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EVALUATE THE EFFECTIVENESS OF COLD APPLICATION PRIOR TO INTRAMUSCULAR IMMUNIZATION ON REDUCING PAIN AMONG INFANTS AT CHENNAI.

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ABSTRACT

Introduction: Vaccination to children at the right time so they develop antibodies that provide strong immunity. During Vaccination in infants can cause mild discomfort, such as redness, swelling, and fussiness, which usually resolves within a couple of days. These reactions are common and temporary, but it's important to manage the pain and discomfort for the infant's well-being. Cold application helps in the treating of injury which reduce swelling and pain.

Methodology: This study involved 60 infants, divided into two groups a study group (30 infants) and a control group (30 infants). The study group received cold therapy following vaccination, while pain levels in both groups were measured using the Neonatal Infant Pain Scale (NIPS).

Conclusion: Cold application effectively reduced pain in infants following vaccinations. This simple and easy-to-apply method can help manage discomfort after immunization. Given its effectiveness, healthcare providers should consider incorporating cold therapy as part of pain management strategies during vaccinations to improve the comfort of infants.

INTRODUCTION

Infancy as the period from birth to one year of age, is a critical stage of life during which children are highly vulnerable to infectious diseases due to an immature immune system. Timely immunization is essential to protect infants from preventable diseases that can cause serious illness, long-term complications, or death. Routine immunization schedules recommend several vaccines during infancy, including Hepatitis B (at birth and 1–2 months), DTP (five doses), Haemophilus influenzae type b (Hib) (three or four doses), Pneumococcal Conjugate Vaccine (PCV) (four doses), and Respiratory Syncytial Virus (RSV) vaccine for infants under eight months during the RSV season. These vaccines work by stimulating the

immune system to recognize and fight harmful pathogens, creating immune memory that enables rapid protection upon future exposure.

Delayed immunization increases the risk of vaccine-preventable diseases and exposes infants to infections during their most vulnerable period. Children vaccinated late may not develop adequate immunity before exposure, increasing morbidity, mortality, and disease transmission within the community. Maintaining timely vaccination is therefore crucial for individual protection and herd immunity.

Pain during immunization is one of the most common causes of procedural discomfort in infants and children. Injection-related pain can lead to fear, anxiety, and negative attitudes toward healthcare. Every child has the right to effective pain relief, and nurses play a vital role in minimizing procedural pain while maintaining a positive nurse–patient relationship.

Cold application, also known as cryotherapy, is a simple, safe, and cost-effective non-pharmacological method for reducing pain during immunization. Cold therapy works by decreasing nerve conduction and synaptic activity, numbing the injection site, and reducing inflammation. Applying a cold compress or ice pack wrapped in a cloth to the injection site immediately after vaccination can significantly reduce pain and discomfort.

Common forms of cold application include ice packs, cold compresses, cold water immersion, and cooling gels or sprays. Among these, ice packs and cold compresses are most suitable for use during immunization procedures.

According to the World Health Organization (WHO), in 2023 approximately 84% of infants worldwide received three doses of the DTP vaccine. In India, national full immunization coverage for 2023–2024 reached 93.5%, with significant reductions in the number of zero-dose children as reported by WHO–UNICEF estimates. Despite this progress, addressing pain during immunization remains an important aspect of quality nursing care.

AIM OF THE STUDY

To evaluate the effectiveness of Cold Application prior to Intramuscular Immunization on reducing pain among infants at PMCH & RI, Chennai.

METHODS AND MATERIALS

The study is quantitative research approach to assess the effectiveness of cold application in reducing pain during intramuscular immunization among infants. A true experimental research design was used to establish a cause-and-effect relationship between cold application and pain level. The design included an experimental group and a control group, with both groups undergoing pre-test and post-test assessments of pain. Cold application was administered only to the experimental group, while the control group did not receive any intervention. The study was conducted at Panimalar Medical College Hospital and Research Institute, Poonamallee, Chennai. The target population consisted of infants undergoing intramuscular immunization at the selected hospital. A total of 60 infants aged between 1 and 12 months were selected as samples using a purposive sampling technique based on the availability of infants and the willingness of parents to participate in the study. Cold application during intramuscular immunization was considered the independent variable, while the level of pain experienced by infants was the dependent variable. Data were collected using a structured tool consisting of

two sections. The first section included demographic variables such as age in months, gender, birth order, height, weight, history of illness, position during vaccination, previous experience of cold application, previous intramuscular vaccination, occurrence of fever after immunization, and history of allergic reactions. The second section consisted of the Standardized Neonatal Infant Pain Scale (NIPS), which is a behavioural pain assessment tool used for infants from birth to one year of age. The tool assesses pain based on facial expression, cry, breathing pattern, movement of arms and legs, and state of arousal. Each infant was observed for one minute, and pain scores ranged from 0 to 7, with higher scores indicating greater pain intensity. The collected data were analyzed using both descriptive and inferential statistics. Descriptive statistics such as mean and standard deviation were used to summarize the data, while inferential statistics including the independent t-test and Chi-square test were used to test the study hypotheses and determine the effectiveness of cold application in reducing pain during intramuscular immunization among infants.

