Effectiveness Of Video-Assisted Teaching on The Skin Tap Technique During Pentavac Injection: A Quasi-Experimental Study Among Nursing Students

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Abstract

Pain management during paediatric vaccination is a crucial aspect of safe and compassionate nursing. In preschool and infant immunization, intramuscular injections like the PENTAVAC vaccine cause significant pain and anxiety. The Helfer Skin Tap Technique—a simple, non-invasive method based on the Gate Control Theory of Pain—has proven highly effective at reducing pain perception, yet widespread clinical application remains limited due to gaps in nursing training.

Objective: This study aimed to: (1) assess the pre-test knowledge regarding the Helfer skin tap technique on pain response during Pentavac injection among ANM (Auxiliary Nurse Midwife) students; (2) evaluate the effectiveness of a Video-Assisted Teaching Programme (VATP) by comparing pre-test and post-test knowledge scores; and (3) determine the association between pre-test knowledge scores and selected socio-demographic variables.

Methods: A quantitative, quasi-experimental one-group pre-test post-test research design was conducted at the Bora Institute of Allied Health Sciences, Lucknow, U.P. A sample of 60 ANM students was selected using a non-probability purposive sampling technique. Data collection tools included a demographic profile, the VATP instructional intervention, and a 29-item self-structured multiple-choice knowledge questionnaire evaluating the mechanics and clinical benefits of the skin tap technique.

Results: Baseline demographic characteristics (n = 60) revealed that the participating ANM students were highly homogenous: 91.7% were aged 17–22 years, 98.33% identified as Hindu, 91.7% resided in rural areas, and 93.33% were unmarried. Following the implementation of the Video-Assisted Teaching Programme, the post-test knowledge scores showed a statistically significant increase compared to the pre-test baseline scores (e.g., $p<0.05$ or $p<0.001$), confirming the high educational efficacy of visual training media. Furthermore, inferential statistical analysis indicated no statistically significant association ($p>0.05$) between the pre-test knowledge scores and key socio-demographic variables (such as age, rural/urban residence, or monthly income), demonstrating that baseline knowledge gaps were uniform across the entire student cohort.

Conclusion: The study demonstrates that a Video-Assisted Teaching Programme is highly effective in upgrading the clinical knowledge of ANM students regarding pediatric pain relief. Given the uniform lack of initial awareness across all demographic backgrounds, integrating visually targeted tools into core nursing curricula is essential to prepare front-line healthcare workers for implementing low-cost, non-pharmacological pain reduction strategies like the Helfer Skin Tap Technique in routine immunization drives.

Keywords: Helfer Skin Tap Technique, pain management, immunization, nursing, Video-Assisted Teaching.

1. Introduction

Pain management during vaccination is an essential component of safe and compassionate nursing practice. In pediatric immunization, intramuscular (IM) injections such as the PENTAVAC vaccine are commonly associated with significant pain, crying, fear, and anxiety among children. Reducing injection-related pain is therefore a key responsibility of nurses, especially ANM (Auxiliary Nurse Midwife) students.[1]

Globally, immunization is recognized as one of the most cost-effective public health interventions. UNICEF (2023) estimates that vaccination prevents approximately 4.4 million deaths annually, yet disparities remain across countries due to accessibility gaps, vaccine hesitancy, and fear of injection-related pain. Pain experienced during vaccination is one of the major factors contributing to distress, reduced compliance, and negative healthcare experiences among children and caregivers. According to the World Health Organization (WHO, 2024), global DTP3 (third dose of diphtheria-tetanus-pertussis vaccine) coverage stands at approximately 85%, while 14.3 million children worldwide remain "zero-dose," receiving no vaccination at all. A Video-Assisted Teaching Programme (VATP) is an effective educational tool for improving knowledge, demonstration skills, and retention among

nursing students. Visual learning methods help students better understand clinical techniques and apply them accurately during procedures.[2]

In India, immunization rates have improved significantly but still vary widely by region. According to NFHS-5 (2019–21), the full immunization coverage (children aged 12–23 months) was 76.1%, while the Ministry of Health (2023–24) reported an increase to 93.23% through intensified immunization programs. However, challenges persist, especially in large and diverse states like Uttar Pradesh. NFHS-5 data shows that in Uttar Pradesh, full immunization coverage increased from 51.1% (NFHS-4) to 69.6%, indicating progress but also highlighting the need for improved practices, including pain-reduction strategies to increase cooperation during vaccination.[3]

