

A Study to Assess the Effectiveness of Tucking Positioning Upon Pain Among Infants Undergoing IM Injection at Selected Hospitals, Kanpur

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ABSTRACT

Background: Infants undergoing intramuscular (IM) injections often experience significant pain and distress. Non-pharmacological interventions such as facilitated tucking positioning have emerged as effective methods to reduce pain responses in neonates and infants during minor procedures.

Aim: The study aimed to assess the effectiveness of tucking positioning on pain among infants undergoing IM injection in selected hospitals of Kanpur, Uttar Pradesh.

Methods: A quasi-experimental post-test only control group design was adopted for the study. A total of 80 infants aged between 1 month to 1 year were selected using non-probability purposive sampling technique—40 each in experimental and control groups. The experimental group received tucking positioning during IM injection, while the control group received routine care without positioning. Pain was assessed immediately after injection using the Modified Neonatal Infant Pain Scale (NIPS), which measures pain based on facial expression, cry, breathing pattern, arm and leg movement, and state of arousal. Descriptive statistics (frequency, percentage, mean, standard deviation) and inferential statistics (independent t-test and chi-square test) were used to analyze the data.

Results: The findings revealed that infants in the experimental group who received tucking positioning experienced significantly lower pain scores compared to those in the control group. The mean pain score in the experimental group was notably lower, and the difference was statistically significant ($p < 0.05$). Furthermore, chi-square analysis showed a significant association between pain levels and selected demographic variables such as age of the child and type of family.

Conclusion: Tucking positioning is an effective, simple, and safe non-pharmacological intervention to reduce pain among infants undergoing IM injections. It should be encouraged in clinical practice as a standard supportive technique to enhance infant comfort and reduce procedural distress.

Keywords: Tucking positioning, IM injection, pain, infants, Modified NIPS, non-pharmacological intervention, quasi-experimental design.

INTRODUCTION

Infants, particularly neonates, are highly sensitive to pain due to their immature nervous systems and inability to verbalize discomfort. Common procedures such as intramuscular (IM) injections, heel sticks, and venipunctures are significant sources of procedural pain in this population.¹ Despite advances in neonatal care, pain in infants remains under-recognized and inadequately managed, especially in low-resource settings.²

Facilitated tucking, a non-pharmacological intervention, involves gently holding the infant in a flexed, midline posture that mimics the fetal position. This technique promotes a sense of containment, reduces stress, and provides comfort by replicating the intrauterine environment.³ Research has shown that facilitated tucking stabilizes physiological parameters such as heart rate and oxygen saturation, while reducing behavioral indicators of distress like crying and grimacing.⁴

Painful experiences during infancy, if unaddressed, can have long-term consequences including altered pain thresholds, behavioral disturbances, and impaired neurodevelopment. Effective pain relief not only supports the infant's immediate comfort but also their long-term emotional and cognitive well-being.⁵

Unlike pharmacological options, facilitated tucking is safe, cost-effective, and feasible in diverse clinical settings. It can be easily implemented by healthcare professionals during routine procedures without the need for specialized equipment.⁶ Given its simplicity and efficacy, especially in resource-limited contexts like parts of India, facilitated tucking is a practical intervention to enhance infant care.

This study is undertaken to assess the effectiveness of tucking positioning in reducing pain among infants undergoing IM injections in selected hospitals of Kanpur, with the aim of promoting evidence-based, compassionate pediatric practices.

NEED FOR THE STUDY

Despite advancements in neonatal care, pain management in infants remains a critical and under-addressed concern. Infants are especially vulnerable due to their immature nervous systems and inability to verbalize pain. Repeated exposure to untreated pain during medical procedures, such as intramuscular (IM) injections, has been associated with adverse short- and long-term neurodevelopmental outcomes.⁷ Non-pharmacological interventions like facilitated tucking offer a developmentally supportive and effective alternative for pain relief.

Globally, more than 84% of hospitalized infants experience at least one painful procedure, and nearly 75% of pediatric patients report pain during their stay, with 30% suffering from severe pain. The prevalence is even higher among preterm neonates, who may endure 8–15 painful procedures daily in NICUs, especially in Indian settings. Alarming, these procedures are often performed without any pain mitigation strategies, reflecting gaps in standardized protocols and provider awareness.⁸

A meta-analysis of 15 randomized controlled trials (n=664) confirmed the effectiveness of facilitated tucking in reducing pain during procedures such as endotracheal suctioning and minor interventions. Though not superior to oral glucose during heel pricks, it remains a safe, low-cost, and easy-to-implement strategy that can significantly enhance neonatal comfort. Furthermore, misuse of IM injections is widespread—91% are administered unnecessarily, often at incorrect anatomical sites, increasing risks of complications.⁹

Immunization, a common cause of procedural pain, also lacks integrated comfort measures. While India's coverage has improved with the pentavalent vaccine roll-out, pain from these injections continues to cause behavioral distress and anxiety in infants and caregivers. Introducing interventions like facilitated tucking into routine immunization schedules could reduce distress, improve care quality, and foster positive healthcare experiences.¹⁰

In light of these concerns, this study seeks to evaluate the effectiveness of tucking positioning in reducing procedural pain among infants undergoing IM injections in selected hospitals of Kanpur. The findings aim to support the adoption of evidence-based, developmentally supportive care in neonatal and pediatric practices.