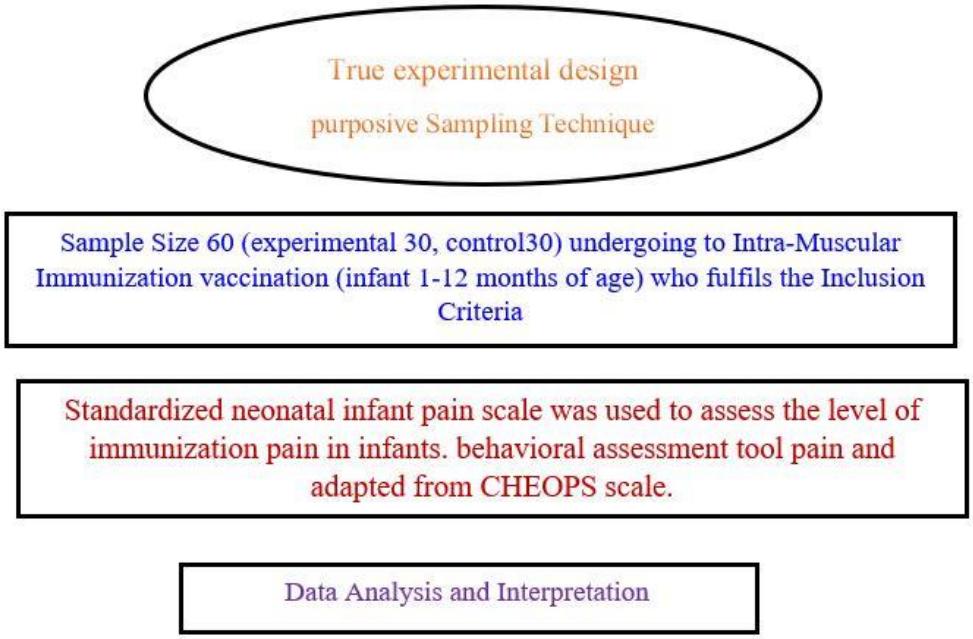

Fig.1 Flow diagram of methodology

STATISTICAL ANALYSIS

Table 2. Analysis of Demographic Variables

Frequency, Percentage Distribution of demographic Variables among the infants receiving intramuscular vaccination in the study and the control group. (N=60)

Variables	Study group (N=30)	Control group (N=30)

	N	%	N	%
Age in months				
1-4 months	11	37	9	30
5-8 months	12	40	14	47
9-12 months	7	23	7	23
Gender				
Male	21	70	17	57
Female	9	30	13	43
Birth order of infant				
First born	18	60	21	57
Second born	11	36	9	43
Third born	1	3	0	0
Height of the infant (cm)				
53.7-54.7cm	12	40	9	30
65.7-67.6 cm	15	43	16	53
74-75.7 cm	3	17	5	17
Weight of the infant (kg)				
3.3 -6.2 kg	11	37	12	40
6.2-9.5 kg	13	43	16	53
9.5-11.3 kg	6	20	2	7
Previous history of illness				
Yes	0	0	0	0
No	30	100	30	100
Position during IM Vaccination				

Cuddle position	18	61	13	37
Lap position	5	16	11	30
Cradled in the arms	7	23	6	33
Previous experience of cold application on IM vaccine				
Yes	0	0	0	0
No	30	100	30	100

Table-2 Frequency, Percentage Distribution of pain among the infants receiving intramuscular vaccination in the study and control Group

(N=60)

Pain	**Study group**		**Control group**	
	N	**%**	**N**	**%**
No pain	-	-	-	-
Mild pain	19	67	7	21
Moderate pain	10	30	13	46
Sever pain	1	3	10	33

Above Table presents the frequency and percentage distribution of levels of pain, study group with the majority demonstrating no pain 0 (0%), mild pain 19(67%), moderate pain 10(30%) and sever pain 1(3%) and control group of no pain 0 (0%), mild pain 7(21%), moderate pain 13(46%) and sever pain 10(33%). Therefore the intervention played the vital role in the study group when compared with the control group.