At the local level, Lucknow district has shown strong performance in routine immunization. In 2022-23, Lucknow achieved 122.89% of its target during routine immunization drives, a remarkable accomplishment reflecting high outreach and coverage. However, research also shows variability within the district. Given this scenario, reducing pain during procedures such as PENTAVAC injections becomes crucial to improve acceptance of vaccines. One effective, evidence-based strategy is the Helfer Skin Tap Technique, introduced by Joanne Kieffer Helfer (2000). The technique involves rhythmic tapping at the injection site before and during needle insertion, stimulating large-diameter nerve fibers and reducing pain perception through the Gate Control Theory of Pain. Because it is simple, inexpensive, and requires no equipment, it is suitable for use in community settings, primary health centres, and during outreach immunization. Recent research supports its effectiveness. A 2024 randomized controlled trial by Sönmez Düzkaya et al. demonstrated that the Helfer Skin Tap Technique significantly lowers pain and fear levels during pediatric vaccinations. Despite its effectiveness, awareness and practical application of this technique remain low among nursing and ANM students due to lack of exposure during training.[4]

1.1 Need of the Study

According to World Health Organization, there are 16 billion injections administered every year. Around 5% of these injections are for immunizing children and adults, and 5% are for other procedures like blood transfusions and injectable contraceptives. The remaining 90% of injections are given into muscle (intramuscular route) or skin (subcutaneous or intra dermal route) to administer medicines. [5]

The use of Helfer skin taps technique to reduce pain during IM injections have been proved effective in different studies. (Manju, (2014), reported that Helfer skin tap tapping is a simple and in-expensive procedure to reduce pain during IM injection. No adverse effect of using Helfer skin tap technique will be noted in the previous studies (George).[6]

Providing pain relief is considered a most basic human right, so it is the responsibility of the nurse to use most effective approach to pain control. Nurses are ethically and legally responsible for managing pain and reliving suffering. Effective pain management not only reduces physical discomfort, but also improves quality of life.[7]

Pain is a complex phenomenon, a subjective sensation which normally humans tend to avoid. The current review was done with an objective of exploring whether nurses are aware of Helfer skin tap technique and practicing it in clinical areas. It was found that innumerable number of researches have been done assessing the effect of Helfer skin tap technique on I/M injection pain, concluding that it is significantly effective. Practicing Helfer skin tap technique routinely by nurses can contribute to improve patients' comfort level by reducing the interventional pain. Effectiveness of skin tap technique in reducing pain response during DPT injection has also been assessed.[8]

Assess the pain level of infants during vaccination receiving Helfer skin tap techniques during vaccination. Effectiveness of Helfer skin tap techniques on pain reduction among children (0–5 years) receiving I/M injection in pediatric units. [9]

Enhancing knowledge regarding and attitudes towards pentavalent vaccine among mothers of under-five children. A study to evaluate the knowledge of pentavalent injections and its vaccine among undergraduate nursing students at BIAHS.[10]

1.2 Objectives of the Study

1. To assess the pre-test knowledge regarding skin tap technique on pain response during Pentavac injection among ANM students.
2. To evaluate effectiveness of video assisted teaching program on knowledge regarding skin tap technique among ANM students by comparing pre-test & post-test knowledge scores.
3. To find out the association between pre-test knowledge scores with selected Socio demographic variables.

2. Methods

Research Approach: Quantitative Research Approach.
Research Design: One group pre-test post-test quasi- experimental research.
Study Setting: The study was conducted at Bora Institute of Allied Health Sciences, Lucknow, U.P.
Target Population: The target population of this study was ANM students in Bora Institute of Allied Health Sciences, Lucknow, U.P.
Sample Size: In this study, the sample size was 60 based on statistical calculations to ensure adequate representation of the target population.
Sampling Technique: Sampling technique used in the study was non-probability purposive sampling technique.

