric nurse should provide children with reassurance and education regarding the nature, risks, and prognosis of the condition. Children education involves recognition of the potential symptoms and actions to take upon recognition of any early warning signs as well as identification of potential triggers. Children should be advised to assume the supine position with legs raised at the onset of symptoms, whenever feasible. For children with vasovagal syncope, pediatric nurses recommend physical isometric maneuvers such as Leg-crossing with simultaneous tensing of leg, abdominal, and buttock muscles and Handgrip, which consists of maximum grip on a rubber ball or similar object (**Shen et al., 2017;Brignole et al., 2018**).

Aim of the study

The aim of this study was to evaluate the effect of leg crossing and hand gripping techniques on reducing vasovagal symptoms associated with vein puncture in pediatric patients.

Research hypothesis:

1- Children who participate in leg crossing and hand gripping techniques would experience fewer vasovagal symptoms as compared with children who received standard care during vein puncture.

2- Children in intervention groups were satisfied with the implemented techniques for its effect on reducing vasovagal symptoms associated with vein puncture.

Subject and Method

Research design:

A quasi –experimental research design was utilized to conduct the study.

Setting:

This study was conducted at emergency department and inpatient pediatric department at both Benha University Hospital affiliated to university and Benha Teaching Hospital affiliated to ministry of health and population.

Sample:

Study subjects were consists of purposive sample of children (90) venous access for any reason as blood sample, or intravenous placement over 6 months period in the previously mentioned settings. A simple random sample was used to assign the children into three groups: Leg crossing group (30), Hand gripping group (30) and control group (30). Children in the control group will receive only the routine department care.

Tools for data collection:

Tool I:- A structured interviewing questionnaire: It was constructed by the researcher in an Arabic language after reviewing the recent relevant literature to

gather data required to assess vasovagal symptoms associated with vein puncture and it was composed of four parts:

- Part (1): Characteristics of the studied children such as: - age, gender, educational stage, birth order & residence. It contained of (five questions)

-Part (2): Medical Data of Children

A- Medical history of the child which was checked from medical file of the child such as: - diagnosis, duration of stay in hospital and past hospitalization (three questions)

B- Data related to vein puncture such as site, reason and problems associated with vein puncture (three questions)

- Part (3): Physiological measurements of the studied Children:

It was consisted of vital signs that were measured just before and after vein puncture (children's heart rate, respiration rate and blood pressure) and compared with their normal peers.

-Part (4): Assessment of common vasovagal signs and symptoms associated with vein puncture pre and post technique implementation such as light-headedness, dizziness, dilated pupils, blurred vision, seeing black dots, a slow, weak pulse, salivation, nausea, vomiting, abdominal discomfort, sudden urge to defecate, pallor, sweating/diaphoresis, sighing & pale skin.

Tool II: Children's Fear Scale (CFS).

The CFS scale was adopted from **McMurtry et al., (2011)** to measure fear level in children. This scale consisted of a row of five neutral faces ranging from a no fear face on the far left to a face showing extreme fear on the far right. Scores on the CFS was converted to numerical scores and the total score is ranging from 0 – 4.

Tool III: Children's satisfaction questionnaire sheet:

It was developed by the researcher after reviewing scientific literature. The children responses were classified into three categories to assess children's satisfaction level regarding the effect of leg crossing and hand gripping techniques on reducing vasovagal symptoms during vein puncture.

Pilot study

Pilot study was carried out on 10% (9 children) of the expected sample size to check the clarity, applicability, and feasibility of the study tools. The necessary modifications were done accordingly. The children included in the pilot study were not excluded from the study as no radical modifications were done in the study tool.

Content validity:

Validity of the tools was checked by a jury of three experts in the pediatric nursing field to test face and content validity. The experts reviewed the tools for clarity, relevance, comprehensiveness, simplicity and applicability. The jury comments were considered regarding the format, layout, paraphrasing, consistency, accuracy and relevancy of the tools. Then the final form was used in data collection.

