



## “Pre-Immunization Ice Therapy as a Pain Reduction Strategy for Intramuscular Injections in Toddlers”

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*(Received: 16 March 2025*

*Revised: 20 April 2025*

*Accepted: 15 June 2025)*

### KEYWORDS

Pre-immunization,  
Ice therapy, Pain,  
Intra Muscular  
immunization,  
Toddler

### ABSTRACT:

Background of study: Pain is measured to be the most vital problem that essential to be examined by some health care professionals. Pain is 1st experienced during childhood. First indicated in English in 1297, the word peyn arises from the Old French peine, in turn from Latin poena meaning "punishment, penalty" (also meaning "torment, hardship, suffering" in Late Latin) and that from Greek ποινή (poine), usually meaning "price paid, penalty, punishment". The aim of the study is to assess the effectiveness of Ice application prior to Intra Muscular Immunization in reducing pain among toddlers.

Material and Method: A quasi-experimental research design (post-test only with control group) was employed to study toddlers receiving intramuscular immunization. A total of 60 participants were selected using a non-probability, simple convenience sampling technique. Pain levels were assessed using the FLACC scale. Prior to immunization, ice was applied to the injection site in the experimental group

Result: The data gathered were analyzed by descriptive and inferential statistics method and interpretation were made on the basis of the objectives of the study. In the experimental group, the mean pain score was 3.2 with a standard deviation of 0.748, while the control group had a mean score of 8.13 with a standard deviation of 0.825. The calculated t-value was 24.65, indicating a statistically significant difference between the groups at  $p < 0.05$ . Hence the research Hypothesis H1 is accepted, there is a significant difference in pain response during intra muscular immunization among experimental and control group.

Discussion: The study demonstrated that ice thera prior to intramuscular immunization significantly reduced pain among toddlers, with the experimental group showing lower pain scores compared to the control group. This non-pharmacological intervention effectively numbs the injection site, minimizing discomfort. No significant associations were found between demographic variables and pain reduction. Ice application is a simple, safe, and effective method that can enhance comfort during routine pediatric procedures.



## INTRODUCTION

Pain is measured to be the most vital problem that essential to be examined by some health care professionals. Pain is 1st experienced during childhood.<sup>1</sup> First indicated in English in 1297, the word peyn arises from the Old French peine, in turn from Latin poena meaning "punishment, penalty" (also meaning "torment, hardship, suffering" in Late Latin) and that from Greek πωινή (poine), usually meaning "price paid, penalty, punishment".<sup>2</sup> The taxonomy committee of International Association for the Study of Pain (IASP) defines pain as "An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage."<sup>3</sup> The American pain society created the phrase "pain: as the 5th animated signs" to rise awareness of pain assessment between the health care experts specially nurses. The logic is that if pain were evaluated the importance as other vital signs, it would further possible to be treated flawlessly.<sup>4</sup> The pain reaction is separating (subjective) and is knowledgeable through social wisdom and practice; furthermore the experience of pain is fairly difficult. Silkman (2008) defined the multi-dimensional complication of pain in physiological, sensory, behavioural, socio-cultural, cognitive and affective. The physiological dimension includes; the patient opinion of pain & body's response to the provocation. The sensory dimension worries the superiority of the pain and in what way severe the pain is supposed to be. This dimension includes: patient opinion of pain's site, intensity and class. The behavioural dimension mentions to the verbal and nonverbal behavioural that the patient reaction to the pain. The social-cultural dimension concerns the impact of the social framework and cultural contextual arranged the patient pain's practice. The cognitive dimension apprehension 'principles, arrogance, purpose and inspiration connected to pain and its organization. The affective dimension disquiets through emotion and feeling associated to pain experience.<sup>5</sup>

## MATERIAL AND METHOD

The study adopted a quantitative research approach utilizing a quasi-experimental design, specifically a post-test only control group format. A total of 60 toddlers from a selected hospital in Vadodara were included in the study, with participants chosen through a non-probability convenience sampling technique. The independent variable was the application of ice prior to intramuscular immunization.

Pain levels were assessed using the FLACC Scale to evaluate the effectiveness of ice application in reducing pain during intramuscular injections among toddlers attending the Outpatient Department of the selected hospital in Vadodara.

A comprehensive review of relevant literature was conducted to enhance the researcher's understanding of the problem, formulate a conceptual framework, guide the intervention process, and support the analysis of study findings.

The research tool for data collection was organized into three sections and two phases:

- **Phase I** :Included demographic information such as the child's age, gender, religion, prior experiences with intramuscular injections, mother's literacy level, and the child's response to healthcare personnel.
- **Phase II**: Involved the use of the FLACC Scale.

**Section I**: covered the demographic distribution of toddlers in both the experimental and control groups.

**Section II**: assessed the pain responses of toddlers during intramuscular procedures using the FLACC Scale.

**Section III**: explored the association between ice applications with their selected demographic variables in relation to pain reduction.



