
RESEARCH ARTICLE

Reducing Tetanus Vaccine Pain in Filipino Pregnant Women: Helfer Skin Tap Technique Efficacy

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ABSTRACT

Intramuscular injections, crucial for medication and vaccine delivery, often induce significant pain, particularly in pregnant women undergoing routine immunizations. Tetanus toxoid (TT) vaccination, vital for maternal and neonatal health, poses a recurring challenge due to associated discomfort. The Helfer Skin Tap Technique (HSTT), known for alleviating injection pain in adults, remains underexplored in pregnant populations. This study evaluates HSTT's efficacy in reducing pain during tetanus toxoid intramuscular vaccination in pregnant women. Employing a true experimental design, 60 primigravida participants aged 18 to 35 were randomly assigned to experimental (HSTT) and control groups. Pain levels, physiological responses, and HSTT's impact were assessed. Results indicate a significant reduction in pain perception ($p=0.004$) in the experimental group, corroborated by physiological indicators. When examining physiological indicators of pain, statistically significant differences were observed in heart rate ($p=0.02$) and respiratory rate ($p=0.001$) between the two groups. However, no significant difference was found in blood pressure ($p=0.98$) between the two groups. HSTT offers a promising avenue for enhancing prenatal care experiences and maternal well-being. Further research should explore its long-term effects, applicability, and cost-effectiveness in obstetric settings to ensure equitable access to pain management interventions for pregnant women worldwide.

KEYWORDS

Pain-reducing Intervention, Intramuscular Injections, Tetanus Toxoid, Helfer Skin Tap Technique.

ARTICLE INFORMATION

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1. Introduction

Intramuscular injections are a common medical procedure utilized for the administration of medications and vaccines. Among the various types of injections, intramuscular injections are often associated with higher levels of pain due to the deeper penetration of the needle into muscle tissue (Cafasso, 2022). Pregnant women, who frequently undergo immunizations and medications administered intramuscularly, are particularly vulnerable to experiencing discomfort during these procedures (Tomita, 2021; Karabey & Karagözoğlu, 2021).

The tetanus toxoid (TT) vaccine is one of the most commonly administered vaccines to pregnant women, given its crucial role in preventing neonatal and maternal tetanus. However, the repetitive nature of TT vaccination during pregnancy underscores the importance of exploring effective pain management strategies to enhance the overall experience of prenatal care for expectant mothers (Amin et al., 2022; Sahib & Pradesh, 2019).

The Helfer Skin Tap Technique (HSTT) has emerged as a promising approach to mitigate pain during intramuscular injections (Helfer 2017). This technique involves the application of mechanical stimulation and distraction to the skin surrounding the

injection site, thereby modulating pain perception and promoting muscle relaxation. Previous research conducted by Soliman and Hassnein (2016) demonstrated the efficacy of HSTT in reducing pain associated with intramuscular injections in adult populations.

Despite the potential benefits of HSTT in pain management, there is a notable gap in the literature regarding its application, specifically in pregnant women receiving tetanus toxoid vaccination. Existing studies primarily focus on adult and infant populations (Vathani et al., 2017), overlooking the unique considerations and potential benefits of pain management techniques in prenatal care settings.

This experimental study seeks to address this gap by evaluating the effectiveness of the Helper Skin Tap Technique in reducing pain during tetanus toxoid intramuscular vaccination in pregnant women. By comparing pain levels between a control group receiving standard intramuscular injection techniques and an experimental group receiving HSTT, this research aims to provide valuable insights into the feasibility and efficacy of HSTT in prenatal care settings.

The primary objective of this study is to assess the level of pain experienced by pregnant women during tetanus toxoid intramuscular vaccination and to analyze the impact of HSTT on pain perception compared to standard injection techniques. By elucidating the potential benefits of HSTT in pain management during intramuscular vaccination in pregnant women, this research aims to contribute to the optimization of prenatal care practices and the enhancement of maternal healthcare experiences.

2. Methods

This study employed a true experimental research design, specifically utilizing a pretest-posttest design. True experimental research, recognized for its reliance on statistical analysis to test hypotheses, ensures rigorous evaluation of interventions. Conducted at Rural Health Units (RHU) 2 Malolos City, Bulacan, Philippines, the study targeted a significant population of pregnant women receiving routine tetanus toxoid vaccination, reflecting the broader public health context.