Reliability:

Reliability of the tools was checked by testing its internal consistency using Cronbach's alpha coefficient test. Where, $r=0.71$ for questionnaire, $r=0.87$ for fear scale and $r=0.84$ for children satisfaction questionnaire sheet. So tools were found to be highly reliable for data collection.

Ethical considerations

Ethical approval was obtained from scientific research ethical committee faculty of nursing

Benha University, hospital administrator and head of department inpatient pediatric department at both Benha Teaching Hospital affiliated to ministry of health and population and Benha University Hospital affiliated to university before starting the study and ensured each participant approval was involved in the study before collection of any data and after explanation of the study aim in simple and clear manner The study subjects (and their accompanying parents) were informed that is the study is harmless. The privacy was maintained and oral consent was taken for participation. Their inclusion in the study is voluntary, they are allowed to quit at any time and confidentiality of the gathered data were secured. Children's norms, believes and habits are taken into consideration.

Field work:

Data collection for this study was conducted for a period of 6 months starting from the first of June to the end of November 2020. The researcher attended in the first study setting (Benha Teaching Hospital) two days weekly (Saturday & Tuesday) from 8A.M to 10 A.M, and in the second study setting (Benha University Hospital) two days weekly (Monday & Thursday) from 8A.M to 10 A.M to collect the data by using previously mentioned tools.

The researcher had explain the nature and purpose of the study to the nurses who are working in the previously mentioned settings to make referral of the children who had a history of vasovagal symptoms during previous vein puncture and had physician order for vein puncture to the researcher.

The researcher reviewed inclusion and exclusion criteria and explained the purpose of study to the children and their accompanying parents and methods of data

collection. Oral consent was obtained was obtained from all parents of the studied children as a pre request of inclusion in the study.

All the studied children receive routine vein puncture protocol during vein puncture.

Physiological measurement (heart rate, respiration and blood pressure) were assessed for each child just before and after vein puncture.

In Control group, children were only received routine care. The children in this group were assessed by the researcher during vein puncture procedure without any interventions from the researcher.

The researcher collect data of the study groups after finishing collection of data of children in control group.

The researcher interviewed each child individually using the previously mentioned tools (10) minutes. Then teach them individually about how to perform the leg crossing and handgrip techniques. This included breaking down the technique into simple steps and using visual images to explain the techniques. The researcher helped the children to practice the techniques many times prior to vein puncture to ensure that children can do techniques effectively and efficiently as the following:

Conducting leg crossing technique following steps.

The technique started by the following steps:

- Children were placed in supine position with head of the bed slightly elevated during venipuncture.
- The child cross his/her legs at the ankles.
- The child squeezes their buttocks together.

- The child takes deep breathing while keeping arm relaxed.

- The researcher was ensured all children performed all four steps of leg crossing technique during the vein puncture procedure.

Conducting handgrip technique following steps.

The technique started by the following steps:

- The child holds a rubber ball in the hand that uses to write.
- The child squeezes the ball for as long as the children can or until symptoms disappear
- The researcher was ensured all children performed the two steps of hand grip technique during the vein puncture.

Children were allowed to practice the techniques then the researcher assesses vasovagal symptoms, their fear of vein puncture and satisfaction with the implemented techniques.

Statistical analysis:

Data entry and statistical analysis were done using SPSS 21.0 statistical software package.

Results:

Table (1) showed that, there was no significant difference in characteristics of the studied children ($p > 0.05$). As noticed, half and more (50%, 56.6% and 50%) of the studied children their age ranged from 8-<10 years. Also, around two thirds (60%, 66.7% and 73.3%) of them were males. Moreover, around two thirds (60%, 66.7% and 60%) of them were at primary school. Around half and more (46.6%, 60% and 53.3%) of the studied children were ranked as the first child between their siblings. Also, half and more

(63.3%, 50% and 53.3%) of them were residing in urban areas.