2.1 Development and Description of the Tools

The tools in this study are:
Tool 1-Demographic profile: It includes age, educational, gender, religion, and previous knowledge regarding skin tap technique on pain response during Pentavac injection.
Tool 2- Video assisted teaching: Video-assisted teaching is an instructional method that integrates video content—such as recordings, tutorials, or demonstrations—to enhance traditional teaching, aiming to improve student comprehension, engagement, and knowledge retention.
Tool 3- Self structured knowledge questionnaire: Knowledge questionnaires were developed by researcher to assess knowledge regarding skin tap technique. This tool considered 29 multiple choice questions have four options. Out of four options only one will be correct of skin tap technique.

3. Data Analysis and Results

3.1 Section A: Distribution of Demographic Variables of ANM Students

Table 1: Frequency and Percentage Distribution of ANM Students According to Demographic Variables and Baseline Knowledge (n = 60)

Variable	Category	Frequency (N)	Percentage (%)
Age (years)	17–22	55	91.7
	23–28	4	6.7
	29 - 34	1	1.7
	Above 35	0	0.0
Religion	Hindu	59	98.33
	Muslim	1	1.7
	Christian	0	0.0
	Others	0	0.0
Place of Residence	Rural	55	91.7
	Urban	5	8.3
Marital Status	Married	4	6.66
	Unmarried	56	93.33
	Others	0	0.0
Monthly Income (₹)	Below 10,000	32	53.3
	10,001– 20,000	15	25.0
	20,001– 30,000	4	6.7
	Above 30,000	9	15.0
Family Type	Joint	42	70.0
	Nuclear	17	28.3
	Extended	1	1.7
Previous Exposure to Skill	Yes	34	56.7
	No	26	43.3
Knowledge on Skin Tap Technique	Yes	31	51.7
	No	29	48.3
Source of Knowledge	Teachers	27	45.0
	Clinical Posting	15	25.0
	Self-study	8	13.3

Variable	Category	Frequency (N)	Percentage (%)
	Others	10	16.7

Table 1 shows that the majority of ANM students (91.7%, n = 55) belonged to the age group of 17–22 years, indicating that most participants were young trainees. Most students were Hindu (98%, n = 59) and resided in rural areas (91.7%, n = 55). With respect to marital status, 93% (n = 56) were unmarried, while 6.7% (n = 4) were married. More than half of the students (53.3%, n = 32) belonged to families with a monthly income below ₹10,000, reflecting a lower socioeconomic background. Slightly more than half of the students (56.7%, n = 34) reported previous exposure to the skill, whereas 43.3% (n = 26) had no prior exposure. Baseline assessment showed that only 51.7% (n = 31) had prior knowledge of the skin tap technique, while 48.3% (n = 29) lacked such knowledge. Teachers were the main source of information for 45% (n = 27) of students, followed by clinical postings (25%, n = 15), indicating limited diversified learning exposure and highlighting the need for structured video-assisted teaching.

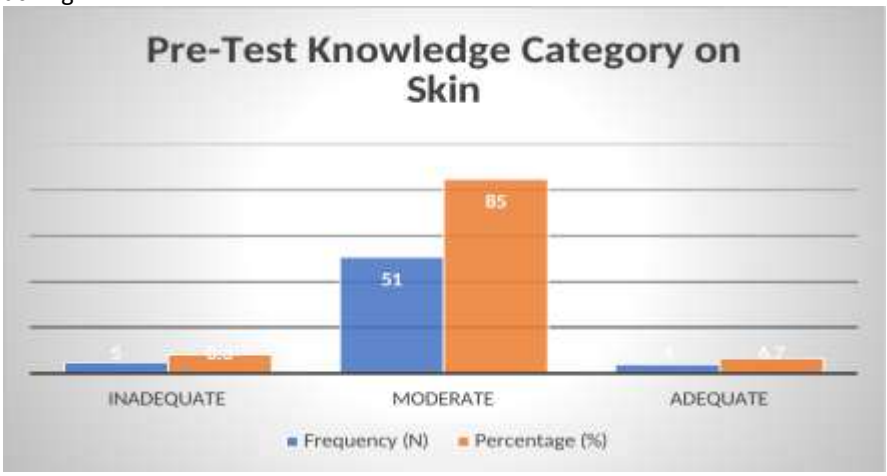


Figure 1: Distribution of ANM Students According to Pre-Test Knowledge Category on Skin Tap Technique

The figure illustrates the pre-test knowledge level of ANM students regarding the skin tap technique. It shows that the majority of students, 85% (n = 51), had moderate knowledge before the intervention. A smaller proportion, 8.3% (n = 5), demonstrated inadequate knowledge, while only 6.7% (n = 4) had adequate knowledge in the pre-test.

