Effect of Helfer skin tap technique on reducing pain in infants undergoing immunization

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Abstract

Background: Child immunization is one of the most important preventitive healthcare practices that shields kids against numerous contagious diseases. Although the practice is associated with immense benefits and advantages, immunization is reportedly characterized by pain that tends to distress kids as well as parents. For this reason, the role of nurses or healthcare providers cannot be underestimated while addressing the issue of pain associated with immunization. **Objective:** The aims of this research were to assess the effectiveness of Helfer skin tap technique in pain reduction in infants that are vaccinated, and also to find the relationship between effectiveness and some sociodemographics in infants. **Methods:** A randomized controlled trial was implemented in primary health care centres within the Rusafa Health Sector in Baghdad Governorate on December 23, 2024, to June 22, 2025. The study included a population of 156 infants aged 2-6 months old, both sexes included, undergoing intramuscular injection immunization. The participants were distributed equally into two separate groups: an intervention group undergoing the 'Helfer skin tap technique,' and another group following the usual method of vaccination. The information was collected through a questionnaire with items including parameters and FLACC scales. **Results:** Severe pain response was observed in all babies in the control group with a mean FLACC pain scale of 7.71 ± 0.824. However, the babies who received the Helfer skin tap technique showed moderate pain. A statistically significant association was also found between pain and the type of vaccine used. **Conclusion:** The result reveals that skin tap Helfer skin technique is an efficient non-pharmacological strategy to alleviate immunization pain among infants. **Recommendations:** It should be recommended that nurses and vaccination team members are educated on non-pharmacological pain relief methods, as well as Helfer skin tap techniques, to enhance pain relief during infant vaccinations.

Keywords: Helfer skin tap technique, immunization, pain, infant pain management

1 Introduction

The children are most precious to their families, and their health is most taken care of by their parents in advance through vaccination. Getting vaccinated regularly is not an unusual practice in childhood [1].

Immunization is the administration of a vaccine in order to stimulate the body's immune system in a bid to offer a protective measure against particular infectious diseases. In fact, this is a critical activity in the early years of a child's life in a bid to protect children against a wide range of health dangers. In fact, in newborn babies and toddlers, the region that is mostly used in carrying out intramuscular injection is in the anterolateral part of the thigh in a bid to reach the vastus lateralis muscle found in the outer part of the thigh, between the lower and upper parts. In other cases, particularly in children and adults, the deltoid muscle, which is about three finger widths below the acromion, is used to give the intramuscular injection [2, 3].

Immunization, a crucial aspect of public health, saving the lives of millions of people all across the world. According to the World Health Organization, vaccination has a major contribution to the saving of 154 million lives across the world for the last five decades, with 101 million lives being infants saved [4].

In Iraq, immunizations are considered a primary healthcare service, contributing significantly to protecting children against preventable diseases. Despite their significance, pain associated with immunizations is one of the major concerns among parents, occasionally causing some reluctance to adhere to immunization schedules. To address such a concern, it is important to apply effective strategies that help address pain not only among children, but also among parents, during immunizations [4, 5].

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Needle-related procedural pain, such as immunization, represents one of the leading causes of pain in children. According to the International Association for the Study of Pain, pain is described as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, which is particularly relevant as it acknowledges pain as a physical and psychological sensation" [6].

The sensitivity of the infant to pain is a result of the poor development of their inhibition pathways and the shorter route of the nervous transmissions compared to other children. The sensitivity of the infant raises a concern not only for the infant but also for the caregivers and the healthcare providers. Pain that is not properly managed during infancy and childhood leads to long-term effects of anxiety prior to medical procedures, fear of needles, and avoidance of medical procedures [7, 8, 9]. Research suggests that nearly 25% of adults have fear associated with needles and nearly 10% avoid procedures because of the pain [7, 8, 9].