Table (2) indicated that, there was no significant difference in medical data of the studied children ($p \geq 0.05$). Where, around half and more (46.7%, 53.3% and 60%) of the studied children had pneumonia. Also, around two thirds (66.7%, 73.3% and 60%) of them stayed at hospital for $1 < 5$ days. Where, half and more (60%, 53.3% and 50%) of the studied children reported previous hospitalization.

Table (3) indicated that, there was no significant difference in medical data of the studied children ($p \geq 0.05$). Most (80%, 86.7% and 83.3%) of them had vein puncture at hand for intravenous cannulation. Also more than two thirds had previous fainting episodes (73.3%, 80%, and 86.7). Moreover, one third and more (33.3%, 40% and 33.3%) of them had pain at the puncture site.

Table (4) revealed that, there was highly significant difference between leg crossing group, griping group and control group related to all physiological measurements immediately before and after vein puncture ($p < 0.01$). As evidence, the heart rate, respiration and blood pressure were in normal ranges in the majority of children in leg crossing and hand griping groups post vein puncture as compared to control group.

Table (5) showed that, there was highly significant difference between leg crossing group, gripping group and control group related to all vasovagal signs and symptoms pre and post technique implementation ($p < 0.01$).

Table (6) revealed that, there was highly significant difference between leg crossing,

griping and control groups related to fear level pre and post technique implementation ($p < 0.01$). As noticed, 46.6% of the leg crossing group had extremely fearful at pre technique. While, 66.7% of them had no fear at post technique implementation. Also, 40% of the hand griping group had extremely fearful at pre technique implementation. While, 60% of them had no fear at post technique implementation. Moreover, 40% of the control group had extremely fearful at pre intervention. Also, 33.3% of them had extremely fearful at post intervention.

Figure (1) indicated that most, (86.7%) of the hand griping group were very satisfied about hand gripping technique. While, 13.3% of them were little satisfied.

Figure (2) revealed that the majority, (90%) of the children in leg crossing group were very satisfied about leg crossing technique. While, 10% of them were little satisfied.

Table (1): Distribution of the studied children according to their personal characteristics (n = 90)

Characteristics of studied children	Leg crossing group (n=30)		Hand griping group (n=30)		Control group (n=30)		Friedman test	
	No	%	No	%	No	%	X ²	P value
Age in years								
8: <10	15	50	7	56.6	15	50	1.627	.903
10: <12	8	26.7	7	26.7	10	33.3		
12: < 15	4	13.3		10	3	10		
15: ≤ 18	3	10		6.7	2	6.7		
$\bar{x} \pm S.D$	10.7±2.34		10.4±3.60		11.3±2.91			
Gender								
Male	18	60	20	66.7	22	73.3	.963	4.360
Female	12	40	10	33.3	8	26.7		
Educational level								
Primary	18	60	20	66.7	18	60	1.347	.985
Preparatory	9	30	8	26.7	10	33.3		
Secondary	3	10	2	6.7	2	6.7		
Rank of the child between his siblings								
1st	14	46.6	18	60	16	53.3	1.530	.891
2nd	8	26.7	7	23.3	9	30		
3rd	8	26.7	5	16.7	5	16.7		
Residence								
Rural	11	36.7	15	50	14	46.7	1.792	.541
Urban	19	63.3	15	50	16	53.3		

Table (2): Distribution of the studied children according to their medical data (n = 90).

Medical data of the studied children	Leg crossing group (n=30)		Hand griping group (n=30)		Control group (n=30)		Friedman test	
	No	%	No	%	No	%	X ²	P value
Diagnosis								
Pneumonia	14	46.7	16	53.3	18	60	1.303	.921
Tonsillitis	4	13.3	5	16.7	5	16.7		
Bronchial asthma	8	26.7	6	20	5	16.7		
Dehydration	4	13.3	3	10	2	6.7		
Duration of hospital stay / day								
1 < 5	20	66.7	22	73.3	18	60	1.104	1.031
5 < 10	8	26.7	5	16.7	8	26.7		
10 ≤ 15	2	6.7	3	10	4	13.3		
Previous hospitalization								
Yes	18	60	16	53.3	15	50	.879	2.908
No	12	40	14	46.7	15	50		

