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# EFFECTIVENESS OF HELFER SKIN TAP TECHNIQUE ON LEVEL OF PAIN DURING INTRAMUSCULAR INJECTION AMONG ADULT FEMALES

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## ABSTRACT

**Background:** Intramuscular injection is a common technique to deliver medication which almost/always lead to pain and discomfort. Different physical methods are used by the nurses to reduce pain during IM injection. This study aimed to examine the effectiveness of Helfer skin tap technique on level of pain during intramuscular injection among adult females. **Methods:** An experimental study (Post-test only control design) among 70 antenatal women (35 experimental and 35 control group) was conducted. The respondents were assigned into Experimental group and Control group through simple random sampling. Numerical Pain Rating Scale (NPRS) was used to assess the level of pain during intramuscular injection in both the groups. Data was analyzed using SPSS version 16 by descriptive (frequency, percentage, mean and standard deviation) and inferential statistics (Fisher's exact test and Mann Whitney-U test). **Results:** The mean pain score of respondents in experimental group (1.77 ± 0.37) was lower than the mean pain score of the respondents in control group (4.06 ± 1.28). There was significant difference in pain score during intramuscular injection in experimental and control group ($p < 0.001$). **Conclusion:** The present study concluded that Helfer Skin Tap Technique was effective in reducing the level of pain during intramuscular injection.

**KEYWORDS**: HELFER SKIN TAP TECHNIQUE, INTRAMUSCULAR INJECTION, LEVEL OF PAIN, NUMERICAL PAIN RATING SCALE.

## INTRODUCTION

Every year at least 16 billion injections are administered worldwide.[1] Apart from IV injections, IM injections are a frequent treatment procedure.[2] More than 12 billion IM injections are administered annually throughout the world.[3] The adverse effect of IM injection along with physical and chemical effect of drugs causes disruption of skin integrity, trauma, pain and discomfort.[4] The International Association for Study of Pain in 1979 defines pain as "unpleasant sensory and emotional experience associated with actual or potential tissue damage, or describe in terms of such damage".[5] Various studies suggest that variety of factors like patient anxiety, patient position, drug volume and speed of delivery, injection technique, injection site and size of the needle bore and length are associated with painful IM injections.[6]

The important role of nurse is to decrease patients pain.[7] Various methods are used by the nurses to reduce pain during IM injections such as applying pressure, tapping the skin, giving injections to a relaxed muscle, applying heat and cold. Application of pressure and tapping the skin before injection are the most effective among the different physical interventions.[8] Helfer skin tap technique (HSTT) developed by Ms. Joanne Keiffer Helfer from California, United States in 1998 is an attempt to alleviate pain in which tapping of the skin over the injection site is done before and during the procedure to relax muscle. HSTT includes tapping over the IM injection site with the palmer aspect of the dominant hand sixteen times to relax the muscle making a "V" with the thumb and other fingers of the nondominant hand and tap the skin again for three times during the insertion and removal of the needle. HSTT provides a mechanical stimulation and distraction during IM injection and thus helps to decrease pain as described by gate control theory published by Ronald

Melzack and Patrick Wall which keeps the muscles relaxed and thus reduce pain while administering IM injection.[9]

As administration of IM injection is a common nursing intervention, incorporating HSTT during IM injection can reduce pain associated with the injection and enhance the comfort of the patients.[18] The main aim of this study is to evaluate the effectiveness of HSTT and bring this technique into practice to reduce pain among the adult females receiving IM injections.[9]

**Rationale of the Study**

A conservative estimate of average of number of IM injections ranged from 0.9-8.5 per person per year with a median of 1.5 IM injections is given per person per year.[10] Although IM injection is common technique for delivering medications, it can lead to pain and discomfort.[11] All the patients expect and experience pain due to IM injection, though transitional in nature. Various researchers have reported that approximately 6-23% of patients have persistent pain, post IM injection; perhaps because of the complications, reactions, or inadequate technique of injection.[12]