STATEMENT OF THE PROBLEM

“A study to assess the effectiveness of tucking positioning upon pain among infants undergoing in injection at selected hospitals, Kanpur”.

OBJECTIVES

1. To assess the pain among infants undergoing IM injection in control group.
2. To assess the pain among infants undergoing IM injection with the help of tucking positioning in experimental group.
3. To find out the association between pain among infant (both control and experimental group) undergoing IM injection with their selected demographic variable.

HYPOTHESIS

H₁: There is a significance decrease in pain among infant undergoing IM injection with the help of tucking position.

H₂: There is a significant association between the pain level of infants undergoing IM injection in the experimental group and their selected demographic variables.

H₃: There is a significant association between the pain level of infants undergoing IM injection in the control group and their selected demographic variables.

Null Hypothesis

H₀₁: There is no significance decrease in pain among infant undergoing IM injection with the help of tucking position.

H₀₂: There is no significant association between the pain level of infants undergoing IM injection in the experimental group and their selected demographic variables.

H₀₃: There is no significant association between the pain level of infants undergoing IM injection in the control group and their selected demographic variables.

METHODS AND MATERIALS

Research Approach

A quantitative evaluative approach was used to measure the impact of tucking positioning using standardized pain scores.

Research Design

A quasi-experimental post-test control group design was adopted. Experimental group received tucking; control group received routine care. Pain was measured using Modified NIPS.

Research Setting

Pilot study: Rama Hospital.

Main study: Pravi Woman & Child Health Care and Anurag Hospital, Kanpur.

Variables

Independent: Tucking positioning. Dependent: Pain level. Demographic: parental and infant data such as age, weight, and gestational status.

Population

The present study the population consists of Infants aged 1 month to 1 year undergoing IM injections.

Target Population

The present study, the target population consists of Infants (1 month–1 year) scheduled for IM injections in selected hospitals, Kanpur.

Accessible Population

The present study, the accessible population consists of Infants at Pravi Woman & Child Health Care and Anurag Hospital.

Sample Size

The sample size consists of 80 infants (40 experimental, 40 control) selected using Cochran's formula.

Sampling Technique

Non-probability purposive sampling.

Sampling Criteria

Inclusion criteria:

The study includes infant who are:

- Within a specific age range of one year old, to ensure consistency in developmental stages undergoing and pain.

- Getting routine IM injections for immunization or medical treatment.
- Consent obtained from parents or legal guardians to participate in the study and allow their infants to be positioned using tucking positioning during IM injection.
- Full-term and without any major congenital anomalies or chronic medical conditions.

Exclusion criteria:

The study excludes the infant who are:

- Pre-existing medical conditions or developmental disorders that may affect their ability to perceive and express pain accurately.
- Requiring immediate medical attention or emergency procedures that do not allow for planned assessment and positioning for IM injection.
- Received any analgesics or sedatives within 24 hours prior to the IM injection.

Development of the Tool

Modified NIPS scale developed after literature review and expert consultation.

Description of the Tool

Section A: Demographic details (parents and infant).
Section B: Modified NIPS – facial expression, cry, breathing, limbs, arousal (scored 0–7: no to severe pain).

Validity of the Tool

Content validated by experts in paediatric care and research

Reliability of the Tool

Inter-rater method using Cohen's Kappa (0.85)

Pilot Study

Conducted at Rama Hospital on 8 infants. Validated tools and procedures.

Data Collection Procedure

Main study: April 30–June 3. Consent obtained. Tucking applied in experimental group. Pain assessed post-IM using NIPS.

Plan for Data Analysis and Interpretation

Descriptive stats: frequency, percentage, means, SD.
Inferential stats: independent t-test and chi-square. $P < 0.05$ considered significant.