Table (3): Distribution of the studied children according to their medical data related to vein puncture (n = 90)

Medical data of the studied children data to vein puncture	Leg crossing group (n=30)		Hand griping group (n=30)		Control group (n=30)		Friedman test		
	X ²	P value							
Location of vein puncture								1.806	.630
Hand	24	80	26	86.7	25	83.3			
Foot	4	13.3	3	10	5	16.7			
Skull	2	6.7	1	3.3	0	0.0			
Indications of vein puncture								.953	2.370
Intravenous cannulation	25	83.3	25	83.3	22	73.3			
Taking a blood sample	5	16.7	5	16.7	8	26.7			
Problems associated with vein puncture *								1.520	746.
Fainting	22	73.3	24	80	26	86.7			
Pain at the puncture site	10	33.3	12	40	10	33.3			
Redness of the puncture site	8	26.7	6	20	4	13.3			
Swelling	4	13.3	2	6.7	2	6.7			
Venous leak	3	10	2	6.7	3	10			
Nothing	5	16.7	8	26.7	11	36.7			

Table (4): Mean and standard deviation of physiological measurements of the studied children in the groups of the study immediately before and after vein puncture (n = 90).

Physiological measurements	Leg crossing group (n=30)		Hand griping group (n=30)		Control group (n=30)		Anova test	
	Pre	Post	Pre	Post	Pre	Post	t. test	P value
	$\bar{x} \pm S.D$	$\bar{x} \pm S.D$	$\bar{x} \pm S.D$	$\bar{x} \pm S.D$	$\bar{x} \pm S.D$	$\bar{x} \pm S.D$		
Heart rate	50.5±4.3	73.9±0.93	51.3±3.9	75.4±1.03	52.2±4.6	55.9±3.8	20.31	.000**
Respiration	25.5±6.34	14±0.99	24.9±4.28	13.5±0.91	23.4±5.5	20.8±3.95	22.87	.000**
Blood pressure:								
Systolic	100.3±5.3	110.5±1.9	101.8±7.6	110.5±1.9	99.3±5.7	101.4±4.5	18.94	.000**
Diastolic	58.7±6.4	81.3±1.7	60.5±5.5	80.7±2.1	61.5±4.9	65.2±4.1	19.06	.000**

Highly significant P < 0.001**

Significant P < 0.05*

Table (5): Percentage distribution regarding the presence of common vasovagal signs and symptoms in groups of the study pre and post technique implementation (n = 90).

Vasovagal signs and symptoms	Leg crossing group (n=30)		Hand griping group (n=30)		Control group (n=30)		Friedman test P value
	Pre	Post	Pre	Post	Pre	Post	
Light-headedness	60	13.3	53.3	13.3	66.7	56.7	.000**
Dizziness	73.3	0.0	66.7	6.7	60	50	.000**
Dilated pupils	40	6.7	33.3	6.7	33.3	26.7	.001**
Blurred vision	46.7	6.7	40	0.0	40	33.3	.000**
Seeing black dots	26.7	6.7	16.7	00.0	20	16.7	.005**
A slow, weak pulse	86.7	13.3	80	13.3	73.3	66.7	.000**
Salivation	26.7	6.7	26.7	6.7	33.3	33.3	.000**
Nausea	60	6.7	50	6.7	60	50	.000**
Vomiting	26.7	6.7	20	0.0	33.3	26.7	.000**
Abdominal discomfort	26.7	6.7	20	0.0	33.3	26.7	.000**
Sudden urge to defecate	13.3	0.0	6.7	0.0	13.3	13.3	.007**
Pallor	73.3	0.0	66.7	6.7	60	50	.000**
Sweating/ Diaphoresis	73.3	13.3	66.7	6.7	60	50	.000**
Sighing	26.7	6.7	23.3	0.0	36.7	33.3	.000**
Pale skin	80%	6.7%	66.7	6.7	66.7	46.7	.000**

Highly significant P< 0.001**

Significant P <0.05*

Table (6): Percentage distribution of the studied children in groups of the study according to their fear level at pre- and post- technique implementation (n = 90).