If IM injection is not performed carefully and in conformity with the correct technique, it can cause serious complications such as abscesses, cellulite, tissue necrosis, granuloma, muscular fibrosis and contracture, intravascular injection, hematoma and nerve damage.[13] The nurse can minimize the discomfort and pain during IM injection by helping the client to assume a proper position and by implementation of different physical and psychological interventions.[8] Different physical methods are used by the nurses to reduce pain during IM injection such as tapping the skin, Z- track, applying pressure, applying heat and cold.[14] However, not all of these interventions are practical for instance, ice application requires preparation. The application of the pressure to the injection area may be a practical intervention because it is simple to learn and inexpensive. The application of physical pressure when applied effectively and correctly in a clinical environment is a simple and cost effective method to mitigate injection-related pain.[16] HSTT not only help to relieve pain due to IM injection but also reduce needle anxiety, and relax the skin and for distracting the patient.[9]

Tetanus diphtheria (Td) is a vaccine given to older children and adults including antenatal women that prevent tetanus and diphtheria. Pain after receiving Td vaccine occurs in about eight in every 10 people that subside in few days.[15] Pain at the injection site is one of the most common side effects from receiving the Td vaccine that may temporarily interfere with daily activities.[16]

HSTT being such a simple, cost-effective and efficacious method and Td vaccine being used for every antenatal woman which causes pain after receiving it, HSTT has not yet been tested in the context of Nepal as the related literatures could not be retrieved yet. Therefore, this study intends to evaluate the effectiveness of HSTT and bring this technique into practice to reduce pain among the adult females receiving IM injections.

**Significance of the Study**

This study would be helpful in investigating the level of pain in adult females receiving IM injection. The study can examine the effectiveness of HSTT in reducing pain related to IM injection. This study can provide direction to incorporate HSTT in practice to reduce pain. The findings of the study might also provide the baseline data for further research in this area.

**Operational Definitions**

**Helfer Skin Tap Technique:** In this study**,** Helfer Skin Tap Technique refers to a technique of administering intramuscular injection which involves tapping deltoid muscle for 16 times rhythmically with the palmer aspect of the dominant hand before IM injection, preparing the skin with cotton swab, uncapping the syringe, tapping with non-dominant hand three times counting 1 2 3 using the V tap (spreading the thumb and index finger); inserting the needle simultaneously on the 3rd count, injecting inj. Tetanus diphtheria (Td) slowly while continuing to tap the muscle gently with non-dominant hand, removing the needle while simultaneously tapping the skin again with the non-dominant hand.

**Conventional Technique**: In this study, conventional technique refers to a technique of administering intramuscular injection which involves preparing the skin with cotton swab, uncapping the syringe, inserting the needle at a 90-degree angle into the deltoid muscle, injecting Inj. Tetanus diphtheria (Td) slowly and removing the needle.

**Effectiveness of Helfer Skin Tap Technique:** The effectiveness of Helfer Skin Tap Technique in this study refers to the reduction in the level of pain by the use of HSTT during IM injection of injection Tetanus diphtheria (Td) in antenatal women. The HSTT was given to study group only and level of pain was measured immediately to both study and control group after IM injection using a Numerical Pain Rating Scale (NPRS).[17]

**Intramuscular injection**: The Intramuscular injection in this study refers to administration of inj. Tetanus diphtheria into the deltoid muscle; the dose of which was 0.5 ml.

**Pain**: In this study, pain refers to the perception of pain by adult females during IM injection which was measured using Numerical Pain Rating Scale where 0 represent no pain and 10 represent worst pain imaginable.[17] Pain was measured that of both study and control group immediately after intervention.

**Adult Females:** The adult females refer to antenatal women aged above 18 years who came to MCH clinic after ANC checkup for receiving IM injection of 0.5 ml Tetanus diphtheria in deltoid muscle.

**Theoretical Framework**

Ernestine Wiedenbach born in Germany in 1900; a progressive nursing leader postulated "Prescriptive theory" in 1969. Prescriptive theory (a situation-producing theory) may be described as one that stipulates what the health care professional must do to attain a prescribed goal. Thus, a prescriptive theory directs action toward an explicit goal. Prescriptive theory is made up of three factors, or concepts:

1. The central purpose that the practitioner recognizes as essential to the particular discipline.
2. The prescription for the fulfillment of the central purpose.
3. The realities in the immediate situation that influence the fulfillment of the central purpose.