Participants, selected via randomization, consisted of 60 primigravida pregnant women aged 18 to 35, ensuring a homogeneous sample with minimal confounding variables. The researchers specifically chose primigravida subjects receiving their first dose of tetanus toxoid to ensure that they had no prior exposure to it. Research in the field of pain suggests that repeated exposure to painful stimuli may increase an individual's pain tolerance (Novus Spine & Pain Center, 2017). From these sixty (60) participants, thirty (30) were randomly assigned to the control group, where the standard procedure for injecting tetanus toxoid was followed, while the other thirty (30) were also randomly assigned to the experimental group, where the Helper skin tap technique was used during the injection process. Random assignment to control and experimental groups mitigate bias. Data collection instruments included a numerical pain scale (Arbuck & Fleming, 2020) alongside physiological measurements such as blood pressure, heart rate (Dayoub & Jena, 2016), and respiration rate (Hegewald & Crapo, 2011), enhancing the comprehensive assessment of pain and discomfort levels. According to Morrow (2022), a pain level of 0 indicates the absence of pain, while a pain level of 1 to 3 corresponds to mild pain. Moderate pain is described by a pain level of 4 to 6, and severe pain is represented by a pain level of 7 to 10. It was also important that these women did not take any medications that could influence their blood pressure.

Table 1. Severity of Pain as Reflected in Vital Signs

Vital signs	Severity of pain		
	Mild	Moderate	Severe
*Blood pressure (Systolic BP)	Remain unchanged or < 5mmHg	Increase of ≥ 5 mmHg	Increase of ≥ 10 mmHg
*Heart Rate	Increase of ≤ 5 bpm	Increase of ≥ 6 bpm	Increase of ≥ 9 bpm
*Respiratory Rate	Remain unchanged or ≤ 20 cpm	21-24 cpm	≥ 25 cpm
Pain scale	1-3	4-6	7-10

*Bendall et al (2011)

The data gathering procedure adheres to ethical guidelines, ensuring voluntary and informed consent, confidentiality, and participant well-being. Rigorous statistical treatment using Jamovi software evaluates the effectiveness of HSTT compared to standard technique, with significance levels guiding hypothesis testing.

Ethical considerations remain paramount throughout, with researchers prioritizing subjects' welfare, privacy, and the avoidance of biases (Philippine Health Research Ethics Board, 2019), ensuring the integrity and credibility of the study's findings.

2.1 Helfer Skin Tap Technique Intervention

Pregnant women who arrived for their tetanus toxoid vaccine at each of the involved Rural Health Units(RHU) were evaluated to determine their eligibility for the study. Once screened, eligible women were provided with consent letters and forms. Confidentiality, anonymity, and privacy of the subjects were ensured. The researchers asked the subjects to pick a piece of paper from an envelope with numbers between 1 and 60. Choosing an even number placed them in the experimental group, while an odd number placed them in the control group. Prior to the experiment, permission was obtained before proceeding with the initial assessment of baseline data, which included measuring blood pressure, heart rate, and respiratory rate. Following approval, the researchers provided a detailed explanation of the study's procedures and objectives. The research lead initiated the experiment while the co-researchers carefully observed and tracked the subject's heart rate, blood pressure, and respiratory rate.

The Helfer Skin Tap Technique was implemented following these steps: a.) cleanse the injection site by swabbing it with a fully saturated alcohol swab containing 60% to 70% alcohol for half a minute, then allow the area to air dry for the same duration., b.) grasp the syringe with the dominant hand and gently tap the side of the deltoid using the palm of the nondominant hand; c.) on the third tap, inject the medication into the muscle at a 90-degree angle. d.) throughout the administration of the medication, maintain a steady tapping motion on the side of the deltoid., and e.) upon completing the injection, simultaneously tap the deltoid and withdraw the needle. Subsequent to the experiment, the subjects were asked to provide a rating indicating the level of pain they felt during the experimentation.