Items	Leg crossing group (n=30)		Hand griping group (n=30)		Control group (n=30)		Friedman test	
	Pre	Post	Pre	Post	Pre	Post	X ²	P value
No fear	(0.0)	66.7	(0.0)	60	(0.0)	6.7	26.34	.000**
Mild fear	6.7	23.3	10	26.7	6.7	16.7		
Moderate fear	16.7	10	23.3	13.3	26.7	16.7		
Severe fear	30	(0.0)	26.7	(0.0)	26.6	26.6		
Extremely fearful	46.6	(0.0)	40	(0.0)	40	33.3		



Figure (1): Distribution of the studied children according to their satisfaction level with the effect of hand gripping technique on reducing vasovagal symptoms associated with vein puncture (n = 30).

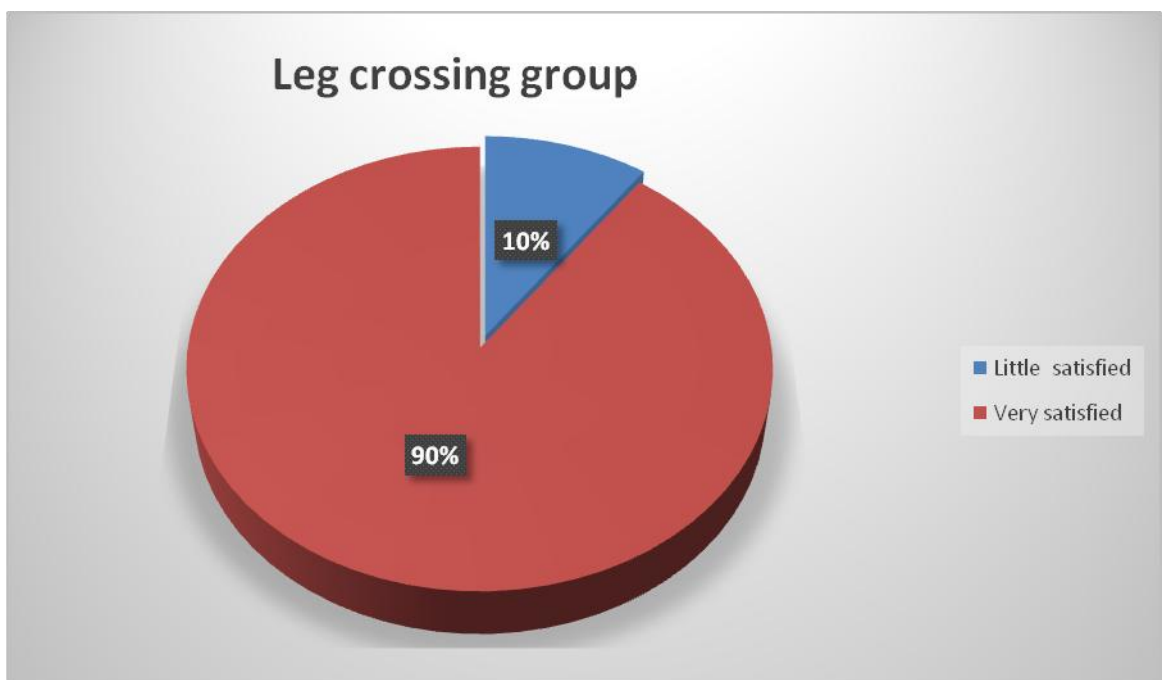


Figure (2): Distribution of the studied children according to their satisfaction level with the effect of leg crossing technique on reducing vasovagal symptoms associated with vein puncture (n = 30).