To control the pain felt in immunizations, two methods can be used: Pharmacological approach, which includes the use of medications. Non-pharmacological approach, which does not include the use of medications. Another promising non-pharmacological technique that has shown potential in reducing the pain related to vaccinations is the Helfer skin tap technique [10]. Non-pharmacological treatment is particularly useful for the control of pain in less invasive procedures because it allows the patient to feel a regain of control over the situation and thus alleviates the helplessness that is associated with painful experiences [11]. Some of the methods under non-pharmacological treatment that received attention because of its simplicity and affordability include the Helfer skin tap method [11]. Helfer skin tap was developed in the late 20th century and works on the principles of the gate control theory of pain [11, 12].

2 Methodology

2.1 Design

A randomized controlled trial (RCT) was conducted during the period from 23th of September 2024 to 22th June 2025, to assess the impact of Helfer skin tap technique on reducing infants pain after receiving routine vaccination. Pain intensity was assessed once post-immunization using FLACC Pain Assessment Scale .

2.2 Setting

The research was carried out in the Rusafa Health Sector of Baghdad Governorate, specifically within primary healthcare centers affiliated with the sector. A total of 11 centers were included in the study, selected through a stratified random sampling technique.

2.3 Sample and sampling

The research targeted infants receiving vaccinations. From the analysis of the vaccination rates of children between 1 month and 1 year of age in the chosen health centers each month, a total of 156 infants were selected as the required sample size. This selection was carried out with the aid of a sample size calculator with a margin of error of 5% and a 95% confidence level, catering to the representation of the population of interest sufficiently well. Half of the selected samples comprised the control group and experimental group, consisting of 78 children each. These samples are selected through simple random sampling.

2.4 Inclusion criteria

The study will involve infants aged 1 to 12 months who are scheduled to attend immunization sessions. To be included in the study, the participants will need to be in good health and cannot be suffering from any condition such as neurological problems that may affect pain sensation. Additionally, the study will only involve infants who are being immunized through the intramuscular route and cannot be those that had pre-vaccination pain interventions. Parental consent will be necessary before enrolling the infant.

2.5 *Exclusion criteria*

Neonates with any acute or chronic medical conditions like congenital abnormalities, fever, or infections that might impact the pain response of the neonates will not be considered participants in the study. Neonates on any treatment or current pain medication that might have influenced pain perception are not qualified participants. Premature neonates, those born before the age of 37 weeks gestational age, are disqualified since there might be varying pain perceptions among them. Additionally, neonates whose guardians have not shown consent are disqualified.

2.6 *Data Collection*

The data was collected between February 2nd and April 11th, 2025. The primary healthcare centers were chosen on the Rusafa side. The parents' consent was obtained when they signed the consent form after properly briefing them on the study's goals. They were promised that all personal data with regards to themselves and their babies would be treated with utmost privacy. The parents were asked to choose either the control or experimental group in a random fashion. They did this in an easy random fashion. They were asked to choose one of two papers with equal folds. They had to choose which paper they want to use. They had two papers with different study group names. The parents in this research were asked to choose either to be part of the control or experimental group. They did this in an easy random fashion. They were asked to choose one of two papers with equal folds. They had to choose which paper they want to use. They had two papers with different study group names. They were asked to choose either to be part of the control or experimental group. They did this in an easy random fashion. They were asked to choose one of two papers with equal folds. They had to choose which paper they want to use. They had two papers with different study group names. They were asked to choose either to be part of the control or experimental group. They did this in an easy random fashion. They were asked to choose one of two papers

2.7 *Ethical consideration*

After obtaining the approval of the College of Nursing Council/University of Baghdad and the Research Ethics Committee of the aforementioned college for the study proposal, the Ministry of Planning, the General Authority for Statistics and Geographic Information Systems, was contacted to obtain a letter facilitating the study. The study protocol and questionnaire were reviewed by the authority, which approved the study. The Ministry of Health/Baghdad Health Department/Rusafa was then contacted to begin collecting the sample at its affiliated healthcare centers. After obtaining approval, the healthcare centers included in the study were visited and data collection began. The study objectives and purpose were explained, followed by written consent from the parents of the infants included in the study.