The central purpose: the nurse's central purpose in nursing defines the quality of health she desires to affect or sustain in her patient and specifies what she recognizes to be her special responsibility in caring for the patient. this central purpose (or commitment) is based on individual nurse's philosophy. In this study, the central purpose is to reduce the level of pain during IM injection.

The prescription: once the nurse has identified her own philosophy and recognizes that the patient has autonomy and individuality, she can work with the individual to develop a prescription or plan of his care. A prescription is a directive to activity. It specifies both the nature of the action that will most likely to lead to fulfillment of the nurse's central purpose and the thinking process that determines it. In this study, HSTT during IM injection is the prescription.

The realities: when the nurse has determined her central purpose and has developed the prescription, she must then consider the realities of the situation in which she is to provide nursing care. Realities consist of all the factors- physical, physiological, psychological, emotional and spiritual. Wiedenbach (1970) defines the five realities as agent, the recipient, the goal, the means and the framework.

1. Agent: The agent or nurse practitioner who performs the nursing action. In the study, researcher was the agent.
2. Recipient: The recipient or patient who is vulnerable and is dependent on others for help. In this study, the antenatal women receiving injection Td by IM route was the recipient.
3. Goal: The goal or directed outcomes the nurse wishes to achieve. In this study, the goal was to evaluate the effectiveness of HSTT on level of pain during IM injection.
4. Means: The means (actions, skills, experience) that empowers the nurse to achieve the desired goals. In this study, HSTT was the means to achieve the desired goal.
5. Framework: The framework consists of the human, environmental, professional, and organizational facilities. In this study, MCH clinic was the framework.

According to Wiedenbach, the practice of nursing comprises a wide variety of services, each directed toward the attainment of one of its three components:

1. Identification of the patient's need for help: In the study, demographic variables i.e. age of the antenatal women visiting immunization clinic for injection Td was obtained.
2. Ministration of the help needed: In the study, for experimental group, IM injection was provided by the use of HSTT and for control group, IM injection was provided by conventional technique.
3. Validation that the help provided was indeed helpful to the patient: Validation of the procedure was done by use of Numerical Pain Rating Scale in both the experimental and control group.[18]