Discussion:

According to characteristics of the studied children, the current study revealed that, age of half and more of the studied children was ranged from 8-<10 years ($\bar{x} \pm S.D$ 10.7 \pm 2.34, 10.4 \pm 3.60 and 11.3 \pm 2.91). Also, around two thirds of them were males. Moreover, around two thirds of them were at primary.

These findings were in an agreement with **Fathalla & Ghoneim, (2018)** who conducted a study about “Leg crossing and hand-gripping interventions: it's effect on reducing of vasovagal symptoms associated with vein puncture in pediatric patients” who reported that the majority of children were school aged ($\bar{x} \pm S.D$ 12.32 \pm 4.68). But not similar as regard gender of the studied children, as they revealed that the majority of children were females.

As regards residence of the studied children, the result of the present study illustrated that, half and more of the studied children living in urban areas. This finding was in an accordance with **Hassanein & Deif, (2020)** who conducted a study about “Effect of customized venipuncture nursing technique on selected responses and insertion difficulty among patients with blood disorders” and reported that 56.7 % of them were living in urban areas.

The finding of the present study indicated that, there was no significant difference between all medical data of the studied children ($p=>0.05$). Where, around half of the studied children had pneumonia. This finding was in the same line with **Alizadeh et al., (2016)** who conduct study about “The role of acute physical maneuver in preventing vasovagal syncope: a randomized clinical trial” and reported hospitalized children had respiratory problems.

The finding of the present study indicated that, there was no significant difference between all medical data of the studied children ($p=>0.05$) related to vein puncture. Most of them had vein puncture at hand for intravenous cannulation. From point of view of the researcher this might be due to the hand is most practicable site for intravenous cannulation.

This study finding was supported by **Fathalla & Ghoneim, (2018)** who reported that the most frequently punctured site was forearm veins. And concerning to type of vein access, peripheral intravenous cannulation was the most frequent type of vein access in the three groups.

According to problems associated with vein puncture the result of the current study reported that about one thirds and more of the studied children had pain at the puncture site . This finding was in contrast with **Galena, (2015)** who conduct study about “Complications occurring from diagnostic venipuncture” and reported that minor bruising and hematoma were fairly common, involving 12.3% of vein punctures, with minor bruising being the most common reaction.

As well as, this study finding agreed with **Português, (2021)** who conduct study about “Peripheral venipuncture: comprehension and evaluation of nursing practices” and reported there were no serious local reactions such as cellulitis or phlebitis observed the following complications and their respective incidences were documented in children with peripheral venous catheters: phlebitis (22.2%), obstruction (27.7%), fluid exiting through insertion site (36.1%), infiltration (38.8%) and accidental catheter removal (47.2%). Catheter obstruction with an incidence of 22.2% was only observed in those who used

the peripherally inserted central venous catheter.

The findings of the present study showed that, there was highly significant difference between leg crossing group, griping group and control group related to all physiological measurements immediately before and after vein puncture ($p < 0.01$). As evidence, the heart rate, respiration and blood pressure were in normal ranges in children in leg crossing group and hand griping group post vein puncture as compared to control group. From the researcher point of view this might be due to that leg crossing technique considered effective strategy during vein puncture.

These study findings contradicted with **Adlakha et al., (2018)** who conducted a study about “Association between baseline blood pressures, heart rates, and vasovagal syncope in children and adolescents” and who reported that there were no significant differences between cases and controls related to systolic blood pressure ($p = 0.003$)

The findings of the present study showed that, there was highly significant difference between leg crossing group, hand griping group and control group related to total vasovagal signs and symptoms associated with vein puncture pre and post technique ($p < 0.01$). Children in leg crossing group exhibited less frequent vasovagal symptoms on post technique than control group. On the other hand, had griping group exhibited less frequent vasovagal symptoms on post technique than control group.