3. Results

The data that were gathered were subjected to statistical analysis using Jamovi Software. The results are presented in this portion, as well as their implication to the objectives of this research paper through discussion.

Table 2. Comparison of Pain Perception Between Experimental and Control Groups During Tetanus Toxoid Intramuscular Injection

Measures	Experimental Group		Control Group	
Pain Scale				
Mild	18	60%	9	30%
Moderate	12	40%	15	50%
Severe	0	0%	6	20%
Mean	3.3		6	
<i>*p-value</i>	0.004			
Blood Pressure				
Mild	17	56.7%	11	36.7%
Moderate	9	30%	12	40%
Severe	4	13.3%	7	23.3%
Mean	122.5		124	
<i>*p-value</i>	0.98			
Heart Rate				
Mild	17	56.7%	14	46.7%
Moderate	7	23.3%	7	23.3%
Severe	6	20%	9	30%
Mean	82		92	
<i>*p-value</i>	0.02			
Respiratory Rate				
Mild	21	70%	12	40%
Moderate	9	30%	18	60%
Severe	0	0%	0	0%
Mean	18		22	
<i>*p-value</i>	0.001			

Table 2 shows the efficacy of the Helfer Skin Tap Technique (HSTT) in alleviating pain during tetanus toxoid injection among 60 pregnant women. The participants were divided into two groups: the Experimental Group, which received the tetanus toxoid injection with the application of HSTT, and the Control Group, which received the standard intramuscular injection. Pain levels were assessed using a pain scale categorized as mild, moderate, or severe. Additionally, physiological indicators of pain, including blood pressure, heart rate, and respiratory rate, were measured.

The results revealed a notable difference in pain perception between the two groups. In the Experimental Group, a significantly lower proportion of participants reported mild pain (60%) compared to the Control Group (30%), as evidenced by a p-value of 0.004. Moreover, the mean pain score was substantially lower in the Experimental Group (3.3) than in the Control Group (6).

When examining physiological indicators of pain, statistically significant differences were observed in heart rate and respiratory rate between the two groups. The Experimental Group exhibited lower mean heart rate (82) and respiratory rate (18) compared to the Control Group (heart rate: 92; respiratory rate: 22), with p-values of 0.02 and 0.001, respectively. However, no significant difference was found in blood pressure between the two groups.

These findings suggest that the implementation of HSTT during tetanus toxoid injection effectively reduces pain perception among pregnant women compared to the standard intramuscular injection. Furthermore, the physiological responses, as indicated by heart rate and respiratory rate, corroborate the subjective reports of reduced pain in the Experimental Group. This study underscores the potential of HSTT as a promising technique for pain management during injections in obstetric settings.

4. Discussion

In the experimental cohort, over half of the participants reported mild pain, whereas in the control group, approximately half experienced moderate pain. Conversely, in the experimental group utilizing the Helper skin tap technique, 60% reported mild pain during the injection, contrasting with only 30% in the control group employing the standard technique. Additionally, around 40% of the experimental group experienced moderate pain, while half of the control group encountered this level of discomfort. This indicates the effectiveness of the Helper Skin Tap technique in reducing pain during intramuscular injection compared to the standard technique. The table depicting these findings illustrates a notable difference in mean values between the two groups, with the experimental group having a mean of 3.3 and the control group 5, indicating statistical significance. Statistics revealed a significant disparity, with a p-value of 0.004, leading to the rejection of the null hypothesis. The pain induced by the injection triggers A-delta fibers, initiating sharp pain perception, as outlined by Cherry (2022) and Melzack & Wall (1965). The Gate Control Theory of Pain posits that non-painful inputs can modulate pain perception, with tapping as a non-painful stimulus, enhancing the flow of normal touch sensory information and lowering pain perception (Cherry, 2022; Melzack & Wall, 1965). The study's classification of pain levels based on changes in systolic blood pressure after injection aligns with the findings of Pfoh et al. (2020). While the Helper technique effectively reduced pain levels in relation to blood pressure, there was no significant difference in mean blood pressure between the two groups. Pain induces a rise in blood pressure, mediated by the sympathetic nervous system and stress hormones, as described by Saccò et al. (2013) and Ahmed (2023). However, acute pain does not directly cause hypertension, with blood pressure typically returning to normal once the pain subsides, aided by endogenous opioids (Rivasi et al., 2022). Heart rate increases in response to pain, with a rise of less than 5 beats per minute classified as mild pain, as proposed by Dayoub & Jena (2016). The experimental group exhibited substantially lower rates of severe pain compared to the control group, indicating the effectiveness of the Helper technique in reducing pain concerning heart rate. The difference in mean heart rates between the two groups was statistically significant, as confirmed by statistical results. Initial studies have shown that exposure to noxious stimuli elevates heart rate, although individual responses may vary (Dayoub & Jena, 2015). Similarly, the Helper technique was effective in reducing pain compared to the control group in terms of respiratory rate. The lateral parabrachial nucleus and the pre-Böttinger complex play crucial roles in processing pain and fear and regulating breathing rhythm, as observed by Liu et al. (2022). The significant difference in mean respiratory rates between the two groups, as indicated by the results, underscores the effectiveness of the Helper technique. Physiological changes during pregnancy contribute to a limited increase in the respiratory rate in response to pain, owing to compensatory mechanisms in the respiratory system (Hegewald & Crapo, 2011).