DATA ANALYSIS AND INTERPRETATION

Figure 1: Percentage distribution of participants according to Demographic variable

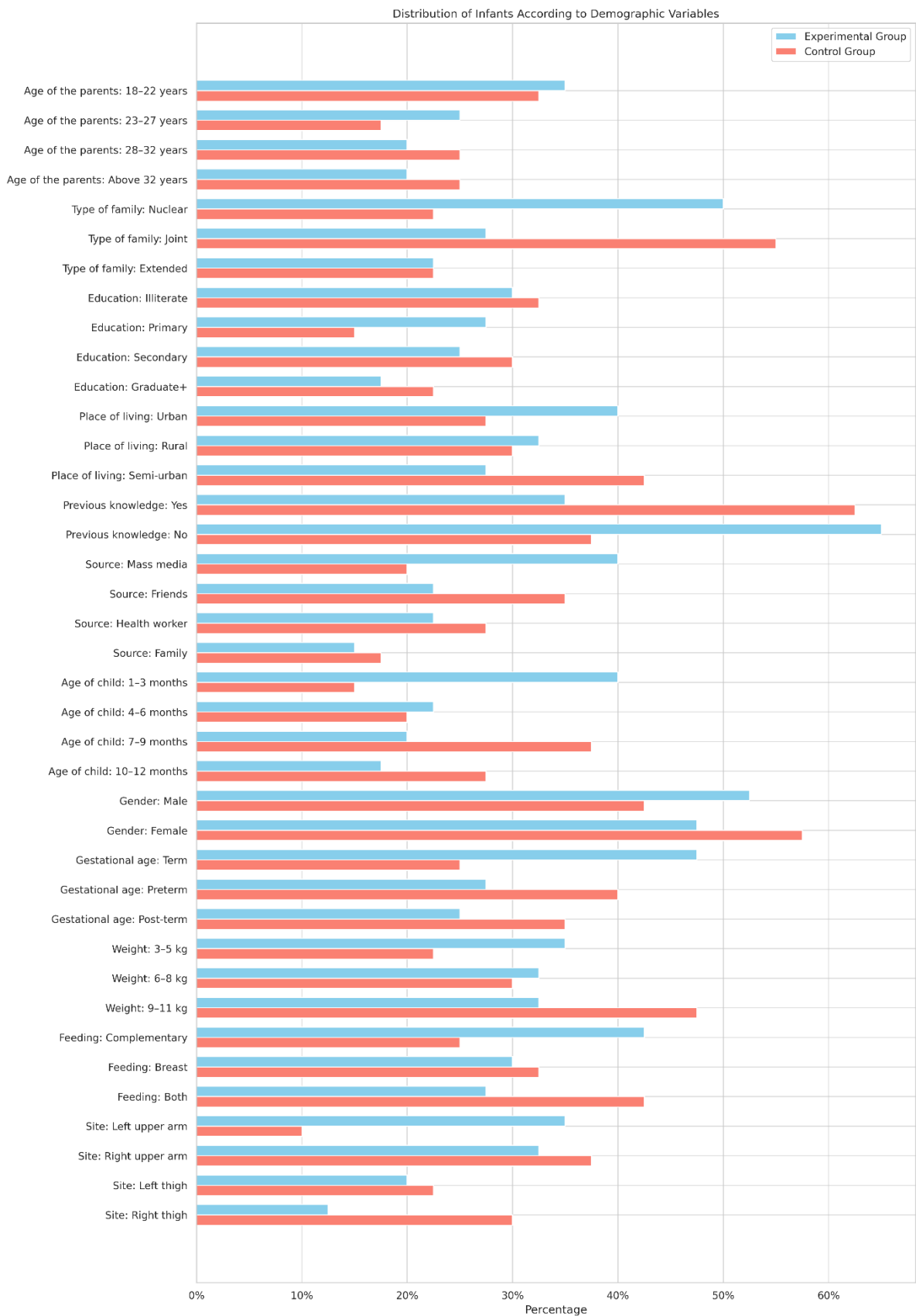


Table 1: Comparison of Pain Levels Among Infants in Experimental and Control Groups

(n=40+40)

Pain Level	Experimental Group		Control Group	
	Frequency	%	Frequency	%
Mild pain	27	67.5	10	25.0
Moderate pain	11	27.5	18	45.0
Severe pain	2	5.0	12	30.0

A higher proportion of infants in the experimental group (67.5%) experienced mild pain, compared to only 25% in the control group. Moderate and severe pain were more common in the control group (45% and 30%) than in the experimental group (27.5% and 5%). This indicates that tucking positioning effectively reduced pain during intramuscular injections.

Table 2: Effectiveness of Tucking Positioning in Reducing Pain Among Infants During IM Injection (n = 40+40)

Group	Mean	SD	SEM	t-value	p-value	Significance
Experimental	2.35	1.46	0.23	3.83	0.00026	Significant
Control	3.73	1.74	0.20			

Infants in the experimental group had significantly lower pain scores (Mean = 2.35) compared to the control group (Mean = 3.73). The t-test value of 3.83 and a highly significant p-value (0.00026) indicate that tucking positioning was effective in reducing pain during intramuscular injection. Hence, H_1 is accepted and H_0 is rejected.