3.2 Section B: Assessment of Pre-Test and Post-Test Knowledge Regarding Skin Tap Technique

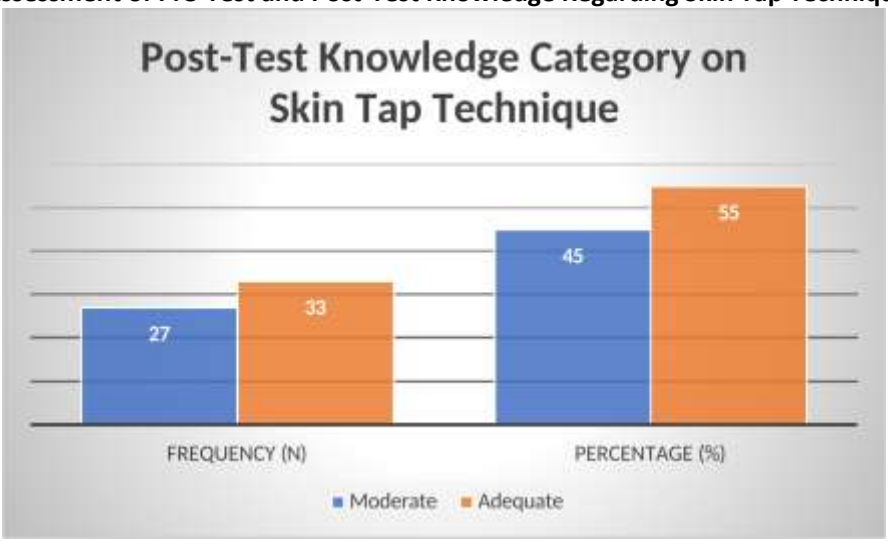


Figure 2: Distribution of ANM Students According to Post-Test Knowledge Category on Skin Tap Technique

The figure depicts the post-test knowledge level of ANM students regarding the skin tap technique after the implementation of the video assisted teaching programme. It shows that 55% (n = 33) of the students achieved adequate knowledge, while 45% (n = 27) remained in the moderate knowledge category. Notably, none of the students were categorized under inadequate knowledge in the post-test. This clear improvement in knowledge levels demonstrates the effectiveness of the video assisted teaching programme in enhancing students' understanding of the skin tap technique.

3.3 Section C: Comparison of Pre-Test and Post-Test Knowledge Scores

Table 2: Comparison of Pre-Test and Post-Test Knowledge Scores of ANM Students on Skin Tap Technique (n = 60)

Test	Mean	Standard Deviation	Mean Difference	t-value	Df	p-value
Pre-Test	10.93	2.28	3.62	10.14	59	<0.001*
Post-Test	14.55	2.33				

**Statistically significant at p < 0.05*

Table 2 presents the comparison of pre-test and post-test knowledge scores of ANM students regarding the skin tap technique using a paired t-test. The mean pre-test knowledge score was 10.93 ± 2.28, which increased to 14.55 ± 2.33 in the post-test after the video assisted teaching programme. The mean difference in scores was 3.62, indicating a clear improvement in knowledge. The calculated t-value of 10.14 at 59 degrees of freedom was found to be statistically highly significant ($p < 0.001$). This result confirms that the video assisted teaching programme was effective in improving the knowledge of ANM students regarding the skin tap technique. Hence, Hypothesis H_1 was accepted.

