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A QUASI EXPERIMENTAL STUDY TO ASSESS THE EFFECTIVENESS OF ICE APPLICATION ON PAIN PERCEPTION OF PATIENTS UNDERGOING PERIPHERAL VENOUS CATHETERIZATION IN SELECTED HOSPITALS AT JALANDHAR, PUNJAB, 2019.

Meha, M.Sc(N)

LALA LAJPAT RAI INSTITUTE OF NURSING EDUCATION GULAB DEVI HOSPITAL, JALANDHAR, PUNJAB (INDIA)

ABSTRACT

Background : Pain is referred as fifth vital sign. Peripheral venous catheterization is an everyday practice in hospitals, which many patients find painful and can be a terrifying and painful experience for them. Ice pack application is the one of the simplest, safest, effective and most widely used technique to reduce pain.

Aim: The study was conducted with an objective to determine the effectiveness of ice application on pain perception of patients undergoing peripheral venous catheterization.

Methodology : The study was conducted on conveniently selected 60 sample of patients having age group of 17-60 years undergoing peripheral venous catheterization of Civil Hospital, Oxford Hospital, Satyam Hospital, Gulab Devi Hospital, Jalandhar, Punjab. Data was collected by socio-demographic variables and Wong- Baker FACES Pain Rating Scale. Collected data was analyzed by descriptive and inferential statistics. Tables and Bar diagrams were used to depict the findings.

Results : The study finding revealed that post test mean level of pain score in control group and experimental group was 50.67 and 34 respectively.

The mean difference of post test level of pain score in control group and experimental group was 16.67 and tcal 2.6153 > t_{tab} 1.96 So difference between mean post test level of pain among patients undergoing peripheral venous catheterization in the control and experimental group was statistically significant at $p<0.05$ level.

Conclusion : Since the study showed that the ice application had significant impact on pain perception of patients undergoing peripheral venous catheterization in experimental group so there is a need to use an ice application in reducing procedural pain

Key Words: - Effectiveness, Ice Application, Pain Perception, Peripheral Venous catheterization.

INTRODUCTION

"An ounce of prevention is worth a pound of cure"

-Gregory Y

The history of intravenous therapy began in 1628 with the discovery by Sir Williams Harvey. The first practical application was by Dr. Thomas Latta, who used infusion of saline to treat the intractable diarrhoea. Approximately 90% of patients in acute care setting receive some form of intravenous infusion therapy.

The intravenous infusion is an important aspect of therapy under both medical and surgical conditions. Physiologic homeostasis within the body requires the presence of an adequate supply of fluids. Their imbalances may result from many factors like injury, surgery and different kinds of medical illnesses. These imbalances can be corrected by intravenous therapy. Intravenous therapy has become a lifesaving as well as life sustaining therapy and the intravenous therapy is increasingly being performed by nursing staff in hospitals. So, starting intravenous infusion is more challenging skills in nursing. [1]

Administering drugs by the intravenous route has advantages. Often the nurse uses the intravenous route in emergencies when a fast acting drug must be delivered quickly. The intravenous route is also best when constant therapeutic blood levels must be established. Some medications are highly alkaline and irritating to muscles and subcutaneous tissues. These drugs cause less discomfort when given intravenously. [2]

Over a billion peripheral intravenous catheters are inserted each year in hospitalized patients worldwide. Global audit involved 14 hospitals across 13 countries, with 479 patients screened for the presence of a peripheral intravenous catheterization and also founded that 59% of patients had at least 1 peripheral intravenous catheterization in place, and 16% had other types of vascular devices.[3]

Peripheral venous catheterization is the process of puncturing a peripheral vein, with a flexible tube containing a needle, to gain access to the venous system for administering fluids and medications using aseptic technique. Peripheral venous catheters are the most common invasive device inserted in hospitals. Up to 60% of all patients undergoing treatment in a tertiary hospital will have at least one peripheral venous catheterization during their hospital admission (New,2014; Alexandrou, 2015).Previous studies have found that insertion of these devices is associated with a range of negative outcomes, from mild discomfort to extreme pain or anxiety (Halter ,2000; Wright, 2011).[4] Pain is referred as the fifth vital sign. The international Association for the study of pain (IASP) defined pain as "an unpleasant sensory of emotional experience associated with actual or potential tissue damage, or describe in terms of such damage" Pain is a complex perception that has profound affective & cognitive feature .It is a physiological mechanism that protect the individual from a harmful stimulus. It serves as a warning to tissue damage. [5]

The perception of pain is an important component of pain assessment. Clinical and experimental research indicates that pain is perceived, assessed differently depending on a person's sex and age. Compared to men, women report more pain and have a lower pain threshold and tolerance to experimental pain stimuli. [6] Some studies suggest a decrease in sensitivity to experimental pain with age.[7]