**Modified Wiedenbach's Prescriptive Theory**

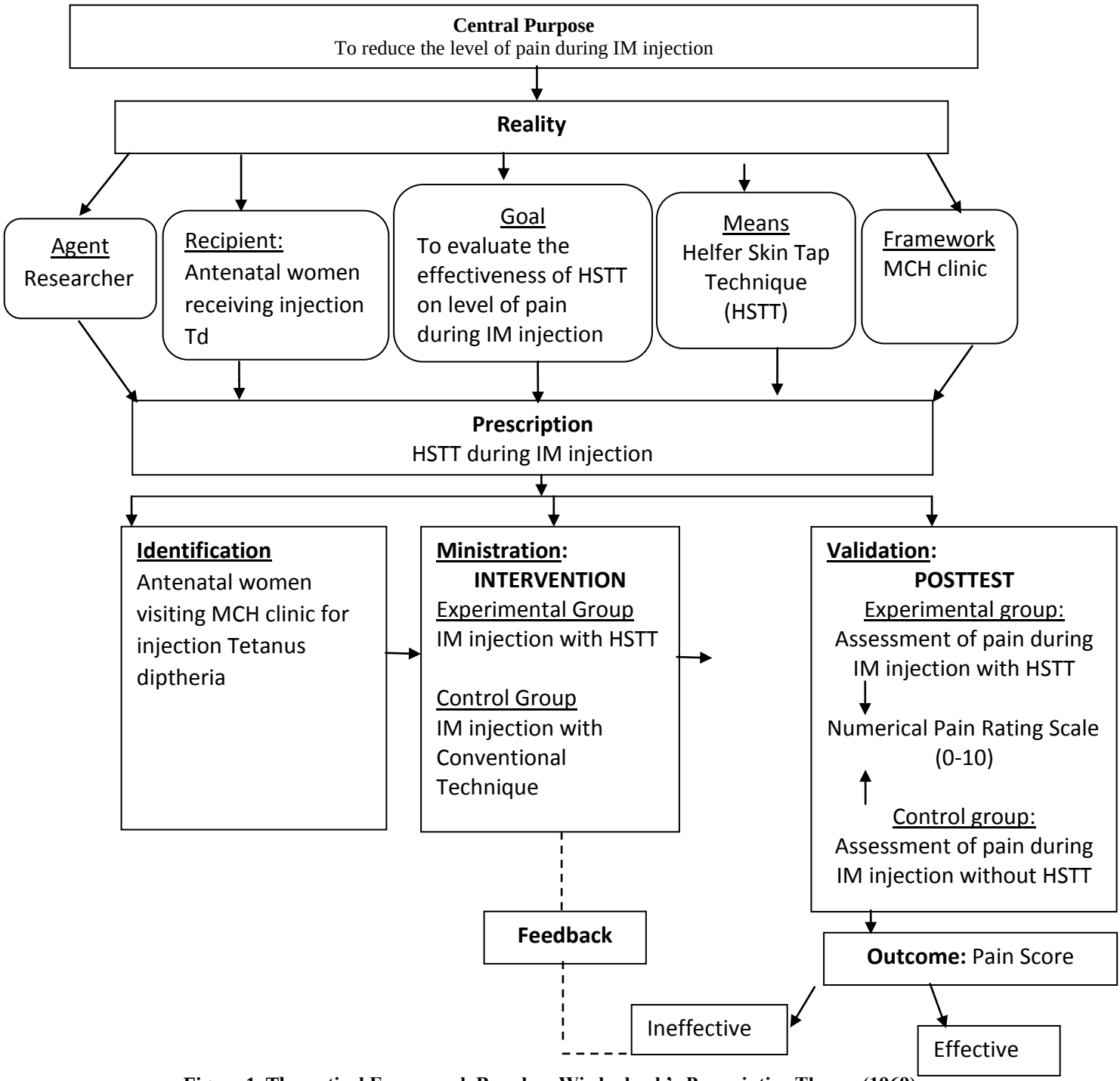


**Figure 1. Theoretical Framework Based on Wiedenbach's Prescriptive Theory (1969)**

Note: _ _ _ _ _ Not included in this study

## METHODOLOGY

### Null Hypothesis

There is no significant difference in pain score of adult females receiving intramuscular injection by HSTT and conventional technique.

### Alternate Hypothesis

There is a significant difference in pain score of the adult females receiving intramuscular injection by HSTT and conventional technique.

### General Objective

To examine the effectiveness of Helfer skin tap technique on level of pain during intramuscular injection among female adults in Patan Hospital.

### Specific Objectives

1. To assess the level of pain during IM injection by Helfer Skin Tap Technique (HSTT) in experimental group and injection by conventional technique in control group.

2. To compare the pain score during IM injection by HSTT and conventional technique.

**Place of Study:** This study was carried out in Maternal and Child Health (MCH) Clinic of Patan Hospital, Patan Academy of Health Sciences (PAHS), Lagankhel, Lalitpur. Patan Hospital is a 450 bedded teaching hospital with modern equipment and facilities which was established in 1956 as a Shanta Bhawan. It is recognized as a tertiary level public hospital.

**Population of the Study:** The population of the study included all the antenatal women aged above 18 years receiving IM injection of Td vaccine in MCH clinic at Patan Hospital.

**Duration of Study:** The duration of research study was from April 2020 A.D. – April 2021 A.D.

**Design of the study:** An experimental (post-test only control design) was carried out to examine the effectiveness of Helfer skin tap technique on level of pain during intramuscular injection among adult females.

**Sampling:** A simple random sampling technique (lottery method without replacement) was used for sample collection.

**Inclusion Criteria**

- Antenatal women who presented to the Immunization clinic for injection Td.
- Antenatal women who were willing to participate in the study.

**Exclusion Criteria**

- Antenatal women with inflammation and previous history of surgery in both the deltoid muscles.

