



AN EXPERIMENTAL STUDY TO ASSESS THE EFFECTIVENESS OF THERMOMECHANICAL STIMULATION DURING VENIPUNCTURE ON PAIN & ANXIETY AMONG THE PAEDIATRIC POPULATION 8-14 YEARS OF AGE IN SELECTED GOVT HOSPITAL RAIPUR.

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ABSTRACT

Introduction: Pain is a distressing feeling often caused by intense or damaging stimuli..Procedures that require a needle stick are among the most common procedures for paediatric patients in the health care setting and are a source of pain. Venipuncture which is a needle-procedure, including vascular access and setting up of intravenous cannulation, was reported to be one of the most common source of pain (Linhares et al., 2012), The pain that accompanies these procedures may induce anxiety in both paediatric age groups. Though impressive pain reduction was observed when cold and vibration were combined (thermomechanical stimulation), the two have not been used in conjunction in a clinical setting until recently.Aims: To evaluate the effectiveness of thermo mechanical stimulation (cold & buzzy device) during venipuncture on pain & anxiety among paediatric population 8-14 years of age. **Materials and methods:** A true experimental research design post test only design is utilized to achieve the stated objectives.the conceptual framework of the study was based on roys adaptation with gate control theory of pain .A systemic random sampling was used to select the samples(n=60)(experimental group=30:control group=30) in which theage group is 8-14 yrs .the tools were used in this study is socio demographic variables, wongs baker pain scale and child fear scale used to assess the pain and anxiety during veinpuncture. **Results:** Data analysis was done by using descriptive statistics (Mean, Median ,standard deviation, Mean percentage , t test ,coefficient of variance) and Inferential statistics (Chi- square test). Result of data was analysed by an unpaired “t” test which reveals that the post , test pain score (X= 1.13, SD=0.68) in experimental group and in control group (X=4.07, SD=0.74,df=58) and obtained “t” value is 16.02 { Highly significant} and table value is 2.00 whereas, post test anxiety score was (X=4.07, SD=0.74,df=58) in experimental group and in control group (X=3.37 ,SD=0.49) and obtained “t” value is 15.12 {highly significant} and table value is 2.00 at the level of 0.05 level of significance .The calculated value is more then tabulated value so research hypothesis is accepted and null hypothesis is rejected. **Conclusion:** The findings reveals that there is significant reducing pain and anxiety during veinpuncture after administering thermomechanical stimulation via buzzy.

Key words: Effectiveness Thermo Mechanical Stimulation, Pain, Anxiety, Venipuncture, Pediatric Population.

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INTRODUCTION:

Pain is a distressing feeling often caused by intense or damaging stimuli. The word pain is derived from the latin word ‘poena’ which means punishment, which in turn derived from the Sanskrit root ‘pu’ meaning

purification. The International Association for the Study of Pain's 2006 widely used definition defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage", Procedures that require a needle



stick are among the most common procedures for paediatric patients in the health care setting and are a source of pain. Venipuncture which is a needle-procedure, including vascular access and setting up of intravenous cannulation, was reported to be one of the most common source of pain, and ranked within the top three most painful procedures by children in hospitals [1]. The pain that accompanies these procedures may induce anxiety in both paediatric and adult patients with significant consequences. Trypanophobia is estimated to affect approximately 10%–20% of the population. While it is believed that a majority of needle phobia is due to genetic factors and the experience of vasovagal reflexes, the remaining 30% are considered classic phobias arising due to traumatic experiences, particularly during paediatric venipunctures in which the patient perceives that medical personnel completed procedures without any effort to relieve pain or anxiety).

In [2], reported an interesting phenomenon: the research group induced pain in healthy research subjects using electrical stimulation in order to test whether common maneuvers such as vibration, massage, warming, or cooling would affect subjects' pain experience [2]. Vibration provided the most effective response on its own, however, a combination of vibration and cooling provided the most potent analgesic effect of those investigated, at times completely inhibiting moderate pain. Though impressive pain reduction was observed when cold and vibration were combined (thermomechanical stimulation), the two have not been used in conjunction in a clinical setting until recently.

The Thermo mechanical stimulation device, a vibrating motor with ice pack, combines multiple approaches by supplying cold analgesia, tactile stimulation, and distraction. Thermo mechanical stimulation is thought to provide pain relief via gate control theory, by stimulating nerves with cold to “close” the fast pain gate. It is hypothesized that by simultaneously stimulating A β mechanoreceptors with vibration, one can also close the fast pain gate via presynaptic inhibition at the dorsal horn; the combination of the two would provide optimal pain relief [3]. Pilot data in adults demonstrated greater pain relief using Thermo mechanical stimulation compared to vapocoolant sprays [4]. Similarly, studies investigating the use of this device in paediatric populations have also demonstrated superior pain relief in children while confirming the feasibility of its use in a fast-paced care setting [5].