2.8 *Instrument of the study*

The FLACC pain assessment scale was utilized to measure the effectiveness of the Helfer skin tap technique in alleviating pain among infants receiving intramuscular immunizations. The data collection tool consisted of two primary sections:

2.9 *Sociodemographic characteristics*

This section focused on collecting key sociodemographic information related to both the infants and their parents. The form gathered data on the infant's age in months, sex, father's occupation, mother's occupation, type of family structure, parental education levels, household income, type of vaccine administered, and the regularity of healthcare visits

2.10 FLACC pain assessment scale form

The researcher applied the FLACC scale immediately after the immunization procedure, observing each infant for one minute to assess behavioral indicators of pain. This tool is widely used to evaluate pain in infants and young children who are unable to communicate their discomfort verbally [13].

The FLACC scale is composed of five key behavioral categories: Face, which assesses facial expressions associated with pain; Legs, which monitors movement or signs of tension; Activity, which evaluates general body movements; Cry, which captures vocal indicators of distress such as crying or moaning; and Consolability, which measures how easily the child can be calmed through verbal reassurance or physical comfort [14] .

Each of the five categories in the FLACC scale is scored from 0 to 2 based on specific observable behaviors. For example, in the Face category, a score of 0 indicates a calm expression, while a score of 2 reflects continuous frowning, a clenched jaw, or a quivering chin. The remaining categories—Legs, Activity, Cry, and Consolability—are similarly scored, with 0 representing relaxed behavior and 2 indicating noticeable signs of distress, such as kicking, crying, or being difficult to soothe. The individual scores are summed to yield a total score ranging from 0 to 10, where higher scores signify more intense pain: 0 denotes no pain, 1–3 indicates mild pain, 4–6 corresponds to moderate pain, and 7–10 reflects severe pain [13].

The FLACC scale has demonstrated strong validity across various clinical settings and is especially effective for assessing pain in non-verbal children undergoing procedures like immunizations [15]. In addition, the FLACC scale has shown high reliability, as evidenced by studies including the original research by Merkel et al. which reported strong inter-rater and test-retest consistency. These qualities make the FLACC scale a dependable and standardized tool for evaluating pain in pediatric populations [16].

2.11 Analysis of data

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS), version 26.0. Descriptive statistics such as frequency, percentage, mean, and standard deviation were applied to summarize the data. Inferential statistical methods used in the analysis included the Mann-Whitney U test, Kruskal Wallis H test, Dunn's post-hoc test, Bonferroni correction, Spearman's rank correlation coefficient, and the point biserial correlation coefficient.

3 Results

Table 1 presents the distribution of sociodemographic characteristics among the study groups. The infant age distribution includes those at two, four, and six months, with six-month-old infants representing the largest proportion in both groups. Despite some variation in age frequencies, variance analysis ($\Lambda = 0.337$, $p = 0.714$) indicated no statistically significant differences between groups, confirming that the groups were comparable in terms of age.

Table 1: Distribution of participants according to their socio-demographic variables in each group