**Data Collection Instrument**

The tool consisted of two parts

- **Part I** consisted of socio-demographic data of the respondents i.e. age.
- **Part II** consisted of Numerical Pain Rating Scale (NPRS) to assess the level of pain during IM injection. NPRS requires a patient to rate their intensity of pain during IM injection on a defined 11-point scale ranging from 0 – 10.[17]

➢ 0: No pain
➢ 1-3: Mild pain
➢ 4-6: Moderate pain
➢ 7-9: Severe pain
➢ 10: Worst pain imaginable

**PROCEDURE**

Data collection was done after approval from the Research Committee of School of Nursing and Midwifery and Institutional Review Committee (IRC) of PAHS. Data from female adults who visited the MCH clinic for injection Td was collected.

Upon receiving adult females fulfilling the inclusion criteria, they were explained about the purpose and benefit of the study in detail. Informed written consent was taken from those who were willing to participate in the study. Informed written consent and demographic information was collected outside the MCH clinic in waiting area. The respondents were allocated to experimental and control group randomly through lottery method without replacement. Chits numbered from 1 to 70 was made and shuffled in a pencil case from which each respondents had to take one chit; the respondents with the chit having odd numbers were allocated to experimental group and those with even numbers were allocated to control group.

Intervention was done by the researcher herself in both the experimental and control group in the MCH clinic and data related to pain during IM injection was collected outside the MCH clinic immediately after intervention. Data was collected by using a structured questionnaire. Data was collected on five days a week except on Wednesday and Saturday between 9-3pm within three weeks. The duration of participation by each participant was 15-20 min. In average, 3-6 participants were taken per day.

**Interventional Procedure**

Intramuscular injection was given preferably in left arm deltoid muscle; if not in right arm deltoid muscle in both experimental and control group. Antenatal women with inflammation and previous history of surgery in both the deltoid muscles were excluded from the study.

Procedures in experimental group and control group were same except for the application of HSTT in the experimental group.

**A) Experimental Group Intramuscular Injection by the use of HSTT**

1. Verify doctor's order and respondent's identification.
2. Assemble articles, dry cotton, syringe, inj. Tetanus toxoid) and prepare inj. Td 0.5 ml after checking the vaccine label.
3. Perform hand hygiene.
4. Explain the procedure to the respondent.
5. Place the respondent in comfortable sitting position in a chair. Instruct the respondent to relax the arm by placing it in a dependent position (hanging loosely at the side).
6. Locate the injection site in deltoid muscle by placing 2 finger width down from the acromion process and tap the skin for sixteen times with the palmar aspect of the fingers of the dominant hand to relax the muscle.
7. After preparing the skin with cotton swab, uncap the syringe in the dominant hand. Make a large V with the thumb and index finger of the non-dominant hand and tap the skin again. The entire hand is used to tap the muscle three times. The tap (not slap)

must be firm, using entire hand, to ensure stimulation of the large fibers.
8. On the count of three, simultaneously insert the needle at a 90° angle into the muscle.
9. Inject the medication slowly while continuing to tap the muscle gently to keep it relaxed with the palmar aspect of the fingers of the non-dominant hand.
10. Remove the needle while simultaneously tapping the skin again using V tap of the non-dominant hand. Press the area gently.

**B) Control Group (Intramuscular Injection by Conventional Technique)**

1. Verify doctor's order and respondent's identification.
2. Assemble articles (spirit swab, dry cotton, syringe, inj. Tetanus toxoid) and prepare inj. Tetanus toxoid (Td) 0.5 ml after checking the vaccine label.
3. Perform hand hygiene.
4. Explain the procedure to the respondent.
5. Place the respondent in comfortable sitting position in a chair. Instruct the client to relax the arm by placing it in a dependent position (hanging loosely at the side).
6. Locate the injection site in deltoid muscle by placing 2 finger width down from the acromion process, preparing the skin with cotton swab, uncap the syringe in the dominant hand.
7. Insert the needle at a 90-degree angle into the muscle.
8. Inject the medication slowly into the muscle.
9. Remove the needle, and press the area gently.[19,20]