## RESULTS

**Table – 1:** Distribution of Toddlers by Demographic Variables: Frequency and Percentage Analysis"  
N = 60

Sr.No.	Demographic variable	Experimental & control group	
		Frequency	Percentage (%)
1.	<b>Age of the Child</b>		
	a. 12 - 16 months	10	16.67 %
	b. 17 - 21 months	11	18.33 %
	c. 22 - 26 months	15	25.00 %
	d. 27 - 31 months	14	23.33 %
	e. 31 - 36 months	10	16.67 %
2.	<b>Gender of the Child</b>		
	a. Male	37	61.67 %
	b. Female	23	38.33 %
3.	<b>Religion of Toddlers</b>		
	a. Hindu	39	65.00 %
	b. Muslim	17	28.33 %
	c. Others	4	6.67 %
4.	<b>Child past experience to intra muscular injection</b>		
	a. Yes	60	100.00 %
	b. No	0	0.00 %
5.	<b>Mothers literacy level</b>		
	a. Illiterate	0	0.00 %
	b. Primary Education	14	23.33 %
	c. High School	19	31.67 %
	d. Higher Secondary	24	40.00 %
	e. Graduate and Above	3	5.00 %

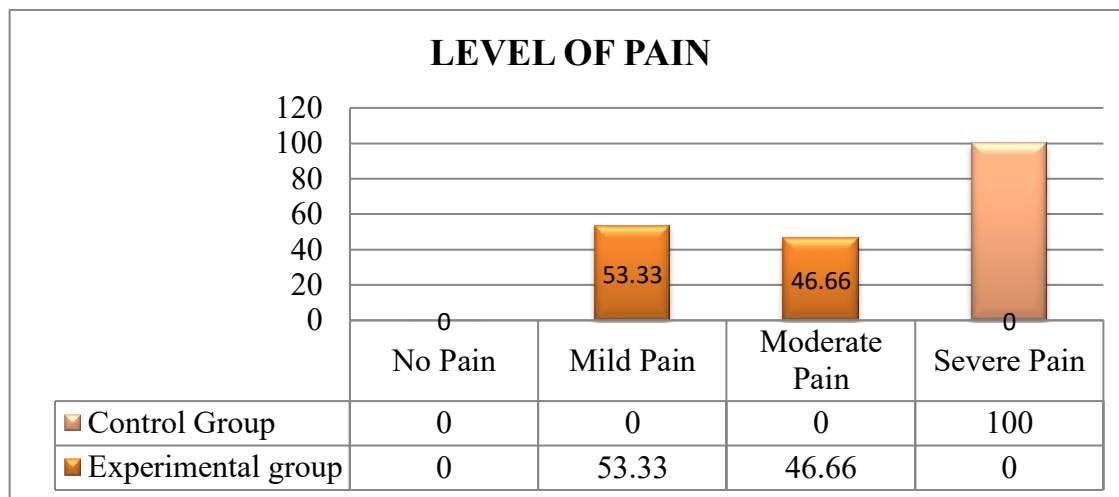


6.	<b>Reaction of child to Health Personnel</b>		
	a. Easily Accept		
	b. Denial		
	c. Crying	5	8.33 %
	d. Fear	11	18.33 %
		29	48.33 %
		15	25.00 %

Table – 1 The demographic analysis reveals that the majority of toddlers (25%) were aged between 22–26 months, with a relatively even distribution across other age groups. A larger proportion of the participants were male (61.67%), and most belonged to the Hindu religion (65%). All toddlers (100%) had prior experience with intramuscular injections. Regarding maternal education,

the highest proportion (40%) of mothers had completed higher secondary education. In terms of toddlers' reactions to healthcare personnel, the most common response was crying (48.33%), followed by fear (25%). These demographic characteristics provide a foundational understanding of the study population and support the contextual relevance of the intervention.

**Table 2:** Pain Levels in Toddlers Receiving Intramuscular Immunization: A Comparison between the Experimental and Control Groups



**Table 2:** It reveals pain score wise distribution of toddlers. In control group out of 30(100%) children according to pain category maximum 30 hurts worst (severe pain) and In Experimental group out of 30(100%) children according to pain category maximum 16(53.33%) had Mild Pain and 14(46.66%) had Moderate pain.

**Table – 2:** effectiveness of ice application on pain response during intramuscular immunization among toddlers

PARAMETERS	GROUP	MEAN	STANDARD DEVIATION	t VALUE	SIGNIFICANCE
Pain level	Experimental	3.2	0.748	24.65	Significance



	Control	8.13	0.825		
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Unpaired t test was performed to check the difference for pain score level among toddlers during immunization between control group and experimental group. It was found that mean pain score level was higher among children from control group (8.13) than experimental group (3.2). Standard deviation in experimental group is 0.748 and in control group is 0.825 with the “t” value is (24.65) which indicate that ice application prior intramuscular immunization reduce pain is effective.