List	Group variables	Control		Helfer		Variance test
		No	%	No	%	

1	Age (Months)	Two	23	29.5	19	24.4	Λ=.337 P= .714 Sig= N.S
		Four	27	34.6	29	37.2	
		Six	28	35.9	30	38.5	
		Total	*78*	*100*	*78*	*100*	
2	Sex	Male	36	46.2	20	25.6	Λ= 12.415 P= .000 Sig= H.S
		Female	42	53.8	58	74.4	
		Total	*78*	*100*	*78*	*100*	
3	Father's occupation	Public sector	33	42.3	36	46.2	Λ= 4.442 P= .013 Sig= S
		Private sector	45	57.7	42	53.8	
		Total	*78*	*100*	*78*	*100*	
4	Mother's occupation	Public sector	10	12.8	4	5.1	Λ= 3.679 P= .027 Sig= S
		Private sector	13	16.7	14	17.9	
		Housewife	55	70.5	60	76.9	
		Total	*78*	*100*	*78*	*100*	
5	Type of family	Single parent	3	3.8	1	1.3	Λ= .072 P= .931 Sig= N.S
		Nuclear family	53	67.9	54	69.2	
		Extended family	22	28.2	23	29.5	
		Total	*78*	*100*	*78*	*100*	
6	Father's education	Read & write	1	1.3	4	5.1	Λ= 1.051 P= .351 Sig= N.S
		Primary school	4	5.1	6	7.7	
		Middle school	12	15.4	12	15.4	
		Secondary school	22	28.2	18	23.1	
		Diploma	12	15.4	21	26.9	
		Bachelor	21	26.9	15	19.2	
		Higher diploma	6	7.7	2	2.6	
		Total	*78*	*100*	*78*	*100*	
7	Mother's education	Doesn't read & write	4	5.1	1	1.3	Λ= 7.572 P= .001 Sig= H.S
		Read & write	6	7.7	4	5.1	
		Primary school	11	14.1	17	21.8	
		Middle school	11	14.1	15	19.2	
		Secondary school	7	9	14	17.9	
		Diploma	12	15.4	9	11.5	
		Bachelor	25	32.1	15	19.2	
		Higher diploma	2	2.6	3	3.8	
		Total	*78*	*100*	*78*	*100*	
8	Monthly income (Iraqi Dinar)	Less than 200000	0	0	0	0	Λ= .275 P= .231 Sig= N.S
		200000 – 500000	0	0	0	0	
		501000 – 800000	29	37.2	38	48.7	
		801000 – 1100000	21	26.9	18	23.1	
		1101000 – 1500000	17	21.8	16	20.5	
		1501000 and more	11	14.1	6	7.7	
		Total	*78*	*100*	*78*	*100*	
9	Type of vaccine	Fifth vaccine	37	47.4	43	55.1	Λ= .087 P= .917 Sig= N.
		PCV vaccine	28	35.9	25	32.1	
		IPV vaccine	13	16.7	10	12.8	
		Total	*78*	*100*	*78*	*100*	

10	Medical visits	Regular	76	97.4	76	97.4	Λ= .821
		Irregular	2	2.6	2	2.6	P= .441
		Total	*78*	*100*	*78*	*100*	Sig= N.
No: Number, %: Percentage, Λ= Levene's Test, P: Probability value, Sig: Significance, N.S: Not significant, S: Significant, H.S: High significant							

A statistically significant difference was found in the distribution of sex between the study groups (p = 0.000, indicating high significance). In the Helfer group, female infants made up a substantially larger proportion (74.4%) compared to males (25.6%), whereas the Control group showed a more balanced gender distribution.

A notable difference in paternal employment was observed between the groups. In the Helfer skin tap group, 53.8% of fathers were employed in the private sector, whereas in the Control group, the proportion was slightly higher at 57.7%.

With respect to maternal occupation, most mothers in both groups were housewives, with the highest proportion observed in the Helfer skin tap group, where 76.9% of participants fell into this category.

Regarding family structure, the majority of participants in both groups belonged to nuclear families 67.9% in the Control group and 69.2% in the experimental group while extended and single-parent households accounted for a smaller percentage of the sample.

In both groups, most fathers had attained either a secondary school education or held a diploma-level qualification.

Regarding maternal education, a larger percentage of mothers in the Control group held a bachelor's degree (32.1%), while the Helfer group had a higher proportion of mothers with only primary-level education (21.8%).

The majority of families reported a monthly income between 501,000 and 800,000 IQD, with this range being most prevalent in the helfer group, where it accounted for 48.7% of participants.

Vaccine type distribution was comparable between the study groups, with no statistically significant differences noted (p = 0.917). The fifth vaccine was the most frequently administered in both groups, followed by the pneumococcal conjugate vaccine and the IPV vaccine.

Furthermore, over 97% of participants in both groups reported attending regular medical checkups, with no significant difference between them (p = 0.441). This indicates a strong level of healthcare engagement within the study population.