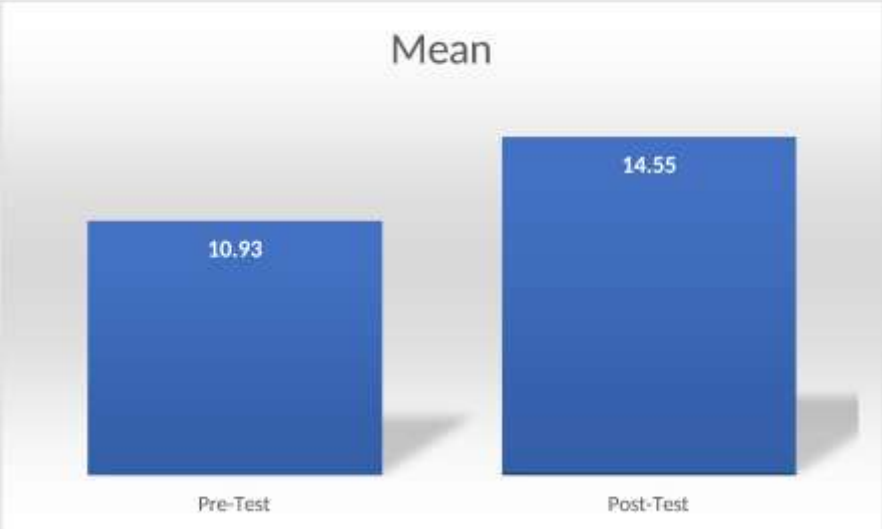


Figure 3: Comparison of Mean Pre-Test and Post-Test Knowledge Scores on Skin Tap Technique

The figure illustrates the comparison between the mean pre-test and post-test knowledge scores of ANM students regarding the skin tap technique. The mean pre-test score was 10.93, which increased to 14.55 in the post-test following the video assisted teaching programme. This noticeable increase in mean scores indicates a substantial improvement in knowledge after the intervention. The improvement was statistically supported by the paired t-test results, confirming that the video assisted teaching programme was effective in enhancing students' knowledge regarding the skin tap technique

3.4 Section D: Association Between Pre-Test Knowledge and Selected Demographic Variables

Table 3: Association Between Pre-Test Knowledge Category and Selected Demographic Variables of ANM Students (n = 60)

Demographic Variable	Inadequate n (%)	Moderate n (%)	Adequate n (%)	χ^2	df	p-value	Significance
Age	5 (8.3)	51 (85.0)	4 (6.7)	1.929	4	0.749	Not Significant
Religion	5 (8.3)	51 (85.0)	4 (6.7)	1.176	6	0.978	Not Significant
Place of Residence	5 (8.3)	51 (85.0)	4 (6.7)	7.328	2	0.026	**Significant**
Marital Status	5 (8.3)	51 (85.0)	4 (6.7)	15.321	4	0.004	**Significant**
Monthly Income	5 (8.3)	51 (85.0)	4 (6.7)	14.634	6	0.023	**Significant**
Family Type	5 (8.3)	51 (85.0)	4 (6.7)	14.879	4	0.005	**Significant**
Previous Exposure	5 (8.3)	51 (85.0)	4 (6.7)	1.246	2	0.536	Not Significant
Prior Knowledge of Skin Tap Technique	5 (8.3)	51 (85.0)	4 (6.7)	2.226	2	0.329	Not Significant
Source of Knowledge	5 (8.3)	51 (85.0)	4 (6.7)	3.412	6	0.756	Not Significant

Level of significance: $p < 0.05$

Table 3 illustrates the association between pre-test knowledge category and selected demographic variables of ANM students. Overall, 8.3% (n = 5) of students had inadequate knowledge, 85% (n = 51) had moderate knowledge, and 6.7% (n = 4) had adequate knowledge in the pre-test. A statistically significant association was observed between place of residence and pre-test knowledge ($\chi^2 = 7.328$, df = 2, $p = 0.026$), indicating that residential background influenced baseline knowledge. Marital status also showed a significant association ($\chi^2 = 15.321$, df = 4, $p = 0.004$). Further, monthly income ($\chi^2 = 14.634$, df = 6, $p = 0.023$) and family type ($\chi^2 = 14.879$, df = 4, $p = 0.005$) were significantly associated with pre-test knowledge levels.

However, no statistically significant association was found between pre-test knowledge and age, religion, previous education, previous exposure to the skill, prior knowledge of skin tap technique, or source of knowledge ($p > 0.05$). These findings indicate that selected socioeconomic and family-related variables influenced baseline knowledge, while other variables did not. Hence, Hypothesis H_2 was partially accepted.