5. Conclusion

In conclusion, this study provides valuable insights into the efficacy of the Helper Skin Tap Technique (HSTT) in reducing pain associated with tetanus toxoid intramuscular vaccination among pregnant women. The findings underscore the significance of implementing effective pain management strategies in prenatal care settings to enhance maternal healthcare experiences.

The results revealed a significant difference in pain perception between the experimental group, where HSTT was employed, and the control group receiving standard intramuscular injection techniques. A substantially lower proportion of participants in the experimental group reported mild pain compared to the control group, indicating the effectiveness of HSTT in mitigating pain during vaccination.

Moreover, physiological indicators of pain, including heart rate and respiratory rate, corroborated the subjective reports of reduced pain in the experimental group. The lower mean heart rate and respiratory rate observed in the experimental group further support the efficacy of HSTT in pain management during intramuscular injections.

These findings contribute to the optimization of prenatal care practices by highlighting the potential benefits of integrating HSTT into routine vaccination procedures for pregnant women. By minimizing pain and discomfort associated with tetanus toxoid vaccination, HSTT can enhance the overall experience of prenatal care and promote maternal well-being.

Future research should focus on further exploring the long-term effects of HSTT on pain management in obstetric settings, as well as investigating its applicability to other types of intramuscular injections. Additionally, studies examining the cost-effectiveness and feasibility of implementing HSTT in healthcare settings are warranted to facilitate its widespread adoption and ensure equitable access to pain management interventions for pregnant women worldwide.

6. Implications

Implementing the Helfer Skin Tap Technique (HSTT) during tetanus toxoid intramuscular vaccination can significantly reduce pain perception among pregnant women. This contributes to enhancing the overall prenatal care experience by minimizing discomfort associated with routine vaccinations, thus promoting maternal well-being.

In addition, effective pain management strategies, such as HSTT, play a crucial role in improving maternal healthcare outcomes. By reducing pain during intramuscular injections, healthcare providers can encourage pregnant women to adhere to vaccination schedules, leading to better protection against tetanus for both mothers and infants. The findings of this study also suggest that HSTT has the potential to be applied beyond tetanus toxoid vaccination to other intramuscular injections in obstetric settings. This opens avenues for the integration of HSTT into various prenatal care procedures, thereby improving pain management across different healthcare contexts.

Moreover, integrating HSTT into routine prenatal care procedures could offer a cost-effective pain management solution. By reducing pain perception and associated physiological responses, HSTT may lead to decreased healthcare resource utilization, including fewer interventions to manage pain-related complications.

Future research should explore the long-term effects of HSTT on pain management in obstetric settings and its applicability to different types of intramuscular injections. Additionally, studies examining the cost-effectiveness and feasibility of implementing HSTT in various healthcare settings are warranted to facilitate its widespread adoption and ensure equitable access to effective pain management interventions for pregnant women worldwide.

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Informed Consent: The participants returned a signed copy of the written consent form.

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