Table 2 illustrates the distribution of pain intensity among children receiving immunizations across two groups: the control group (without any intervention) and the Helfer skin tap group. In the control group, all infants (100%) experienced severe pain, with a high mean pain score of 7.71 ± 0.824, reflecting considerable discomfort. Conversely, in the Helfer skin tap group, all participants (100%) reported moderate pain, with a significantly lower average pain score of 4.86 ± 0.864, indicating a notable reduction in pain intensity.

Table 3 presents the statistical comparison of pain scores between the control and intervention groups using the Mann-Whitney U test. The findings revealed a highly significant difference in pain levels between the two groups. The control group had a higher mean rank of 117.50, whereas the Helfer skin tap group showed a substantially lower mean rank of 39.50. The Z-score for the Helfer skin tap group was -10.994, with a p-value of .000, indicating a statistically highly significant difference. These results strongly support the effectiveness of the Helfer skin tap technique in reducing pain after immunization.

Table 4 summarizes the results of the Kruskal-Wallis H test, conducted to evaluate differences in pain scores among children after immunization based on the intervention method used. The analysis demonstrated a statistically highly significant difference between the groups (p = .000, df = 2, H = 202.671). The control group, which received no pain-relief intervention, exhibited the highest mean rank for pain (195.50), while the Helfer skin tap group had a lower mean rank (113.69). This pattern suggests that the Helfer skin tap technique was effective in reducing pain levels. Overall, the findings underscore the benefit of nonpharmacological strategies particularly the Helfer skin tap method in managing immunization related pain in children.

Table 2: Pain levels among children undergoing immunization without intervention technique (control) and with intervention technique (Helfer skin tap technique)

Group	Control		Helfer skin tap	
Pain	No	%	No	%
No pain	0	0	0	0
Mild pain	0	0	0	0
Moderate pain	0	0	78	100
Severe pain	78	100	0	0
Total	78	100	78	100
Mean ±SD	7.71 ± .824		4.86 ± .864	
No: Number, %: Percentage, M: Mean of total score, SD Standard deviation				

Table 3: Significant difference in pain score based on application technique for infant undergoing immunization

Pain Technique	N	Mean Rank	Mann-Whitney U	Z-score	p-value	Sig.
Control	78	117.50	3081.000	-10.994	.000	H.S
Helfer skin tap	78	39.50				
N: Number, p: Probability, Sig.: Significance, HS: High Significant, N.S: Not Significant						

Table 4: Significant difference in pain score based on application of intervention techniques for children during immunization

Pain Technique	N	Mean Rank	Kruskal-Wallis H	df	P-value	Sig
None (Control)	78	195.50	202.671	2	.000	H.S
Helfer skin tap	78	113.69				
N: Number, df: Degree of freedom, P: Probability, Sig: Significance, N.S: Not significant						

Table 5 shows that the comparison between the control group and the Helfer skin tap group resulted in a borderline statistically significant finding (adjusted p = 0.051), suggesting a potential, though not conclusive, reduction in pain.

Table 6 indicates that among the examined sociodemographic variables, only the type of vaccine showed a statistically highly significant association with pain scores during the application of the Helfer skin tap technique (p = .000, r = -0.816). This strong negative correlation suggests that infants who received the pneumococcal conjugate or IPV vaccines reported notably lower pain levels compared to those who received the fifth vaccine, highlighting the role of vaccine type in pain perception. In contrast, no significant correlations were found between pain scores and the child's age (p = .566), sex (p = .807), or frequency of medical visits (p = .817), suggesting these variables did not substantially impact pain levels when the Helfer skin tap method was employed.