**Statistical Analysis**

After collection of data, data were checked out thoroughly for completeness then edited, coded and entered into SPSS 16 version. The analysis and interpretation were done using descriptive statistics and inferential statistics. The descriptive statistics was used to calculate frequency, mean, percentage and standard deviation of socio-demographic data and pain score. Fisher's exact test was used for statistical comparison of age in experimental and control groups. Test of normality of the data was done using QQ- normal plot, normality curve and Shapiro-Wilk test in which the point in the QQ- normal plot didn't lie on a straight diagonal line, the normality curve was not normal and the value of Shapiro-Wilk test in both experimental (0.05) and control (0.00) group was not greater than 0.05 which proved that the data were significantly deviated from a normal distribution because of which Mann-Whitney U test was used to compare the pain score between experimental and control group.

**Ethical Consideration**

Formal permission from the research committee of the School of Nursing and Midwifery (Lalitpur Nursing Campus) was obtained approval. Approval of the study was obtained from the Institutional Review Committee (IRC) of PAHS. Permission was obtained from Hospital and Nursing director. Respondents were explained about the type, purpose and intervention of the study. Respondents could participate voluntarily. Informed written consent was obtained from all the respondents of the study. Confidentiality of the respondents was maintained throughout the study by coding in the interview questionnaire and interviewing in a separate place. The respondents were assured that the information given by them would be confidential and used only for academic purpose of the researcher only.

**Data management and storage**

Data will be stored for 5 years in a password-protected file after completion of the study/after publication on the researcher's personal computer.

After completion of the study, the study related documents is submitted to the LNC and will be stored in a password protected device, accessible only to EC-PAHS and IRC-PAHS.

## RESULT

This chapter deals with the analysis and interpretation of findings obtained from a total of 70 antenatal women (35 experimental group and 35 control group) in MCH clinic at Patan Hospital of Lalitpur District. The obtained data were analyzed as per the research objectives using descriptive (Frequency, percentage, mean and standard deviation) and inferential statistics using Fisher's exact test and Mann Whitney U test. Findings of the study are presented in the tables and figure as follows:

**Table 1: Statistical Comparison of Age of Adult Females in Experimental and Control Group.**

**N=70**

| Variables | Experimental group (n=35) | Control group (n=35) | Fisher's exact test | p-value |
|---|---|---|---|---|
| | Frequency (Percent) | Frequency (Percent) | | |
| **Age (in years)** | | | | |
| 19-24 | 11 (31.4) | 7 (20) | | |
| 24-29 | 12 (34.3) | 15 (42.8) | 16.87 | 0.726* |
| 29-34 | 10 (28.6) | 10 (28.6) | | |
| 34-39 | 2 (5.7) | 3 (8.6) | | |
| Mean ± S.D: | 25.97 ± 4.436 | 27.37 ± 4.59 | | |

* p value <0.05 = statistically significant

Table 1 shows the age of the respondents in both the experimental and control group and the statistical test using Fisher's exact test to find the significant difference among experimental and control group. Out of 70 respondents (35 in experimental group and 35 in control group), 34.3% belonged to 24-29 years of age in experimental group. Similarly, 42.8% of the respondents belonged to 24-29 years of age in control group. Mean and standard deviation of age of respondents was 25.97 ± 4.436 in experimental group and 27.37 ± 4.59 in control group. The minimum age of respondents was 20 years and the maximum age was 38 years. There was no any statistically significant difference between experimental and control group with respect to age which signifies that the respondents in both the groups were similar.