OBJECTIVES

- To evaluate the effectiveness of thermo mechanical stimulation during venipuncture on pain & anxiety among paediatric population 8-14 years of age in experimental group.

- To assess the pain & anxiety during venipuncture among paediatric population 8-14 years of age in Control group.
- To find out association between the Thermo-mechanical stimulation and pain among selected demographic variables.
- To find out association between the Thermo-mechanical stimulation and anxiety among selected demographic variables.

HYPOTHESIS

Hypothesis were tested at $p < 0.05$ level of significance.

- Hypothesis 1: The mean post interventional pain & anxiety score of paediatric population 8-14 years of age in experimental group would be significantly lower than control group.

Hypothesis 2:

There is a significant association between the Thermo-mechanical stimulation and pain & anxiety among selected demographic variables.

OPERATIONAL DEFINITION

Assess:- In this study, assess refers to determining the effectiveness of Thermo mechanical stimulation during Venipuncture on pain & anxiety among the paediatric population 8-14 years of ages.

Effectiveness:- In this study it refers to the extent to which the planned intervention has achieved desired results in terms of reducing pain among paediatric population during venipuncture.

Thermo mechanical stimulation:- A integration of vibration and cold via buzzy It is a reusable, battery powered plastic vibrating motor resemble a bee or ladybug that combines cold and vibration using a thin (disposable or reusable) ice pack (wings).

Venipuncture:- Venipuncture which is a needle-procedure, including vascular access and setting up of intravenous cannulation, was reported to be one of the most common source of pain, and ranked within the top three most painful procedures by children in hospitals.

Pain:- “an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in term of such damage” suggested by the International Association for the Study of Pain (IASP) [6].

Anxiety:- In this study Anxiety is a uncomfortable feeling of nervousness or worry about the Venipuncture procedure among paediatric population 8-14 years of age.

MATERIALS AND METHODS:

Research design and setting: Quantitative experimental research approach was adopted & A true experimental research design adopted for this study. This study was design to assess the effectiveness of Thermomechanical stimulation during venipuncture on



pain & anxiety among the paediatric population 8-14 years of age in selected Govt Hospital Raipur.

Sample size:

The sample for the present study is (n=60)(experimental group=30:control group=30) paediatric population who scheduled for venipuncture selected Govt Hospital Raipur (C.G.) and who had agreed to participate in the study.

Sampling technique:

In the present study the probability systematic random sampling technique was used to the study more particulars and feasible

Description of tools and techniques

Tools are the instruments used by the researcher to collect the data. It should serves as an appropriate means to collect or measure what the investigators actually wants to get.

Section I: Socio Demographic Variables

It consist of socio demographic variables like age, gender, diagnosis, area of residence, history of previous hospitalization, previous experience of venipuncture, presence of care givers during vein puncture and number of prick.

Section-II Discription of Thermomechanical Stimulation

It consist of description of device used for evaluate the effectiveness of thermo mechanical stimulation during venipuncture on pain & anxiety among paediatric population. Thermo – mechanical stimulation is a integration of vibration and cold via buzzy. It is a hand held device that naturally and quickly minimizes sharp pain from needle sticks like IV starts, blood draws, finger pricks and immunizations, through a combination of vibration and ice methods. Buzzy is a bee shaped, palm sized pain relief device that uses cold ice wings and vibration to help reduce pain for children by sensitizing nerves.

Section III: Assessment of level of pain.

The Wong-Baker Faces Pain Rating Scale (styled Wong-Baker FACES Pain Rating Scale) is a pain scale that was developed by Donna Wong and Connie Baker. The scale shows a series of faces ranging from a happy face at 0 which represents "no hurt" to a crying face at 5 which represents "hurts worst." Based on the faces and descriptions, the patient chooses the face that best describes their level of pain.

Section IV: Assessment of level of Anxiety

Children's Fear Scale is used to assess the level of anxiety In this scale faces are showing different amounts of being scared. This face [point to the left-most face] is not scared

at all, this face is a little bit more scared [point to second face from left], a bit more scared [sweep finger along scale], right up to the most scared possible [Spoint to the last face on the pain).