Table 5: Multiple comparisons of pain scores using Dunn's and Bonferroni Post-Hoc test between both groups for children undergoing Immunization

Comparison	Z-value	Raw p-value	Adjusted p-value (Bonferroni)	Significance
Control vs. Helfer skin tap	2.39	0.017	0.051	Borderline

Table 6: The relationships between pain score with Helfer skin tap technique and Sociodemographic variables of children

Variables		Pain Score		
		Mean	SD	Association
Child's age (Months)	Two	4.84	.958	r^s= .066 P-value= .566 Sig= N.S
	Four	5.00	.886	
	Six	4.73	.785	
	Total	4.86	.864	
Child's sex	Male	4.90	.912	r^*= .028 P-value= .807 Sig= N.S
	Female	4.84	.854	
	Total	4.86	.864	
Type of vaccine	Fifth vaccine	5.56	.502	r^s= -.816 P-value= .000 Sig= H.S
	PCV vaccine	4.00	.000	
	IPV vaccine	4.00	.000	
	Total	4.86	.864	
Medical visits	Regular	4.86	.875	r^*= .027 P-value= .817 Sig= N.S
	Irregular	5.00	.000	
	Total	4.86	.864	
r^s: Spearman correlation coefficient, r^*: Biserial correlation coefficient, P: Probability, Sig: Significance, N.S: Not Significant, S: Significant, H.S: High Significant				

4 Discussion

4.1 Socio-demographic variables in each group

4.1.1. Age . The present study showed that the sample includes infants at two, four, and six months, with the highest proportion being six-month-old infants in both group (35.9%) for control group and (38.5%) for experimental group .

These findings are consistent with those reported by Mostafa et al. (2020), who investigated the impact of skin cooling techniques on pain relief during and after immunization in infants. Their study noted that 33% of six-month-old infants were in the control group [17].

In contrast, which examined pain levels in infants during intramuscular injections, differed from the present research. Their findings showed that infants aged three months constituted 30% of their sample [18].

From the researcher's perspective, the predominance of six-month-old infants in this study likely mirrors the national immunization schedule in Iraq, which schedules multiple vaccines at the six-month visit. This results in a higher number of infants receiving vaccinations at this age. Furthermore, by six months, parents may become more accustomed to and engaged with the immunization process, contributing to increased attendance rates during this stage.

4.1.2. Sex. In this study the percentage of females are higher than male participants which are (74.4%) in the helfer group and (53.8%) in the control group.

These results are consistent with the study conducted by Shawq et al. [19] to determine the effect of music in reducing the pain and anxiety of thermally burned children during routine dressing changes. The study result indicate that the female in the study group (52.5%) was more than male (47.5%) [19]. Additionally, a 2019 study by Peter and Mathew [20] examining pain levels in infants receiving the Helfer skin tap technique during vaccination at selected hospitals in Pathanamthitta district found that female participants outnumbered males. The study reported that females comprised 67.1% of the sample, whereas males accounted for 32.9% [20].

There is a study that contradicts this study results by Shawq [21] to determine the effectiveness of the deep breathing technique on children's pain intensity during urine catheterization procedures. Where the percentage of males was (58.3 %) while the percentage of females was (41.7% ,21).and this is consistent with the result of of a study conducted by Mizal et al. (2024) to compare the effect of hospitalized and outpatient settings on quality of sleep in children with respiratory tract dysfunction where they found that more than half of participants in hospitalization were male 64.0% as compared with those in outpatient group male accounted 58.4% [22].

From the researcher's perspective, the higher number of female infants compared to males in the study sample might be coincidental, possibly due to the random sampling method or the specific timing of data collection, rather than indicating a true demographic disparity within the population.

4.1.3. Father's occupation. According to the findings of this study most of parent of the participant in the two group were working in the private sector.

The findings of Khalel and Shawq (2024) support the current study where the result of the study showed that (75.6%) of fathers included in the study was not employed [23].

From the researcher's point of view The employment patterns among fathers in this study mirror wider socioeconomic shifts in Iraq, where private sector jobs have become more prevalent as opportunities in government roles have remained limited.

4.1.4. Mother's occupation. The result of this study indicate A large proportion of mothers were housewives in the two group, especially in the helfer group (76.9%).

This study agree with a study conducted by Hussain and Mohammed (2021) where the result of the study indicate that (70.6%) of mothers were housewife [24].

Conversely, a 2024 study by Kamal et al. [25] examining the quality of life and socioeconomic disparities among children with cyanotic congenital heart disease in Sulaymaniyah, Iraq, found that 55.2% of the mothers in the sample were employed in the public sector [25].