Table 3: Association Between Pain and Selected Demographic Variables (Experimental Group)

Demographic Variable	Chi-Square Value	df	P-value	Inference
Age of Parents	11.02	3	< 0.05	Significant
Type of Family	13.62	2	< 0.05	Significant
Age of Child	8.69	3	< 0.05	Significant
Educational Background	4.69	3	> 0.05	Not Significant
Place of Living	5.62	2	> 0.05	Not Significant
Previous Knowledge	2.67	1	> 0.05	Not Significant
Source of Knowledge	6.75	3	> 0.05	Not Significant
Gender	0.92	1	> 0.05	Not Significant
Gestational Age	3.97	4	> 0.05	Not Significant
Weight	0.50	2	> 0.05	Not Significant

Type of Feeding	2.56	2	> 0.05	Not Significant
Site of IM Injection	1.71	3	> 0.05	Not Significant

The chi-square analysis revealed that age of parents, type of family, and age of the child had a significant association with pain levels among infants ($p < 0.05$), indicating these factors influence the effectiveness of tucking during IM injections. All other demographic variables showed no significant association, suggesting they did not impact pain outcomes in the experimental group.

Table 4: Association Between Pain and Selected Demographic Variables (Control Group)

Demographic Variable	Chi-Square Value	df	P-value	Inference
Age of Parents	11.02	3	< 0.05	Significant
Type of Family	13.62	2	< 0.05	Significant
Educational Background	4.69	3	> 0.05	Not Significant
Place of Living	5.62	2	> 0.05	Not Significant
Previous Knowledge	2.67	1	> 0.05	Not Significant
Source of Knowledge	6.75	3	> 0.05	Not Significant
Age of Child	8.69	3	< 0.05	Significant
Gender	0.92	1	> 0.05	Not Significant
Gestational Age	3.97	4	> 0.05	Not Significant
Weight of Child	0.50	2	> 0.05	Not Significant
Type of Feeding	2.56	2	> 0.05	Not Significant
Site of IM Injection	1.71	3	> 0.05	Not Significant

In the control group, parental age, family type, and child's age were significantly associated with infant pain response to IM injection. Other variables like education, living area, previous knowledge, gender, feeding type, and injection site had no significant association. Hence, H_3 is accepted and H_{03} is rejected.

DISCUSSION

This study, conducted in hospitals of Kanpur, aimed to assess the effectiveness of tucking positioning in reducing pain during IM injections among infants. Objective 1: In the control group (no tucking), infants showed higher pain scores (Mean = 3.73) with 30% experiencing severe pain. In contrast, the experimental group using tucking showed lower scores (Mean = 2.35), with only 5% reporting severe pain. These findings align with studies by Kucukoglu et al. (2015) and Siddharth et al. (2023), emphasizing the need for non-pharmacological pain interventions. Objective 2: The experimental group's most affected pain indicator was state of arousal. Tucking positioning mimics the womb-like posture, providing comfort, reducing pain, and enhancing infant self-soothing. Prior studies by Sujatha et al. (2017) and Lopez et al. (2015) also support its safety and effectiveness. Objective 3: Chi-square tests showed that parental age, type of family, and age of the child were significantly associated with pain in both groups. These factors may influence pain sensitivity or coping. Other demographics like education, gender, weight, and feeding type were not significantly

associated. In summary, tucking is a simple, cost-effective, and clinically relevant technique to reduce procedural pain in infants and should be integrated into routine neonatal care.

CONCLUSION

The present study evaluated the effectiveness of tucking positioning in reducing pain among infants undergoing intramuscular (IM) injections in selected hospitals of Kanpur. Tucking positioning is a simple, safe, cost-effective, and non-pharmacological intervention that can be easily adopted in clinical settings. It should be promoted as a standard supportive care technique during procedures like IM injections to enhance infant comfort and reduce distress. The results underscore the importance of integrating such evidence-based interventions into nursing practice, education, research, and administration for improving neonatal care outcomes.

IMPLICATIONS:

Nursing Practice

- Nurses, especially those working in immunization and pediatric units, should be trained and competent in using tucking positioning as a non-pharmacological technique for managing procedural pain in infants.

Nursing Education

- Tucking positioning should be incorporated into pediatric and neonatal nursing curricula as a core skill for managing pain in infants.

Nursing Research

- Additional research may be carried out to evaluate the efficacy of tucking posture in comparison to other non-pharmacological therapies, such as swaddling, non-nutritive sucking, nursing, or kangaroo mother care, which are all used during painful operations.

Nursing Administration

- Pediatric and immunization room policies should advocate the use of nonpharmacological interventions such as tucking positioning as a standard component of infant procedural care.

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