These study findings were consistent with **Fathalla & Ghoneim, (2018)** who illustrated a comparison of vasovagal symptoms among leg crossing, hand griping and routine care groups. It was obvious that children in leg-crossing group exhibited less frequent vasovagal symptoms during vein puncture

than control group (dizziness= 16%, pallor= 12%, bradycardia= 32%, hypotension= 32%, nausea= 8%, abdominal discomfort= 4%, sweating= 16%, seeing black dots= 48% and blurred vision= 20%). On the other hand, hand gripping group exhibited less frequent vasovagal symptoms during vein puncture (bradycardia= 40%, hypotension= 40% and sweating= 20%). In addition, there were statistically significant differences between children in leg-crossing, and control groups regarding vasovagal symptoms (dizziness, pallor, bradycardia, hypotension, nausea, abdominal discomfort, sweating, seeing black dots and blurred vision: p value < 0.001).

The results of the present study showed that, there was highly significant difference between leg crossing group, griping group and control group related to total fear level pre- and post- technique at ($p < 0.01$). there was highly significant difference between leg crossing group, griping group and control group related to total fear level pre- and post-technique at ($p < 0.01$). As regard, children in all groups of the study had a high fear level in pre technique, while children in leg crossing and hand griping group had lower fear level than children in control group pot technique .From the researcher point of view this might be duo to effect of hand griping and leg crossing techniques help children to be more relaxed and decreasing fear during vein puncture.

These results agreed with **Petronella, (2017)** who conduct a study in “Comparison of children's venipuncture fear and pain: randomized controlled trial of mela and j-tip needleless injection system” and reported that the procedural pain scores were significantly lower in the EMLA group (local anesthetic) (mean score $1.63 + 1.659$) vs. the J-Tip group (Needleless Injection) (2.99 ± 2.586 ; $p < 0.001$). Post-procedure fear scores were

significantly lower than pre-procedure fear scores in both treatment groups ($p < 0.002$), but there was no difference in fear scores between the two treatment groups ($p = 0.314$).

The result of the present study revealed that the entire hand gripping group very satisfied about hand-gripping technique helps to prevent fainting and help to reduce pain during vein puncture, respectively. Also, all of them very satisfied about steps of hand -gripping technique was easy to perform and hand-gripping technique helps to reduce pain during vein puncture, respectively. From the researcher point of view this might be due to hand gripping technique was simple, easy to perform and more effective technique in decreasing vasovagal signs and symptoms associated with vein puncture.

This finding was supported by **Vimala et al, (2018)** who conduct study entitled “Effect of leg crossing and muscle tensing technique on pain among children undergoing vein puncture” and reported that approximately, majority of children were satisfied with the effect of the hand-gripping (83%) techniques in reducing the vasovagal symptoms.

The result of the present study showed that, all of the leg crossing group very satisfied about steps of leg crossing technique was easy to perform and can repeat vein puncture again with hand gripping technique, respectively. Also, the majority of them very satisfied about leg crossing technique helps to prevent fainting and their health conditions after vein puncture were excellent with leg crossing technique, respectively.

This finding was supported by **McIntyre et al., (2018)** they reported approximately, all children were satisfied of the effect of the leg-crossing (90%) techniques in reducing the vasovagal symptoms.

Conclusion:

Leg crossing and hand gripping techniques were associated with decrease in vasovagal symptoms of children undergoing vein puncture and experienced fewer numbers of vasovagal symptoms as compared to children in control group. Children in intervention groups were satisfied with the implemented techniques for its effect on reducing vasovagal symptoms associated with vein puncture.

Recommendation:

- Leg crossing and hand gripping techniques can be integrated as a part of routine daily care for children who had a past history of vasovagal symptoms during vein puncture.
- In-service nursing educational training programs about a leg crossing and hand gripping techniques for children undergoing vein puncture.
- Further studies are highly suggested including a larger sample size.
- Suggest non pharmacological interventions namely leg crossing and hand gripping techniques to reduce child pain and fear.
- Close supervision of the children pre/post vein puncture for vasovagal signs and symptoms.

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