From the researcher's point of view Most mothers in the study were housewives, a pattern likely shaped by restricted job opportunities within government sectors and the increased flexibility that this role offers, potentially facilitating better access to healthcare services.

4.1.5. Type of family. Most of families in the present study are nuclear (67.9%) for control group and (69.2%) for experimental group.

Adokiya et al. [26] conducted a study to assess immunization coverage and related factors among children aged 12 to 23 months in Techiman Municipality, Ghana. The study concluded that the majority of the children's parents belonged to nuclear families, accounting for 52% of the sample [26].

From the researcher's perspective, this pattern reflects a typical family structure in urban and semi-urban regions of Iraq. Understanding these demographic traits is crucial in pediatric care, as nuclear families tend to have fewer members, which may influence caregiving practices, the level of parental attention, and the emotional support a child receives during medical treatments.

4.1.6. Father's and mother's education. In this study The largest proportion of participant have a secondary school degree for fathers (28.2%) in the control group and bachelor's degree for mothers (32.1%) also in the control group.

This study aligns with several previous investigations. For example, Mohamed et al. [27] evaluated the impact of the Helfer skin tap Technique on pain perception and trypanophobia among patients using analgesics. Their findings indicated that 41% of participants of both sexes held a bachelor's degree, while 39% had completed secondary education [27] . a study conducted by Kareem in [28] the result show that (43%) of mothers in the study was Secondary school graduated [28] , another study by Muslim et al. [29] included (53.2%) of participant with college graduated [29].

From the researcher's point of view Higher educational attainment is generally associated with better health literacy, increased knowledge of pain relief methods, and greater adherence to recommended vaccination schedules.

4.1.7. Monthly income (Iraqi Dinar). Most of families within this study have moderate economic status . Similarly , A study by Kavlu and Begum (2024) explored differences in parental concerns about children's education in Iraq, focusing on the influence of education level and income. The findings indicated that the largest proportion of parents (62.3%) reported a medium income level [30].

In contrast, a 2024 study by Karim investigating quality of life and socioeconomic disparities among children with cyanotic congenital heart disease in Sulaymaniyah found that the largest portion of parents in the sample (31.3%) belonged to the lowest economic status group(25).

From the researcher's perspective, the fact that nearly half of the participating families reported a moderate monthly income suggests a degree of economic stability within the study population. In Iraq, having a moderate income often improves families' ability to access healthcare services.

4.1.8. Type of vaccine. This study reported that the most commonly vaccine is fifth vaccine that given to children .

A study that supports the findings of Peter and Mathew [20], which assessed pain levels in infants receiving the Helfer skin tap during vaccination at selected hospitals in Pathanamthitta district, reported that 64% of the vaccinations administered were the Pentavalent vaccine [20].

From the researcher's point of view The fifth vaccine was the most commonly given to infants in the study, a pattern that likely reflects its scheduled administration at around two and six months of age. the age groups that made up the majority of the participants.

4.1.9. Medical visits. This study report that most of sample of the study have regular visits and adhering to the immunization schedule.

The results of this study align closely with those of Hargreaves et al. [31], who investigated adherence to timely vaccinations in the United States and found that only 63% of families complied with the recommended immunization schedule for their children. Another study support these findings to assess depressive symptoms in adolescents with diabetes type I the study concluded that 74% of sample have regular visits to the diabetes center [32].

Conversely, this study's findings differ from those of Ali et al. [33], who examined immunization adherence rates during the first year of life in Misan. Their research reported that only 22.8% of participants fully adhered to the national immunization schedule, while 68% showed partial adherence and 9.2% did not adhere at all [33].

From the researcher's point of view the high rate of adherence to scheduled medical appointments likely indicates a growing awareness among Iraqi parents about the significance of immunizations.

4.2 Pain levels among children undergoing immunization without intervention technique (control) and with intervention technique (helfer skin tap technique).

4.2.1. Control group. All children in the present study (100%) experienced severe pain with a high mean pain score of 7.71 ± 0.824, indicating the highest level of discomfort.

