



Comparative Evaluation of Pain during Local Anaesthetic Administration with Conventional and Camouflaged Syringe in Pediatric Dental Patient: An In-Vivo Study.

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ABSTRACT

Background: *The administration of local anaesthesia often evokes anxiety and fear in pediatric patients, impacting their overall experience and compliance during dental procedures. Traditional syringes can contribute to this anxiety due to their clinical appearance and associations with pain. Innovative approaches to reduce this anxiety and enhance comfort are warranted, especially in a pediatric setting.*

Aim: *This clinical trial aimed to evaluate and compare the pain experienced during local anaesthetic administration when using a conventional syringe versus a Camouflaged Syringe. The hypothesis was that the Camouflaged syringe would significantly reduce perceived pain and anxiety among pediatric patients.*

Materials and Methods: *A total of thirty pediatric dental patients, aged 6-8 years, were randomly assigned to receive local anaesthesia via either a conventional disposable syringe or a Camouflaged Syringe. Pain levels were assessed immediately after the injection using the Wong-Baker FACES Pain Rating Scale, enabling patients to visually express their pain intensity. The data collected were analyzed to compare pain scores between the two groups.*

Results: *The findings revealed that patients who received local anaesthesia with the Camouflaged syringe reported significantly lower pain scores compared to those who used the conventional syringe.*

Conclusion: *The use of Camouflaged syringes may represent an effective strategy for reducing pain and anxiety associated with local anaesthetic administration in pediatric patients. These results underscore the potential benefits of such innovations for enhancing patient comfort and cooperation in clinical settings. Further research is needed to explore the long-term impacts of these modifications on patient experiences across various medical procedures.*

Keywords: *Pain, Local Anesthesia, Wong-Baker FACES Pain Rating Scale.*

Introduction

The administration of local anaesthesia is a fundamental aspect of dental practice, particularly in pediatric dentistry, where it plays a crucial role in pain management during various treatments.¹⁻³ However, the perception of pain and anxiety related to local anaesthetic delivery can significantly influence a child's overall experience and subsequent cooperation with dental procedures. Traditionally, local anaesthetic injections in children have been met with resistance and fear, often rooted in past experiences or the clinical appearance of dental instruments.³⁻⁵

Pediatric patients are particularly susceptible to anxiety due to their developmental stage, which shapes their understanding of medical procedures. Their fear can be exacerbated by the sight of conventional syringes, which may appear intimidating and evoke associations with pain. As a result, many children exhibit heightened anxiety and distress, potentially leading to avoidance of necessary dental care. This underscores the importance of seeking innovative solutions to mitigate this fear and enhance the therapeutic experience.^{6,7}

The clinical appearance of a syringe often contributes to a child's perception of impending pain. Conventional syringes are typically metallic, clinical in design, and lack any features that might render them more child-friendly. In contrast, alternative devices, such as Camouflaged Syringes, feature designs that are visually appealing and less intimidating to young patients. These syringes are often designed with bright colors, cartoon characters, or playful shapes, thereby transforming the perception of a potentially fear-inducing tool into a more friendly and approachable object.⁹⁻¹²

Given the concerns surrounding pain management and patient comfort in pediatric dentistry, the present study aims to address these issues by comparing the pain experienced during local anaesthetic administration using conventional syringes versus Camouflaged Syringes. The research is rooted in the hypothesis that the Camouflaged syringe will not only diminish the perceived pain during injection but also alleviate anxiety levels among pediatric patients, thereby facilitating a more positive dental experience.^{6,9-11}

In the course of this study, we sought to evaluate pain levels immediately following local anaesthetic administration, utilizing the Wong-Baker FACES Pain Rating Scale to provide a visual method for children to express their pain. This scale is designed specifically for pediatric patients, allowing them to communicate their experiences effectively. The study sample consists of thirty pediatric patients aged between 6 to 8 years, a critical age range for exploring the foundations of anxiety management in dental practice.^{13,14}

Through our comparative analysis, we aim to demonstrate statistical differences in pain perception between both groups, contribute to the understanding of how innovative syringe designs can affect patient experience, and advocate for a shift towards more child-centered approaches in the administration of local anaesthesia in pediatric dentistry. Ultimately, this research strives to provide actionable insights that can enhance child

comfort and cooperation, reduce anxiety, and improve overall dental experiences for young patients.

Materials and Methods

Study Design: This study was designed as a randomized controlled clinical trial conducted in a pediatric dental outpatient setting. Approval was obtained from the institutional review board, and informed consent was secured from parents or guardians of all participating children.

Participants: The study included thirty pediatric dental patients aged 6 to 8 years, who required dental procedures necessitating local anaesthesia. Exclusion criteria comprised children with a known allergy to local anaesthetics, significant behavioral issues, or major medical conditions impacting pain perception or anxiety levels.

Randomization: Participants were randomly allocated into two groups: the Conventional Syringe group and the Camouflaged Syringe group. Randomization was achieved using a computerized random number generator to ensure unbiased allocation.

Intervention:

Conventional Syringe Group: Patients in this group received local anaesthesia via a standard disposable syringe, which has a transparent barrel and metallic needle.

Camouflaged Syringe Group: Participants in this group received local anaesthesia using a Camouflaged Syringe, designed with playful colors and patterns to minimize the clinical appearance typically associated with a syringe.

Procedure: Local anaesthesia administration was performed by the same experienced pediatric dentist to standardize technique and minimize variations in pain experience. Before injection, a topical anesthetic gel (Mucopain gel, ICPA health products Ltd, Ankleshwar, India) was applied to the mucosa for 1-2 minutes to further reduce discomfort.