**Table 3: Associations between ice application with their demographic variable**

Variables	Score which falls below the median	Score which falls above the median	Total	X <sup>2</sup>	Df	Level of Significance
<b>Age of Child</b>				5.89	4	NS
12 - 16 months	4	1	5			
17 - 21 months	2	3	5			
22 - 26 months	5	4	9			
27 - 31 months	5	1	6			
31 - 36 months	5	0	5			
<b>TOTAL</b>	<b>21</b>	<b>9</b>	<b>30</b>			
<b>Gender of Child</b>				0.45	1	NS
Male	10	7	17			
Female	6	7	13			
<b>TOTAL</b>	<b>16</b>	<b>14</b>	<b>30</b>			
<b>Religion</b>				9.8	2	NS
Hindu	8	12	20			
Muslim	5	1	6			
Other	3	1	4			
<b>TOTAL</b>	<b>16</b>	<b>14</b>	<b>30</b>			
<b>Mothers literacy level</b>				6.17	4	NS
Illiterate	0	0	0			



Primary Education	4	5	9			
High School	8	2	10			
Higher Secondary	3	7	10			
Graduate and Above	1	0	1			
<b>TOTAL</b>	<b>16</b>	<b>14</b>	<b>30</b>			
<b>Reaction of child to Health Personnel</b>						
Easily Accept	2	1	3	1.27	3	NS
Denial	4	3	7			
Crying	6	8	14			
Fear	4	2	6			
<b>TOTAL</b>	<b>16</b>	<b>14</b>	<b>30</b>			

Table 3 shows that in Experimental group, on considering the Age of child, the chi-square value was 5.89, the table value at degrees of freedom 4 was 9.49. Gender of the child, the chi-square value was 0.45, the table value at degrees of freedom 1 was 3.84. As per Religion the chi-square value was 9.8, at degrees of freedom 2, the table value was 5.99. On considering the mother literacy chi-square value was 6.17 at degrees of freedom 4, the table value was 9.49. As per reaction of child to health personnel the chi-square value was 1.27, at degrees of freedom 5 the table value was 7.82

#### DISCUSSION:

The purpose of this study was to evaluate the effectiveness of ice application in reducing pain during intramuscular immunization among toddlers. The findings of the present study support the hypothesis that the application of ice prior to intramuscular injection

significantly reduces pain intensity in toddlers, as assessed using the FLACC Scale.

The mean pain score of toddlers in the experimental group was significantly lower ( $3.2 \pm 0.748$ ) compared to those in the control group ( $8.13 \pm 0.825$ ), with the unpaired t-test revealing a highly significant difference ( $t = 24.65$ ). These results confirm that ice application is an effective, simple, and low-cost intervention for managing procedural pain in young children.

The results align with previous research and recommendations from pediatric pain management literature, which emphasize the benefits of non-pharmacological interventions, such as cold therapy, in reducing procedural pain. Cold application is known to slow down nerve conduction, reduce inflammation, and provide a numbing effect, all of which contribute to its



analgesic impact during invasive procedures like injections.

Additionally, the demographic analysis revealed no significant association between the effectiveness of ice application and variables such as age, gender, religion, mother's literacy level, or the child's reaction to healthcare personnel. This suggests that ice application can be universally applied across various toddler populations without the need for individualized adjustments based on these characteristics.

Despite its strengths, the study does have certain limitations, including a relatively small sample size and the use of a non-probability convenience sampling method, which may limit the generalizability of the results. Future research with larger, randomized samples and longitudinal designs could provide deeper insights into the long-term benefits and potential drawbacks of cold application during immunizations.

Nevertheless, this study contributes to the growing body of evidence supporting non-pharmacological pain management strategies in pediatric care. It emphasizes the importance of proactive pain assessment and intervention by healthcare professionals, particularly nurses, to enhance the overall experience of young children undergoing routine medical procedures.

## CONCLUSION

The present study clearly demonstrates that the application of ice prior to intramuscular immunization significantly reduces pain in toddlers. Findings from the FLACC Scale indicate that toddlers in the experimental group experienced notably lower pain levels compared to those in the control group, as reflected by a mean pain score of 3.2 versus 8.13, respectively. The statistical analysis using the unpaired t-test confirmed the effectiveness of the intervention with a highly significant t-value of 24.65. Moreover, the study found no significant association between pain reduction and demographic variables such as age, gender, religion, mother's literacy, or the child's reaction to health personnel, indicating that the ice application was broadly effective across various subgroups. This evidence highlights the value of using a simple, non-pharmacological method like ice application to enhance

comfort during routine immunizations, and it supports its integration into pediatric nursing practice.

## CONSENT:

As per international standard or university standard, parents written consent had collected and preserved by the author(s)

## ETHICAL APPROVAL:

The study was approved from ethical committee of sumandeep vidyapeeth institutional ethical committee and ethical approval number is sviec/on/nurs/SRP/21040

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