Comparison the pain score among the infants receiving intramuscular vaccination in the study and control Group

(N=60)

Variables	Study group (n=30)		Control group (n=30)		Mean difference	Paired t-test p value
	Mean	SD	Mean	SD	-0.74	3.95
Pain	2.36	0.55	3.1	0.75		0.001**

p<0.005 level

The tables 3 represent the difference between the mean and standard deviation of Study group and control group of level of pain. It shows that the mean score of level of pain in study group is 2.36 and in control group 3.1 and the standard deviation score in 0.55 and in post-test 0.75. The mean difference of -0.74. T test value was 3.95 and it is statistically significant at p<0.005 level. This infers that the mean score decreases as the pain in the study group and in control group as the mean score increases the pain it indicate the cold application is effective.

Association of pain with the demographic variables among the infants receiving intramuscular vaccination in the study Group

(N=30)

Variables	Study group (n=30)			Chi - square & p value
	Mild pain	Moderate pain	Sever pain	
Age in months				χ^2 = 5.29 0.25
1-4 months	7	3	1	
5-8 months	10	2	0	
9-12 months	3	4	0	
Gender				χ^2 = 4.18 0.12
Male	16	5	0	
Female	7	1	1	
Birth order of infant				χ^2 = 9.68 0.04*
First born	15	2	1	
Second born	4	7	0	
Third born	1	0	0	
Height of the infant (cm)				χ^2 = 5.25 0.26
53.7-54.7cm	8	4	1	
65.7-67.6 cm	11	2	0	
74-75.7 cm	3	1	0	
Weight of the infant (kg)				χ^2 = 7.01

3.3 -6.2 kg	7	3	1	0.01*
6.2-9.5 kg	11	2	0	
9.5-11.3 kg	2	4	0	
Previous history of illness				
Yes	-	-	-	-
No	23	7	0	
Position during IM Vaccination				χ^{2} = 1.47 0.83
Cuddle position	12	5	1	
Lap position	4	1	0	
Cradled in the arms	4	3	0	
Previous experience of cold application on IM vaccine				-
Yes	-	-	-	
No	21	9	1	

Above table the association of mean differed score regarding infants receiving intramuscular vaccination in the study group. It shows that demographic variable, weight of the infants p 0.01 level of significant and birth order infant p 0.04 level of significant and had a statistically significant association with study group level of pain among infants receiving intramuscular vaccination at $p<0.05$ level. Therefore, the table describes that birth order and weight of the infants have shown statistically significant with the selected demographic variables.

DISCUSSION

The study aimed to evaluate the effectiveness of cold application in reducing pain during intramuscular immunization among infants. The first objective was to assess the level of pain during intramuscular vaccination among infants. The demographic characteristics of infants in both experimental and control groups were comparable with respect to age, gender, birth order, height, weight, health status, position during vaccination, and previous exposure to cold application. Most infants in both groups were healthy, had no prior experience with cold application, and were immunized in supportive positions such as cuddling or cradling. Assessment of pain levels revealed that infants in the experimental group predominantly experienced mild pain, whereas a higher proportion of infants in the control group experienced moderate to severe pain. These findings indicate that infants who received cold application experienced lower pain intensity compared to those who did not receive the intervention. The second objective was to evaluate the effectiveness of cold application on pain during intramuscular vaccination. The post-test mean pain score in the experimental group was

significantly lower than that of the control group, and the difference was statistically significant at $p < 0.005$. This finding confirms that cold application effectively reduces pain associated with intramuscular immunization in infants. The third objective was to determine the association between selected demographic variables and pain level during intramuscular vaccination among infants in the experimental group. The findings revealed a statistically significant association between pain level and certain demographic variables, specifically weight of the infant and birth order, in the experimental group. No significant association was observed in the control group.

RESULTS

The study group showed a mean pain score of 2.36, in the control group had a mean score of 3.1. The standard deviation for the study group was 0.55, and for the control group, it was 0.75. The mean difference between the groups was -0.74, with a T-test value of 3.95, the mean score decreases the pain increases it indicate that the cold application is effective, which was statistically significant ($p<0.005$). Furthermore, demographic factors such as infant weight ($p=0.01$) and birth order ($p=0.04$) were found to have significant associations with pain levels.

CONCLUSION

Cold application effectively reduced pain in infants following vaccinations. This simple and easy-to-apply method can help manage discomfort after immunization. Given its effectiveness, healthcare providers should consider incorporating cold therapy as part of pain management strategies during vaccinations to improve the comfort of infants.

LIMITATIONS

The duration of the study was long.

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