Stimulation Via Buzzy

A guideline for using theromechanical stimulation via buzzy developed for the children. It is a hand held device that naturally and quickly minimizes sharp pain from needle sticks like IV starts, blood draws, finger pricks and immunizations, through a combination of vibration, ice and distraction methods. Buzzy is a bee shaped, palm sized pain relief device that uses cold ice wings and vibration to help reduce pain for children by sensitizing nerves. This is done as the A- beta and C nerve fibers are stimulated by the vibration and cold sensations respectively. This interrupts the transmission of pain. Buzzy also provide distraction before and during procedure and help a child see that he or she can cope with a procedure and make the experience more manageable in the future. Buzzy is FDA approved. The use of cold and vibration to reduce pain is supported by Gate control theory of pain [3]. In this theory cold and vibration stimuli transmit along the same pathway as pain.

How Does Buzzy work?

Uses natural pain relief by confusing your body's own nerves and distracting away from the poke

- This dulls or eliminates the pain
- Works in the same way as:
 - –Rubbing a bumped elbow stops the hurt.
 - –Running water soothes a burn
 - –Putting a hand in ice water lowers pain everywhere else.

IV placement

Apply tourniquet if applicable

- Through Buzzy slot or
- Prior to placing Buzzy
- Place buzzy 2-5 cm proximal to site
- Place wider end of buzzy closest to pain. (Head of buzzy closer to patient's head during procedures)

Venipuncture procedure :-

- Turn on Buzzy atleast 30 sec before procedure.
- Clean site per protocol.
- Leave Buzzy activated until procedure completed.
- Remove Buzzy.
- Clean Buzzy and cold pack and strap with saniwipe.

Data Analysis, Interpretation

Section I:Finding related socio demographic characteristics of the subjects.

Section II:Findings related to level of pain and anxiety during venipuncture among paediatric population 8-14 years of age .

Section III: Finding related to evaluate the effectiveness of thermo mechanical stimulation during



venipuncture on pain & anxiety among paediatric population 8-14 years of age in interventional experimental group.

Section IV: Finding related to association between the Thermo-mechanical stimulation and pain & anxiety among selected demographic variables.

SECTION II: Findings Related To Level Of Pain Of Paediatric Population During Venipuncture Procedure

Table 2 ,fig 13 depicted that 5(16.67%) paediatric population were no hurt , 16(53.33%) were hurts little bit, 9(30%) paediatric population were hurts little more in experimental group and 7(23.33%) paediatric population were hurts little even more, 14(46.67%) were hurts whole lot and 9(30%) paediatric population were hurts worst in control group.

Table No- 3 ,depicted that 5(16.67%) paediatric population were not scared ,17(56.67%) were a little scared , 8(26.67%) paediatric population were a little more scared and 19(63.33%) paediatric population were even more scared and 11(36.67%) were most scared.

SECTION III: Findings Related To Effectiveness Of Thermomechanical Stimulation On Pain & Anxiety Among Paediatric Population During Venipuncture Procedure

Table No- 4 and figure No-16 depicted that in overall analysis of post test score in experimental group of pain mean 1.13, mean % 22.5, SD is 0.68 and Coefficient Variance. Mean of control group is 4.07, mean% 81.4, SD is 0.74 and Coefficient Variance is 18.18. The table value is 3.55 at 0.001 level of significance and calculated value is 16.02., calculated value is more than tabulated value so the mean post interventional pain score of paediatric population 8-14 years of age in experimental group would be significantly lower than control group. So accept the research hypothesis and reject null hypothesis.

Table No-5 depicted that in overall analysis of post test score in experimental group of pain mean 4.07, mean % 81.4 , SD is 0.74 and Coefficient Variance 18.18. Mean of control group is 3.37, mean % 67.4, SD is 0.49 and Coefficient Variance is 14.54. The table value is 3.55 at 0.001 level of significance and calculated value is 15.12, ,calculated value is more than tabulated value so the mean post interventional anxiety score of paediatric population 8-14 years of age in experimental group would be significantly lower than control group. So accept the research hypothesis and reject null hypothesis.

SECTION-IV: Finding Related To Evaluate Association Between Thermo Mechanical Stimulation And Pain & Anxiety During Venipuncture Among Paediatric Population 8-14 Years Of Age.