Almost every tissue found in the human body contains pain receptors, called nociceptors. It has been estimated that the skin may contain as many as 1,300 nociceptors in one square inch. These nociceptors respond to thermal, chemical, and mechanical stimuli through a-delta, C, and a-beta fibers. The a-delta receptors contain small, myelinated fibres that rapidly transmit acute, sharp pain signals from the peripheral nerves to the spinal cord. C receptors have larger, unmyelinated fibers that transmit pain at a slower rate and are commonly associated with long lasting, burning pain sensation.[8]

During peripheral venous catheter insertion Needle will activate a- delta receptor, causing sharp pain. Non-pharmacological techniques to reduce venipuncture related pain and avoid potential drug side effects are generally less costly and can be performed independently by nurses.[9] A number of non-pharmacological techniques, such as distraction, relaxation, guided imagery, and cutaneous stimulation provide coping strategies that may help reduce pain perception, make pain more tolerable, decrease anxiety and enhance the effectiveness of analgesics. Among these measures, the proper use of cutaneous stimulation can reduce pain perception. Cutaneous stimulation is performed by several methods such as simple rhythmic rubbing, use of pressure or electric vibrators, massage with hand and application of heat or cold at the site before injection, which has been significantly valued in various studies.[10]

Ice application is a treatment of cold temperatures to an injured area of the body or it is the local or general use of low temperatures in medical therapy.

Cold and heat application relieve pain and promote healing. An application of cold is considered to slow the ability of pain fibres to transmit pain impulses. There are many theories and it is possible that a number of the proposed mechanisms in combination can cause pain relief. Some of the possible mechanisms include: A decreased nerve transmission in pain fibres, cold reduces the activity of free nerve endings, cold raises the pain threshold, cold causes a release of endorphins, cold sensations over-ride the pain sensation - known as the pain gate theory.[11]

Patients who are above 16 years of age are capable to recognize the influence of pain and rate the intensity of pain. The most commonly used assessment tool for them is facial expression scales to obtain the self-report of pain. The Wong- Baker FACES Pain rating scale is recommended . Health care presonnels needs to explain each face and the intensity of pain on the scale, and then ask the patient to choose the face that most accurately represents his or her self level of pain.[12]

Nurses have most frequent contact with patient presenting for non emergency illness and injury care and they spend more time with patient in pain than any other health care professionals. It is important to monitor the client closely because prolonged exposure to extreme cold may cause serious injury, stop the cold application immediately if the client complains of numbness or the skin appears white or spotty because cold numbs nerve endings, nurse should give special attention to the application of cold because it can cause frostbite, which can be very serious. Frostbite may require extensive debridement, surgery (including amputation), and/or infections (including gas gangrene), nurse should know when and why cold applications are more beneficial than heat therapies.[13]

Bonnie J. Stevens (2012) conducted a study to assess the pain assessment and intensity in hospitalized patients in Canada. The objective of this study was to determine the nature and frequency of acute pain assessment in Canadian hospitals and factors influencing it. Pain assessment practices and pain intensity scores documented during a 24-hour period were collected from 3,822 patients aged 0 to 18 years hospitalized on 32 inpatient units in 8 Canadian hospitals. The result of the study showed that numerous acute pain assessment measures exist.[14]

In a study conducted by Bastami M, Azadi A, Mayel M (2015) on the use of ice pack for the pain associated with venipuncture. Two interventions that are routine venipuncture without ice massage and venipuncture with ice massaged contra laterally to the site, and venipuncture with ice massaged proximally to the site were tested on 61 eligible candidates. Perception of pain was obtained utilizing a 10cm pain scale. Results indicated that there was significantly less pain reported when ice was applied to the contra lateral site, versus routine venipuncture without ice massage.[15]

A study was conducted by *Ahmed Alalo FM, Sayed Ahmad AE, El Sayed HM (2016)* on 50 school age children for pain assessment. 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 .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.[16]

Considering the anxiety due to painful procedures such as injections as well as the unpleasant feelings the patient get, it was hypothesized that the application of local refrigeration would decrease the pain related to injection procedures.

During clinical experience the researcher felt that patients are often exposed to painful procedures on admission during hospitalization and during follow up visits to hospital .One such common procedure is venipuncture procedure which is painful to patients and done very frequently during hospitalization .

OBJECTIVES

1. To assess the pain response of patients during peripheral venous catheterization in control group.
2. To assess the pain response of patients during peripheral venous catheterization in experimental group.
3. To compare the pain response of patients during peripheral venous catheterization in control and experimental group.
4. To find out the association between the pain response of patients during peripheral venous catheterization with selected socio demographic variables in control and experimental group.