4. Discussion

The present study evaluated the effectiveness of a video assisted teaching programme on knowledge regarding the skin tap technique on pain response during Pentavac injection among ANM students in selected colleges of Lucknow, Uttar Pradesh. A one-group pre-test and post-test quasi-experimental research design was adopted, and data were collected from 60 ANM students. The findings demonstrated a statistically significant improvement in mean knowledge scores from pre-test (10.93 ± 2.28) to post-test (14.55 ± 2.33). Additionally, significant associations were identified between selected demographic variables such as place of residence, marital status, monthly income, and family type with pre-test knowledge scores. The discussion interprets these findings in relation to previous research and existing literature.

4.1 Effectiveness of the Video Assisted Teaching Programme

The findings of the present study clearly indicate that the video assisted teaching programme was effective in improving knowledge regarding the skin tap technique among ANM students. The mean post-test knowledge score (14.55 ± 2.33) was significantly higher than the mean pre-test score (10.93 ± 2.28). The calculated paired t-value of 10.142 was statistically significant at $p < 0.001$, confirming the effectiveness of the intervention.

These findings are consistent with previous studies that reported significant improvement in knowledge following video assisted teaching interventions.

Verma and Minu (2019) reported a statistically significant increase in post-test knowledge scores among parents following a video assisted teaching programme on management of convulsions.[38] Similarly, a study conducted by Kaur et al. (2020) found that video-assisted teaching significantly improved nurses' knowledge and practice regarding hospital-acquired infection control.[39]

Further support is provided by a study conducted among B.Sc. nursing students on prevention of needle stick injuries, where the mean post-test knowledge score (24.3 ± 4.3) was significantly higher than the pre-test score (15.78 ± 3.24), with a highly significant paired t-value ($p < 0.05$) (Sharma & Devi, 2021) [41]. These findings align

closely with the present study, demonstrating that structured video-based instruction is an effective teaching strategy for improving procedural and clinical knowledge.

The improvement in post-test knowledge observed in the present study also supports learning theories that emphasize the effectiveness of multimedia instruction. According to Mayer's Cognitive Theory of Multimedia Learning, the integration of visual and auditory elements enhances understanding and retention by engaging multiple cognitive channels (Mayer, 2009).[40] Thus, video assisted teaching serves as a powerful educational tool, particularly for skill-based nursing procedures.

4.2 Knowledge Categories: Pre-Test and Post-Test Profiles

Analysis of pre-test knowledge categories revealed that the majority of ANM students (85.0%, n = 51) possessed moderate knowledge, while only 6.7% (n = 4) had adequate knowledge and 8.3% (n = 5) had inadequate knowledge prior to the intervention. Following the video assisted teaching programme, a substantial shift was observed, with 55.0% (n = 33) of students achieving adequate knowledge and the remaining 45.0% (n = 27) falling under the moderate knowledge category. Importantly, none of the students were categorized as having inadequate knowledge in the post-test.

These findings are consistent with earlier studies that demonstrated improvement in knowledge categories following structured teaching interventions. Sharma and Devi (2021) reported a marked shift from poor and average knowledge levels to good knowledge levels among nursing students after video assisted teaching on needle stick injury prevention.[41] Similarly, Kaur et al. (2020) observed a significant increase in the proportion of participants achieving higher knowledge levels following video-based education on infection control practices.[39] The present study reinforces these findings and highlights the effectiveness of video assisted teaching in producing meaningful improvements in knowledge distribution.

4.3 Association with Demographic Variables

The present study revealed statistically significant associations between pre-test knowledge scores and selected demographic variables, namely place of residence ($\chi^2 = 7.328$, $p = 0.026$), marital status ($\chi^2 = 15.321$, $p = 0.004$), monthly income ($\chi^2 = 14.634$, $p = 0.023$), and family type ($\chi^2 = 14.879$, $p = 0.005$). These findings suggest that socioeconomic and familial factors may influence baseline knowledge levels among ANM students.

Conversely, no statistically significant association was found between pre-test knowledge and variables such as age, religion, previous education, previous exposure to the skill, prior knowledge of skin tap technique, and source of knowledge ($p > 0.05$). Similar findings were reported by Verma and Minu (2019), where certain demographic variables showed no significant association with baseline knowledge levels. [38] Variations in demographic associations across studies may be attributed to differences in sample characteristics, educational background, and institutional settings.