- The association between thermomechanical stimulation and pain among selected demographic variable in experimental group by using chi square method at the level of 0.05 level of significance
- .The association of post test pain score is significant with presence of care giver (df2, $x^2 = 6.43, p < 0.05$ level). Association of post test pain score with any other demographic variables is not significant in experimental group.
- The association between thermomechanical stimulation and pain among selected demographic variable in control group by using chi square method at the level of 0.05 level of significance .The association of post test pain score is significant with Age (df2, $x^2 = 9.30, p < 0.05$ level) and purpose of venipuncture (df2, $x^2 = 6.31, p < 0.05$ level). Association of post test pain score with any other demographic variables is not significant in control group.
- The association between thermomechanical stimulation and anxiety among selected demographic variable in experimental group by using chi square method at the level of 0.05 level of significance .The association of post test anxiety with presence of care giver was significant (df=2, $x^2 = 6.88, p < 0.05$). The association of post test anxiety score is not significant with any other demographic variables in experimental group.
- The association between thermo mechanical stimulation and anxiety among selected demographic variable in control group by using chi square method at the level of 0.05 level of significance .The association of post test anxiety score is not significant with any demographic variables in control group.

Implication:

The present study has implication for Nursing Education, Nursing Practice, Nursing Administration and Nursing research.

Nursing Education:

The student should be given opportunities during his/her training to plan and conduct health education and counselling for non pharmacological pain management.





Scoring for Pain Rating Scale –

S.NO	CRITERIA	RANGE OF SCORING
1.	No hurt	0
2.	Hurt little bit	1
3.	Hurts little more	2
4.	Hurts even more	3
5.	Hurts whole lot	4
6.	Hurts worst	5

Scoring for modified Child Fear Scale :-

S.NO	CRITERIA	RANGE OF SCORING
1.	Not Scared	0
2.	A little scared	1
3.	A little more scared(one cut /fold on forehead)	2
4.	Even more scared(two cut/fold onforehead)	3
5.	Most scared (three cut/fold onforehead)	4



This section describe the finding related to level of pain and anxiety among paediatric population during venipuncture procedure by using Wong Baker facial scale and Child fear scale using frequency and percentage. These are presented in table-2 & 3.

Level of pain	No Hurt 0	Hurts littlebit(1)	Hurtslittlemore (2)	hurts little even more(3)	Hurts whole lot(4)	Hurtsworst (5)
ExperimentalGroup	5(16.67%)	16(53.33%)	9(30%)	0	0	0
ControlGroup	0	0	0	7(23.33%)	14(46.67%)	9(30%)

Table no-3

Level of anxiety	Not scared (0)	A little scared(1)	A littlemore scared(2)	Even mores scared (3)	Most scared (4)
ExperimentalGroup	5(16.67%)	17(56.67%)	8(26.67%)	0	0
ControlGroup	0	0	0	19(63.33%)	11(36.67%)

Table No- 4

Group	Pain score				df	Unpaired 't' value/Significance
	Mean	Mean%	SD	CV		
Expt Group	1.13	22.6	0.68	60.18	58	16.02/P<0.0001 HS
ControlGroup	4.07	81.4	0.74	18.18		

TABLE- 5

Group	Child Fear score				Df	Unpaired 't' value/Significance
	Mean	Mean%	SD	CV		
Expt	4.07	81.4	0.74	18.18	58	15.12/P<0.0001 HS
Control	3.37	67.4	0.49	14.54		

Nursing Practice:

In this practice area nursing personnel should adopt the thermo mechanical stimulation via buzzy as routine pain management therapy of children for every pain generating procedures in hospital. The Buzzy device is an easy to implement intervention to reduce paediatric pain during vaccination. It may have the greatest impact in younger children but could be offered during all immunizations.

Nursing Administration:

Nurse administrator may plan and organize continuing education programme for all categories of nursing and para professional for updating knowledge about nonpharmacological therapy that relief pain during venipuncture. Nurse administrator make protocol about thermomechanical stimulation via buzzy for improving quality of care in pain management of paediatric population during venipuncture ,immunization.

Nursing Research:

The study may be replicated on a large sample to validate the findings and make generalization. Similar kind of studies can be conducted in different settings and with different target population such as paediatric and elder patients. Many types of interventions have been studied with the goal of reducing paediatric pain during

venipuncture including pharmacologic (EMLA cream), behavioral distractions (music, video games, kaleidoscopes), tactile interventions (stroking, Shot Blocker), sweet solutions for infants (glucose or sucrose), and cold analgesia (vapocoolantsprays), with varying results.

CONCLUSION

The study will be a motivated to beginning researcher to conduct similar studies on the large scale. Similar study may be replicated for larger sample in different setting for making broad generalization. The study concluded that the thermo mechanical stimulation via buzzy is a effective measure in reduction of pain and anxiety during venipuncture in paediatric population. Findings reveals that mean post test pain score is 1.13 in experimental group and 4.07 is control group. The mean post test anxiety score is 4.07 in experimental group and in control group 3.37..Thus the findings reveals that there is significant reducing pain and anxiety during venipuncture after administering thermomechanical stimulation via buzzy.

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