A 2024 study by Horo, which assessed pain levels during pentavalent vaccination among infants in a control group at an immunization clinic in a selected hospital in Bangalore, supports these findings. The study reported that the majority (85%) of infants in the control group experienced severe pain [34].

A study with contrasting results was conducted by Meera et al. (2014) to evaluate the effectiveness of the Helfer skin tap technique during immunization in infants at a hospital and Anganwadi in Ambala, Haryana. Their findings revealed that 68% of infants in the control group experienced moderate pain during immunization [35].

From the researcher's perspective, these results provide compelling evidence of the significant discomfort infants experience during routine vaccinations when pain management strategies are not applied.

4.2.2. Helfer skin tap group. In this study, all infants in the experimental group (100%) were reported to experience moderate levels of pain.

Comparable results were observed in a study by Meera et al. (2014), which aimed to assess and compare pain levels in infants with and without the use of the Helfer skin tap technique during immunization. Their findings showed that approximately 98% of infants in the experimental group experienced moderate pain. [35].

The findings of the present study differ from those reported by Peter and Mathew (2019), who evaluated pain levels during intramuscular injections using the Helfer skin tap technique among children in selected hospitals in the Pathanamthitta district. In their study, 57% of children in the experimental group experienced only mild pain [20].

4.2.3. Researcher's perspective. The results suggest that the Helfer skin tap technique provides a meaningful, though not absolute, reduction in pain likely attributed to its mechanism of activating cutaneous receptors to block pain transmission, consistent with the gate control theory. Given its ease of use, safety, and non-invasive approach, this method presents significant potential for effective pain management in clinical practices across Iraq.

4.2.4. Pain score. The results (Tables 3-5) demonstrate a highly significant difference in pain levels between the control and intervention groups. Children in the control group had a notably higher mean rank of 117.50, compared to 39.50 in the Helfer skin tap group. These outcomes confirm that the intervention methods effectively reduced pain in infants receiving immunizations

These results align with those of a study by Karabey and Karagozoglu [36], which compared the effectiveness of the Helfer skin tap technique and ShotBlocker application in reducing pain during intramuscular injections administered to the deltoid muscle. The study concluded that the ShotBlocker was the most effective in minimizing injection-related pain, outperforming both the Helfer skin tap method and routine care. However, the Helfer skin tap technique still demonstrated superior pain control compared to the standard procedure.

From the researcher's perspective, these results provide strong support for the effectiveness of Helfer skin tap in relieving pain in children undergoing vaccination, likely due to its physiological effect of disrupting nerves at the injection site.

4.3 The relationships between pain score with helfer skin tap technique and sociodemographic variables of children

Table 6 demonstrates that among the examined sociodemographic variables, only the type of vaccine showed a statistically highly significant relationship with pain scores during the Helfer skin tap technique ($p = .000$, $rs = -.816$).

A study comparable to the present research was conducted by Willame et al. (2017), which found that children receiving the Priorix vaccine (GSK Vaccines) experienced less immediate injection pain compared to those given the M-M-R II vaccine [37].

From the researcher's point of view These results suggest that different vaccines can trigger varying degrees of pain response in infants.

5 Conclusion

The study concluded according to the result founded that majority of participant age was six month in both groups with the majority of study sample was female infants, the parents of the infants most of them were have primary to Bachelor's degree with higher proportion of mothers housewives and fathers working in a private sector, the large percentage of samples was from nuclear family with moderate economic status and regular medical visits to primary healthcare centers with the most frequent given vaccine was fifth vaccine. The pain perception was reduced to moderate pain with helfer skin tap group compared to sever pain in control group which indicate that helfer skin tap technique is the best technique in pain management With highly significant association was observed between the type of vaccine administered and pain perception in infant.

6 Recommendations

Based on the result of this study the researcher recommend to use non pharmacological technique (helfer skin tap technique) by the nurse or healthcare providers in order to reduce pain for infants undergoing immunization in the primary health care centers and developing protocol By the competent authorities to act in accordance with it.

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