4.4 Comparison with Studies on Skin Tap Technique and Pain Response

Although limited studies focus on educational outcomes related to the skin tap technique, several clinical studies highlight its effectiveness in reducing pain during injections. Research on Helfer's skin tap technique demonstrated a significant reduction in pain perception during intramuscular injections when compared to routine injection techniques (Gupta et al., 2018).[42] In a study conducted among infants, pain scores during injection were significantly lower in the skin tap group (5.30 ± 1.74) compared to the control group, with $p < 0.001$ (Patel & Shah, 2019).[43] Similar results have been reported in adult populations, further validating the clinical utility of the technique.

Although these studies do not assess educational interventions, they underscore the importance of ensuring adequate knowledge and correct application of the skin tap technique among nursing personnel. Effective training of ANM students is therefore essential to improve patient comfort and quality of care.

4.5 Implications for Nursing Education and Practice

The findings of the present study have important implications for both nursing education and clinical practice. The significant improvement in knowledge scores following the video assisted teaching programme highlights the effectiveness of audiovisual teaching methods in enhancing understanding of clinical procedures among ANM students. Therefore, nursing education programs should integrate video assisted teaching as a regular instructional strategy, particularly for skill-based topics such as injection techniques and pain management interventions.

In nursing education, the use of video assisted teaching can help bridge the gap between theoretical knowledge and clinical application. Visual demonstration of procedures like the skin tap technique enables students to better understand the sequence of steps, correct hand movements, and timing of the technique, thereby improving

learning retention. Incorporating such teaching methods into the ANM curriculum can promote active learning, improve student engagement, and enhance overall learning outcomes.

From a clinical practice perspective, improved knowledge of the skin tap technique among ANM students can contribute to better pain management during immunization procedures, particularly Pentavac injections. Application of this technique in clinical settings may reduce pain perception in infants, enhance patient comfort, and improve caregiver satisfaction. Nursing educators and clinical instructors should encourage students to apply evidence-based techniques during clinical postings to improve quality of care.

The exploration of nursing interventions on childhood immunization rates yields significant implications for nursing practice. Nurses serve as key agents in promoting immunization within pediatric healthcare settings and communities. The findings underscore the importance of integrating multifaceted approaches, including educational initiatives, reminder systems, and community outreach efforts, into nursing practice to optimize childhood immunization rates. [44]

In today's world, Students are joining various health profession to make their carrier in a particular profession but does not show much interest in the classes taken by the faculties which may lacks in knowledge and skills required for them. It may be because learner or students uses lots of material available on google and other social media and had some knowledge about the profession, course and the topic which is going to be teach in the class.[45] Furthermore, regular training sessions, workshops, and refresher courses using video-based learning materials can support continuous professional development of nursing students and staff nurses. The study also emphasizes the need for nurse educators to consider students' demographic backgrounds while planning educational interventions, as baseline knowledge levels may vary. Overall, integrating video assisted teaching into nursing education and practice can enhance clinical competence, promote evidence-based nursing care, and improve patient outcomes.

5. Conclusion

The present study was conducted to assess the effectiveness of a video assisted teaching programme on knowledge regarding the skin tap technique on pain response during Pentavac injection among ANM students in selected colleges of Lucknow, Uttar Pradesh. The findings of the study revealed a significant improvement in knowledge levels following the intervention. The mean knowledge score increased from 10.93 ± 2.28 in the pre-test to 14.55 ± 2.33 in the post-test, with a statistically significant paired t-value ($t = 10.142$, $p < 0.001$).

The majority of students demonstrated moderate knowledge in the pre-test (85%), whereas more than half of the students (55%) attained adequate knowledge in the post-test. No student remained in the inadequate knowledge category after the intervention. The study also identified significant associations between pre-test knowledge and selected demographic variables such as place of residence, marital status, monthly income, and family type.

Overall, the findings confirm that the video assisted teaching programme was effective in enhancing knowledge regarding the skin tap technique among ANM students. The study emphasizes the importance of innovative teaching strategies in nursing education to improve understanding of clinical procedures and promote better patient care outcomes.

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