Pain Assessment: Pain levels were measured immediately after the local anaesthetic injection using the Wong-Baker FACES Pain Rating Scale, which consists of a series of facial expressions ranging from a happy face (no pain) to a crying face (very much pain). This scale was selected due to its child-friendly design, allowing patients to easily communicate their pain levels. **(Fig 1)**

Data Collection and Analysis: Pain scores were recorded for each participant, then analyzed using statistical methods. Descriptive statistics were calculated for all variables, and comparisons between groups were assessed using the Mann-Whitney U test for non-parametric data, with a significance level set at $p < 0.05$. SPSS software (Version 25.0) was utilized for all statistical analyses.

Ethical Considerations: The study was conducted in compliance with ethical standards, and all participants

were informed about the study's purpose and procedures. Confidentiality was maintained throughout data collection and analysis.

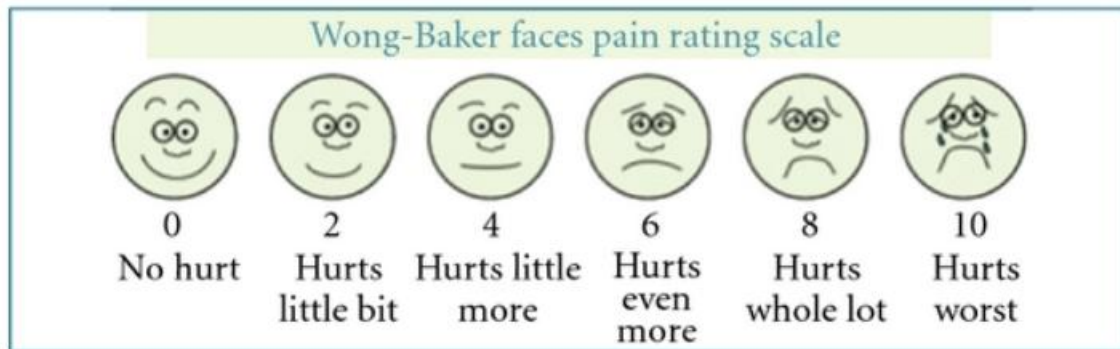


Figure 1: Wong-Baker FACES Pain Rating Scale

Result

In a comparative analysis of pain levels linked to various injection techniques, the conventional syringe group showed a mean pain score of 3.77, with a standard deviation of 0.48. In contrast, the Camouflaged syringe group demonstrated a significantly lower mean pain score of 1.76, with a standard deviation of 0.34. These results indicate that patients in the Camouflaged syringe group experienced less pain during the procedure than those receiving injections from the conventional syringe, underscoring a significant difference in patient comfort between the two injection methods (Table 1).

Intervention	N	Mean Pain Score	P value
Group I (Conventional Syringe)	15	3.77 ± 0.48	<0.05*
Group II (Camouflaged Syringe)	15	1.76 ± 0.34	

*Significant

Discussion

The present study provides compelling evidence regarding the efficacy of the Camouflaged syringe in reducing pain and anxiety during local anaesthetic administration in pediatric dental patients. The findings offer critical insights into the broader implications of injection methods on the overall dental experience of children, a

demographic already prone to anxiety regarding dental procedures.

Anxiety and fear associated with dental visits are prevalent among pediatric patients. These emotional responses can significantly affect both their willingness to seek dental care and their cooperation during procedures. Traditional syringes, with their clinical appearance, often reinforce negative associations and contribute to heightened anxiety levels. Therefore, the use of a Camouflaged syringe, designed to be less intimidating, addresses this critical issue by creating a more welcoming and less distressing environment for young patients.^{15,16}

The study's results indicate that patients administered local anaesthesia via the Camouflaged syringe reported lower pain scores compared to those using the conventional syringe. These results support the hypothesis that the appearance and design of the syringe play a crucial role in altering a patient's perception of pain. The Wong-Baker FACES Pain Rating Scale used in assessing pain levels allowed for a child-friendly evaluative measure, which is essential in pediatric dentistry as children may struggle to articulate their pain accurately. The results demonstrate that not only does this method effectively assess pain but also reflects the actual experiences of the patients.

The significant difference in pain reports suggests that reducing the perceived threat of the injection process can have a profound effect on how pain is experienced. The Camouflaged syringe's design likely reduces anticipatory anxiety, leading to a more positive experience for children. These findings align with existing literature indicating that environmental factors can dramatically influence patient comfort and pain perception. The implications for practice are significant. Dental practitioners should consider integrating the use of innovative tools such as the Camouflaged syringe into pediatric procedures to enhance patient comfort. Training staff on the psychological aspects of patient care, along with the introduction of user-friendly instruments, may help reduce dental anxiety and improve overall patient experiences.

Moreover, reducing pain and anxiety in pediatric patients can lead to greater compliance not only during the initial visit but also in future dental visits. This could foster a more favorable attitude towards dental health, promoting a lifelong commitment to oral hygiene and preventive care.¹⁷⁻¹⁹

While this study provides valuable insights, further research is essential to evaluate long-term effects and the potential necessity for other innovations in dental practice. Future studies could involve larger sample sizes and a diverse range of ages to validate the findings and explore variable outcomes in different demographics. Additionally, investigating other design modifications that may further enhance patient comfort could prove beneficial, as could longitudinal studies assessing the impact of innovative tools on children's long-term perceptions of dental care.

Conclusion

In summary, this study underscores the potential of the Camouflaged syringe as an effective strategy to diminish pain and anxiety associated with local anaesthetic administration in pediatric dental patients. By improving the injection experience, dental practitioners can significantly enhance the overall treatment experience for children, contributing to healthier dental habits and attitudes in the long term. This research paves the way for continued innovations aimed at fostering a more positive dental experience for all patients, especially the most vulnerable among them—children.

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