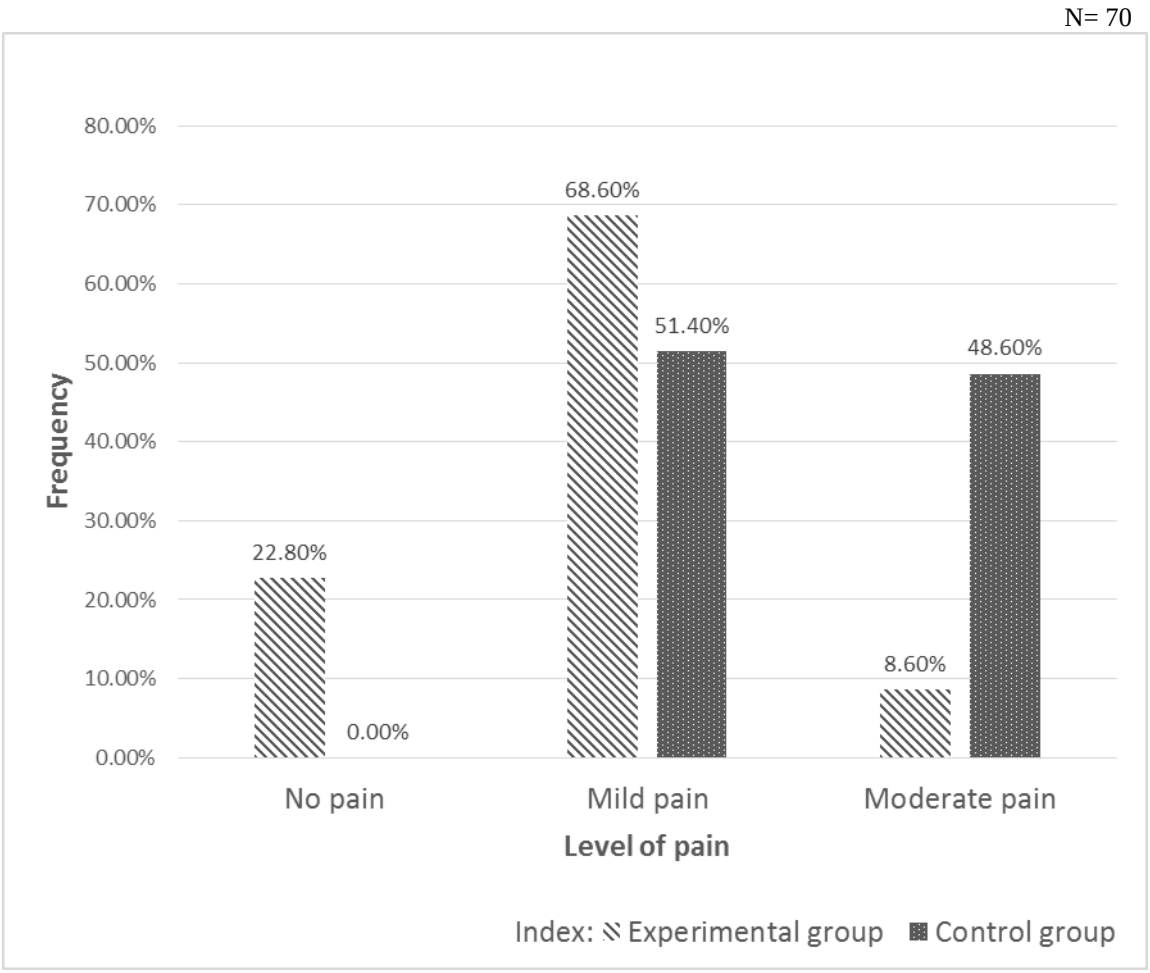


**Figure 6. Level of Pain among Adult Females in Experimental and Control Group during Intramuscular Injection.**

Figure 6 depicts the level of pain in experimental group and control group during IM injection. In experimental group, 22.80% of the respondents experienced 'no pain' whereas none of the respondents in control group expressed 'no pain'. The majority (68.60%) of the respondents in experimental group responded 'mild pain' while 51.40% of the respondents in control group responded 'mild pain'. In experimental group, 8.60% of the respondents had 'moderate pain' while 48.60% of the respondents in control group expressed 'moderate pain'. None of the respondents in both the experimental and control group expressed 'severe pain' and 'worst pain'.