METHODOLOGY

In this study quasi experimental research design (Post-test only control group design) was used to collect the data from 60 patients of age group 17 to 60 years undergoing peripheral venous catheterization admitted in Civil hospital, Oxford Hospital , Gulab Devi hospital, Satyam Hospital , Jalandhar, Punjab and whose pain level was zero before peripheral venous catheterization.
Convenience sampling technique was used to select the sample and Wong- Baker FACES pain rating scale to assess the level of pain during peripheral venous catheterization was used for data collection.Tool was divided into two parts. Part A consist of socio-demographic variables regarding effectiveness of ice application on pain consist of 10 items for obtaining information about selected background factors and Part B consist of Wong Baker FACES pain rating scale. This is a pain scale with a total score of 10.

To ensure the content validity of tool it was submitted to 15 experts (thirteen nursing experts and two doctors) Reliability was calculated by Karl Pearson's Coefficient Correlation (test-retest method). The reliability of Wong- Baker FACES Pain rating Scale was 0.7. Hence, the tool was reliable.

Ethical approval was taken from the ethical committee. Written permission was taken from Medical Superintendent or Senior doctors of selected hospitals. Written informed Consent was taken from each study sample and confidentiality and Anonymity of sample was maintained throughout the study. Written Permission was taken from Wong -Baker FACES Foundation in Oklahoma City, United States.

Data analysis was done by using descriptive and inferential statistics i.e frequency, percentage, mean, mean percentage, and standard deviation, chi square, t-test at 0.05% level of significance. Bar diagrams were used to depict the findings.

RESULTS

Analysis of distribution of sociodemographic variables revealed that in control group majority of respondents 13(43.33%) were in the age group of 17-27(years), 18(60%) female, 27(90%) were Hindu, 25(83.33%) were related to nuclear family, 14(46.67%) who were employed, 22(73.33%) were those whose physical involvement was moderate, 16(53.33%) had no previous experience to venipuncture, 16(53.33%) were those who not known about the pain experience whereas in experimental group majority of respondents 11(36.67%) were in age group of 39-49(years) ,18(60%) were female, 11(36.67%)were come under primary education, 23(76.67%) were Hindu, 19(63.33%) were from nuclear family, 12(40%) who were employed and self employed, 11(36.67%) were those whose physical involvement was moderate and heavy, 16(53.33%) had previous experience to venipuncture, 16(53.33%) were those whose level of pain experience was not known.

Table 1

Comparison of pain response of patients undergoing peripheral venous catheterization in control and experimental group.

N = 60

Pain Score	Group			
	Control group		Experimental group	
	N	%	n	%
Mild (0-2)	02	6.67	15	50
Moderate (4-6)	19	63.33	12	40
Severe (8-10)	09	30	03	10

Table 1 depicted that in control group majority of 19 (63.33%) experienced moderate pain followed by 9 (30%)experienced severe pain and 2(6.67) experienced mild pain during peripheral venous catheterization, whereas in experimental group majority of 15 (50%) experienced mild pain followed by 12 (40%)experienced moderate pain and 3(10) experienced severe pain during peripheral venous catheterization.

Table 2

Comparison of pain response of patients undergoing peripheral venous catheterization in control and experimental group.

Pain Score	Group			
	Control group		Experimental group	
	n	%	n	%
Mild (0-2)	02	6.67	15	50
Moderate (4-6)	19	63.33	12	40
Severe (8-10)	09	30	03	10

N = 60

Table 2 depicted that in control group majority of 19 (63.33%) experienced moderate pain followed by 9 (30%)experienced severe pain and 2(6.67) experienced mild pain during peripheral venous catheterization, whereas in experimental group majority of 15 (50%) experienced mild pain followed by 12 (40%)experienced moderate pain and 3(10) experienced severe pain during peripheral venous catheterization.

Table – 3

Comparison of pain response of patients undergoing peripheral venous catheterization in control and experimental group according to mean score.

Group	n	Mean	SD	Mean difference	df	't'- value
Control Group	30	50.67	33.39			
				16.67	58	2.6153*
Experimental Group	30	34	10.198			

Maximum score= 10

*Significant at p<0.05 level

Minimum score= 00

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Table 3 : Illicited the comparison of level of pain response undergoing peripheral venous catheterization among control and experimental group. It revealed that among Peripheral catheterized patients, the mean control group score was 50.67 with the standard deviation 33.39 and the mean experimental group score was 34 with the standard deviation 10.19. The calculated mean difference was 16.67 and the obtained't' value 2.615 was significant at $p<0.05$ level. Hence the research hypothesis (H_1) was accepted and null hypothesis (H_0) was rejected there was significant (tcal 2.6153 > t_{tab} 1.96 at $p<0.05$) difference between mean post test level of pain among Patients undergoing peripheral venous catheterization in the experimental (34±10.198) and control group ((50.67±33.39). Thus it was concluded that the ice application is effective on pain perception of patients undergoing peripheral venous catheterization.

