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Effectiveness of Insulin Syringe Versus Conventional Dental Syringe in Managing Dental Trypanophobia: A Clinical Study

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ABSTRACT

Background and Objectives: Pain management during dental procedures is of utmost importance. Extreme fear of dental injections can significantly interfere with dental health status. This study aims to demonstrate the efficacy of an insulin syringe loaded with local anaesthetics for the management of dental trypanophobia.

Method: forty-seven patients with an age range of (6-70 years old), 55% female and 45% male, have been enrolled randomly in this study. Each patient was delivered local anaesthesia (lidocaine 2%-epinephrine) for two different sites in two different visits by a standard dental syringe (the length and gauge of the needle were 27 G/L) and an insulin syringe. The insulin syringes (1ml, 30G x 8) were loaded with local anaesthesia (lidocaine 2%-epinephrine). The infiltration technique is used to deliver Local anaesthesia.

Results: Forty-seven patients participated in the study; their mean age (SD) was 30.86 (29) years, the median was 29 years, and the age range was 5-75 years. More than half (53.2%) of the patients were aged 20-39, and 57.4% were females. The median VAS score with the dental syringe was 4, compared with 0 with the insulin syringe. The mean rank of the first group was significantly higher than that of the second group ($p < 0.001$)

Conclusion: Insulin syringe attempts could be a better and more efficient way of managing dental trypanophobia in pediatric patients as well as adults. The mean rank of the dental syringe was significantly higher than that of the insulin syringe. ($p < 0.001$)

Keywords: Local anaesthesia, conventional dental syringe, Insulin syringe, dental trypanophobia

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INTRODUCTION

Pain control is an essential part of dentistry. Pain is a complex process that involves sensory, emotional, and perceptive processes.[1] Dental trypanophobia is defined as an extreme fear of the dental syringe. It is considered the most challenging aspect of patient management, significantly interfering with efficient dental treatment.1 Trypanophobia is the most crucial factor that makes patients continually defer or avoid dental treatments.[2]

To accomplish painless dental treatment, local anaesthesia (LA) is mandatory. Local anaesthesia is injected using a cartridge, syringe, and needle. The fear of needles (trypanophobia) leads to a significant problem, which can lead to syncope or other medical emergencies. It has been reported that nearly 50% of medical emergencies occurring in dental clinics arise during or immediately after local anaesthetic injection using conventional dental syringes.[3]

Dental practitioners prefer small-diameter needles, presuming they are less invasive to the patient than larger-diameter needles. However, this assumption was supported by earlier research conducted in 1972. Hamburg added that his patients cannot differentiate between 23-, 25-, 27-, and 30-gauge needles.[4]

Reducing the anxiety level even before giving LA injection is very important, especially in children, which can be done by using an insulin syringe, which is less frightening than the standard conventional dental syringes that are used.[5]

To the best of my knowledge, no previous research was conducted on the use of insulin syringes for local anaesthetic administration instead of the available dental syringes for adults to observe their effect in reducing anxiety and pain during the injection of LA. This research hypothesises that the syringe has a significant impact on fear and pain perception during local anaesthetic injection. Hence, the study aims to assess whether the use of insulin syringes, known for their smaller needle size and less intimidating appearance, leads to a significant reduction in dental trypanophobia compared to conventional syringes across different age groups.

METHODS

In a clinical comparative study, a total of 47 patients were enrolled with an age range of (6-70 years old, 55% female and 45% male. Each patient received local anaesthesia (lidocaine 2% with epinephrine) for two different sites during two separate visits, one week apart, using both a standard dental syringe (27 G/L) and an insulin syringe (Figure 1). The insulin syringes (1 ml, 30G x 8) were loaded with local anaesthesia from a local anaesthesia cartridge (lidocaine 2% with epinephrine); the technique used for local anaesthesia administration was infiltration. The injection site was the same for both the dental syringe and the insulin syringe, the mucobuccal fold above the tooth to be anaesthetised (Figures 2 and 3). Verbal and written consent have been obtained from each patient for their participation in this study. Regarding the children's patients, verbal and written consent was taken from the parents. A visual analogue scale (VAS) was used to determine the pain perception during the injection.

Figure 1. The difference in shape between an insulin syringe and a conventional dental syringe

Statistical Analysis

The data were analysed using statistical measures by Statistical Package for the Social Sciences (SPSS 26). Therefore, to compare the mean ranks between the two groups, the Mann-Whitney test was used. The Kruskal-Wallis test was used to determine whether the mean ranks differ across three or more groups. In this study, any p-value of ≤ 0.05 was considered statistically significant.

Figure 2. Injecting local anaesthesia by Insulin syringe for adult patients

Figure 3. Injecting local anaesthesia by Insulin syringe for pediatric patients

RESULTS

There were 47 patients in the study, with a mean age (SD) of 30.86 (29) years; the median age was 29; the age range was 5–75 years. Of the patients, the majority (53.2%) were aged 20-39 years, and the majority (57.4%) were females. (Table 1).

The median VAS score with the dental syringe was 4, compared with 0 with the insulin syringe. The mean rank of the first group was significantly higher than that of the second group ($p < 0.001$) (Table 2).