**Table 2: Comparison of Pain Score among Adult Females in Experimental and Control Group during Intramuscular Injection.**

N = 70

| Group | Mean | S.D | MW-U value | p-value |
|---|---|---|---|---|
| Experimental group (n=35) | 1.77 | 1.37 | 131.5 | <0.001 |
| Control group (n=35) | 4.06 | 1.28 | | |

* p value <0.05 = statistically significant

Table 2 reveals the comparison of pain score in experimental and control group during IM injection. The findings show that the mean pain score of respondents in experimental group (1.77 ± 1.37) was lower than the mean pain score of the respondents in control group (4.06 ± 1.28).

Data presented in Table 2 shows that the calculated Mann Whitney U test value (131.5) with p value <0.001. Hence, there was significant difference in pain score in experimental and control group. Thus, Helfer Skin Tap Technique is effective in reducing the level of pain during intramuscular injection.

## DISCUSSION

The present study was designed as a post-test only control design to examine the effectiveness of HSTT on reducing the level of pain during IM injection among adult females visiting MCH clinic of Patan Hospital, Lagankhel, Lalitpur for injection Td. The total of 70 adult females (35 in experimental and 35 in control group) were allocated through simple random sampling (lottery method without replacement). HSTT was applied during IM injection for those in experimental group and for those in control group, IM injection was given by conventional technique without applying HSTT. NPRS was used to collect data regarding level of pain in both the group after IM injection.

### Discussion related to level of pain during intramuscular injection among female adults

In this study, in the experimental group, 22.85% of respondents had 'no pain', 68.60% expressed 'mild pain', 8.57% experienced 'moderate pain' and none of them experienced severe and worst pain. In the control group, none of the respondents experienced 'no pain', 51.42% had 'mild pain, 48.60% expressed 'moderate pain' and none of them experienced severe and worst pain. The findings of this study are similar to the findings of a study conducted in Delhi, India among 60 antenatal mothers (30 in experimental group for whom HSTT was used during IM injection and 30 in control group for whom IM injection was given using conventional technique; without use of HSTT) which reported that 60% of experimental group had 'mild pain', 33.33% had 'no pain' and 6.66% had 'moderate pain' whereas in control group; 50% had 'moderate pain', 30% had 'mild pain' and 6% had severe pain.[21]

### Discussion related to comparison of pain score between experimental and control group

This study showed that the mean pain score during IM injection in experimental group with use of HSTT (mean=1.77, SD= 1.37) was less than the mean pain score during IM injection in control group with conventional technique; without use of HSTT (mean=4.06, SD= 1.28) with p value < 0.001 which showed that there was significant difference in level of pain during IM injection with the use of HSTT and conventional technique. In accordance with the findings of the study, the study conducted in Puducherry, India among 134 patients (67 in study group for which IM injection was given using HSTT and 67 in control group for which IM injection was given by using the routine technique; without using HSTT) revealed that the mean pain score in study group (0.67±1.17) was lower than the mean pain score in control group (4.95±1.77) with p value < 0.001.[22]

Similarly, a pre-experimental with one group pretest posttest study conducted in Karnataka, India among 60 study subjects has shown that there was significant difference in level of pain with the pretest (IM injection without HSTT) and the post-test (IM injection with HSTT) where pretest mean score was 6.95 ± 1.006 and posttest mean score was 2.45 ± 0.938 with p value < 0.05.[23]

## CONCLUSION

The findings of the study showed that the mean pain score in the experimental group was lower than the mean pain score in the control group. The findings of the study revealed that there was significant difference in level of pain in experimental group for whom HSTT was applied during IM injection. Based on the findings of the study, it is concluded that HSTT was effective in reducing the level of pain during IM injection.

## LIMITATIONS

- Generalizability of this study is limited because the study was done among antenatal women visiting MCH clinic of Patan Hospital.

## IMPLICATIONS

- The findings of the study can help nurses to incorporate into the evidence based practice.
- The study findings might help health care providers such as nurses to apply the Helfer Skin Tap Technique while providing IM injections to the patients to reduce the level of pain.
- This study might help future researchers to conduct similar study in different settings and different population.

## RECOMMENDATIONS

- Further study can be conducted in different populations like infants who require frequent vaccinations through IM route.
- As the pain might persist for few more days after IM injection of Td vaccine, study can be done regarding the effect of HSTT on consecutive days after Td vaccine.

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