Table -4

Association between level of pain response undergoing peripheral venous catheterization and selected socio-demographic variables in the control and experimental .

N= 60

Socio demographic variables	Pain Response															
	Control group								Experimental group							
	Mild		Moderate		Severe		χ2	df	Mild		Moderate		Severe		χ2	df
	N	%	n	%	n	%			n	%	n	%	n	%		
1. Age (in years)																
a) 17-27	02	6.67	06	20	05	16.67	14.63*	6	03	10	04	13.33	00	00	4.49 NS	6
b) 28-38	00	00	07	23.33	02	6.67			04	13.33	04	13.33	01	3.33		
c) 39-49	03	10	00	00	01	3.33			06	20	04	13.33	01	3.33		
d) 50-60	00	00	02	6.67	02	6.67			02	6.67	00	00	01	3.33		
2. Gender																
a) Male	00	00	09	30	03	10	1.93 NS	2	02	6.67	09	30	01	3.33	8.54 *	2
b) Female	02	6.67	10	33.33	06	20			12	40	04	13.33	02	6.67		

3. Educational status																
a) Illiterate	00	00	00	00	01	3.33	2.99^{NS}	6	00	0	01	3.33	01	3.33	5.95^{NS}	6
b) Primary education	00	00	03	10	01	3.33			05	16.67	05	16.67	01	3.33		
c) Senior secondary education	01	3.33	06	20	03	10			04	13.33	02	6.67	01	3.33		
d) Graduate and above	01	3.33	10	33.33	04	13.33			05	16.67	05	16.67	00	00		
4. Religion																
a) Hindu	02	6.67	16	53.33	09	30	1.93^{NS}	2	11	36.67	09	30	03	10	1.99^{NS}	4
b) Sikh	00	00	03	10	00	00			03	10	03	10	00	00		
c) Muslim	00	00	00	00	00	00			01	3.33	00	00	00	00		
d) Christian	00	00	00	00	00	00			00	00	00	00	00	00		
5. Type of family																
a) Nuclear	01	3.33	15	50	09	30	3.00^{NS}	2	10	33.33	06	20	03	10	4.20^{NS}	4
b) Joint	00	00	05	16.67	00	00			04	6.67	06	20	00	00		
c) Single parent family	00	00	00	00	00	00			01	3.33	00	00	00	00		
6. Residence																
a) Urban	01	3.33	08	26.67	04	13.33	0.052^{NS}	2	07	23.33	10	33.33	01	3.33	7.02*	2
b) Rural	01	3.33	11	36.37	05	16.67			09	30	01	3.33	02	6.66		
7. Occupation																
a) Employed	02	6.67	10	33.33	02	6.67	6.73^{NS}	4	05	16.67	05	16.67	02	6.67	2.42^{NS}	4
b) Self employed	00	0	04	13.33	01	3.33			07	23.33	05	16.67	00	00		

c) Unemployed	00	0	05	16.67	06	20			03	10	02	6.67	01	3.33		
8. Extent of physical involvement in occupation																
a) Sedentary	02	6.67	01	3.33	02	6.67	13.29*	4	08	26.67	00	00	00	0	11.90*	4
b) Moderate	00	00	15	50	07	23.33			03	10	07	23.33	01	3.33		
c) Heavy	00	00	03	10	00	00			04	13.33	05	16.67	02	6.67		
9. Previous experience to venipuncture																
a) Yes	00	00	08	26.67	06	20	3.35^{NS}	2	03	10	11	36.67	02	6.67	13.99*	2
b) No	02	6.67	11	36.67	03	10			12	40	01	3.33	01	3.33		
10. Level of pain experience during previous venipuncture																
a) Mild	00	00	01	3.33	00	00	15.99*	6	00	0	01	3.33	00	00	6.47	6
b) Moderate	00	00	06	20	00	00			01	3.33	04	13.33	01	3.33		
c) Severe	00	00	01	3.33	06	20			05	16.67	01	3.33	01	3.33		
d) Not known	02	6.67	11	36.67	03	10			09	30	06	20	01	3.33		

As per association between post test level of pain score in both control and experimental group with selected socio-demographic variables ,there was statistically significant association between age, extent of physical involvement in occupation, level of pain experience during previous

venipuncture ,whereas in experimental group there was statistically significant association between gender, residence, extent of physical involvement in occupation, previous experience to venipuncture.

CONCLUSION

The main conclusion drawn from the present study in most of the peripheral venous catheterized patients had mild pain in experimental group and moderate in control group and the research hypothesis of the study was accepted this showed that the ice application was effective on reducing pain perception of patients age group 17-60 years undergoing peripheral venous catheterization.

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