Table 1. Age and gender distribution

	No.	(%)
Age		
< 20	11	(23.4)
20-39	25	(53.2)
40-59	6	(12.8)
≥ 60	5	(10.6)
Gender		
Male	20	(42.6)
Female	27	(57.4)
Total	47	(100.0)

Table 2. VAS scores as perceived by patients receiving dental and insulin syringes

Dental syringe VAS parameters				Insulin syringe VAS parameters				
Mean (SD)	Median	Mean rank	Range	Mean (SD)	Median	Mean rank	Range	P*
3.38 (1.15)	4	69.54	0-5	0.34 (0.73)	0	25.46	0-3	< 0.001

*By the Mann-Whitney test

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When using the dental syringe, there was no significant difference (p = 0.646) in the mean VAS rank between males (22.98) and females (24.74). The medians of males and females were 3.5 and 4, respectively. When using the insulin syringe, the mean VAS score rank of males (27.38) was significantly (p = 0.042) higher than that of females (21.5) (Table 3).

It is evident in Table 4 that there were no significant differences in the mean VAS score ranks across age groups, whether using the dental syringe (p = 0.626) or the insulin syringe (p = 0.434) (Table 4).

Table 3. Comparing VAS scores of males and females in each of the study groups

	Males VAS parameters			**Females VAS parameters**			
Syringe	Mean (SD)	Median	Mean rank	Mean (SD)	Median	Mean rank	P*
Dental	3.25 (1.25)	3.5	22.98	3.48 (1.08)	4	24.76	0.646
Insulin	0.60 (0.94)	0	27.38	0.15 (0.45)	0	21.5	0.042

*By the Mann-Whitney test (comparing VAS of males and females)

Table 4.VAS scores by age in each of the study groups

	Mean VAS	**SD**	**Mean Rank**	**P***
Dental syringe				
Age (years)				
< 20	3.82	0.75	28.55	0.626
20-39	3.20	1.38	22.38	
40-59	3.33	1.03	23.50	
≥ 60	3.40	0.55	22.70	
Total	3.38	1.15		
Insulin syringe				
Age (years)				
< 20	0.55	0.82	27.45	0.434
20-39	0.32	0.75	23.66	
40-59	0.33	0.82	23.25	
≥ 60	0.00	0.00	19.00	
Total	0.34	0.73		

*By the Kruskal-Wallis test

DISCUSSION

The present study was conducted to compare fear and pain perception using two different syringes: a conventional dental syringe and an insulin syringe. Infiltration techniques have been used to administer LA.

The infiltration technique has been selected in the present study for many reasons. The length of the insulin syringe is short, and this will prevent us from using it in block techniques. Additionally, the insulin syringe's gauge is thin, increasing the risk of breakage when used for local anaesthesia. It holds less anaesthetic solution, reducing the risk of technical errors and making the application easier.[1]

The use of insulin syringes for injecting local anaesthetic solutions also helps patients, especially pediatric patients, by curtailing dental appointments, so less time is required to accomplish dental management, which was quite noticeable in the present study.

The results of the present study agree with those of Baharath Vardhanas et al.,[8] who found that insulin syringes have a clinical advantage in reducing pain during local anaesthetic infiltration in pediatric patients.

Our study included patients aged 6–70 years old; the children's patients were considered preferable because the patients can comprehend the notions of pain and anxiety, thus the self-reporting scales were considered more accurate. This also aligns with the Piagetian theory of cognitive development, as children under six may not be able to understand the distinction between the logical and the abstract, making the information relatively inconsequential for research.[9]

This study compared conventional dental syringes with insulin syringes. There are many studies in the past that have reported the use of insulin syringes for painless, fear-free administration of local anaesthesia. Kour et al., Tirupathi et al., Prabhu et al., Vardhana et al., and Nabi et al. conducted various studies in favour of insulin syringes and found that patients perceived less pain. The outcomes of these studies were consistent with those of this study, in which using an insulin syringe reduced pain perception scores and decreased anxiety.[10,11,12,13,14]

According to our analysis, the comparison between male and female participants within the same group revealed no difference in experiencing pain and fear. In contrast, among different groups, males showed higher pain with conventional syringes; based on our knowledge, no previous study reported that result.

Future research should address these limitations through larger, multicentre randomised crossover trials with concealed allocation and partial blinding. Expanding investigations to include various injection techniques, such as inferior alveolar, mental, nasopalatine, and palatal approaches, across different dental procedures would enhance the applicability of findings.

CONCLUSION

From the analysis, it can be concluded that Insulin syringes used in clinical practice offer a range of benefits, including reduced pain and fear when introducing local anaesthetic injections to pediatric and adult patients. In particular, the results show that insulin syringes are much more effective than conventional syringes at reducing dental trypanophobia among adults. Its use in dental practice may enhance patient adherence and reduce emotional barriers to seeking dental treatment. From this title and outline, the reader finds himself confronted with an argument that insulin syringes are better for treating dental trypanophobia and, thus, should be adopted in dental practices.

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CONFLICT OF INTEREST

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