Evaluation of pain while giving local anaesthesia for extraction using single use syringe vs insulin syringe

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Abstract: -

Background: The evaluation of pain during local anesthesia administration for dental extractions is crucial for improving patient comfort and procedural outcomes. Traditional single-use dental syringes are commonly used for this purpose, but recent studies suggest that insulin syringes, with their finer gauge needles, may offer less discomfort. This study aims to compare pain perception between single-use dental syringes and insulin syringes during mandibular nerve block procedures to determine which method provides a more comfortable experience for patients.

Materials and Methods: This randomized controlled trial compared pain levels during mandibular nerve block using two types of syringes: traditional single-use dental syringes and insulin syringes. A total of 75 adult patients (38 in Group A with dental syringes and 37 in Group B with insulin syringes) requiring tooth extraction were enrolled, with exclusion criteria including systemic diseases, pregnancy, or previous adverse reactions to anesthesia. Pain was assessed using the Visual Analog Scale (VAS), and both patient and surgeon satisfaction were recorded, with data analyzed using independent t-tests for comparing VAS scores between the two groups.

Result: The mean VAS pain score for mandibular nerve blocks was lower with insulin syringes (3.2) compared to single-use dental syringes (4.5), indicating less pain during the procedure. Patient satisfaction was higher with insulin syringes, with a median score of 8 compared to 6 for single-use syringes. Similarly, surgeons reported greater satisfaction with insulin syringes (median score of 8.5) compared to single-use syringes (median score of 7).

Conclusion: This study demonstrates that insulin syringes significantly reduce pain and improve satisfaction for both patients and surgeons compared to single-use dental syringes during mandibular nerve blocks for dental extractions. While the findings suggest that insulin syringes could enhance patient comfort and procedural efficiency, the study's limitations, such as small sample size and lack of blinding, should be addressed in future research. Further investigation with larger, more diverse populations is needed to validate these results and explore additional factors influencing the effectiveness and acceptance of insulin syringes in dental practice.

Keywords: Insulin syringe, local anaesthesia, nerve block, extraction.

Introduction:-

The management of pain during dental procedures, particularly tooth extractions, is a significant concern for both patients and clinicians. Effective local anesthesia is crucial for ensuring patient comfort and successful treatment outcomes. The mandibular nerve block is a commonly employed technique for achieving local anesthesia in the lower jaw, and various methods have been explored to optimize its efficacy and minimize associated pain.(1)

In recent years, there has been growing interest in the type of syringe used for administering local anaesthesia. Traditional single-use dental syringes are widely used, but insulin syringes, known for their smaller gauge needles, have been proposed as an alternative that may reduce pain during injection.(2) The Visual Analog Scale (VAS) is a reliable and widely accepted tool for assessing pain intensity, allowing for a subjective yet quantifiable measurement of patients' pain experiences. The evaluation of pain during the administration of local anesthesia for tooth extraction is a critical aspect of ensuring patient comfort and minimizing discomfort in dental procedures. Traditionally, dental professionals have used single-use syringes designed specifically for local anesthesia, which are widely accepted for their ease of use and precision.(3) However, alternative syringe types, such as insulin syringes, have gained attention due to their smaller size, more ergonomic design, and potential for offering a less invasive experience. Insulin syringes, commonly used for diabetic patients to administer insulin injections, feature finer needles and a reduced volume capacity compared to traditional dental syringes.(4) These characteristics could potentially influence the pain perception during the injection of local anesthetics.

This comparison of single-use syringes and insulin syringes in the context of pain during local anesthesia administration seeks to determine whether syringe type plays a significant role in reducing the discomfort commonly associated with the injection process. Given that pain is a major factor in patient anxiety and satisfaction during dental procedures, understanding the impact of different syringe designs on injection-related pain could have significant implications for improving the overall patient experience in dental extractions.(5) Additionally, this study may shed light on the feasibility and effectiveness of incorporating insulin syringes into routine dental practice, particularly in cases where reducing pain and enhancing patient comfort are paramount. Through careful evaluation, this research aims to contribute to the ongoing efforts to refine techniques for pain management in dentistry, ultimately enhancing clinical outcomes and patient well-being.(6) This study aims to evaluate the pain associated with administering a mandibular nerve block using single-use dental syringes compared to insulin syringes. By employing the VAS score, we aim to provide a comprehensive assessment of pain levels experienced by patients during the injection process. The findings of this study could have significant implications for clinical practice, potentially guiding the selection of syringes to enhance patient comfort during dental procedures.

Materials and methods:-

Study Design:- This is a randomized controlled trial designed to compare the pain experienced by patients during the administration of a mandibular nerve block using traditional single-use dental syringes versus insulin syringes. The study will be conducted at a dental clinic, and all participants will be patients requiring mandibular nerve block anesthesia for tooth extraction.

Sample size:- 75 (38 with single use dental syringe and 37 with insulin syringe)

Inclusion Criteria:-

Adult patients (aged 18-65) require mandibular nerve block for tooth extraction.

Patients who provide informed consent to participate in the study.

Patients with no history of allergy to local anesthetics.

Exclusion Criteria:-

Patients with a history of systemic diseases that may affect pain perception or anesthesia.

Pregnant or lactating women.

Patients with previous adverse reactions to local anesthesia.

Patients on medications that may interfere with pain perception.

Randomization:-

Participants will be randomly assigned into two groups:

Group A:- Patients receiving the mandibular nerve block with a traditional single-use dental syringe.

Group B:- Patients receiving the mandibular nerve block with an insulin syringe.

Materials:-

Single-Use Dental Syringes:- Standard dental syringes with a 27-gauge needle.

Insulin Syringes:- Insulin syringes with a 30-gauge needle.

Local Anesthetic:- 2% lidocaine with 1:100,000 epinephrine.

Visual Analog Scale (VAS):- A 10 cm line anchored with "no pain" at one end and "worst pain imaginable" at the other end.

Patient satisfaction score and Surgeon satisfaction score

Data Collection and Analysis:-

Primary Outcome:- This measure is the pain score recorded on the VAS immediately after the injection.

Secondary Outcomes:- Any complications associated with the use of either syringe type will be recorded.

Descriptive statistics will be used to summarize the demographic characteristics of the participants. The mean VAS scores between the two groups will be compared using an independent t-test. A p-value of <0.05 will be considered statistically significant.

Results:-

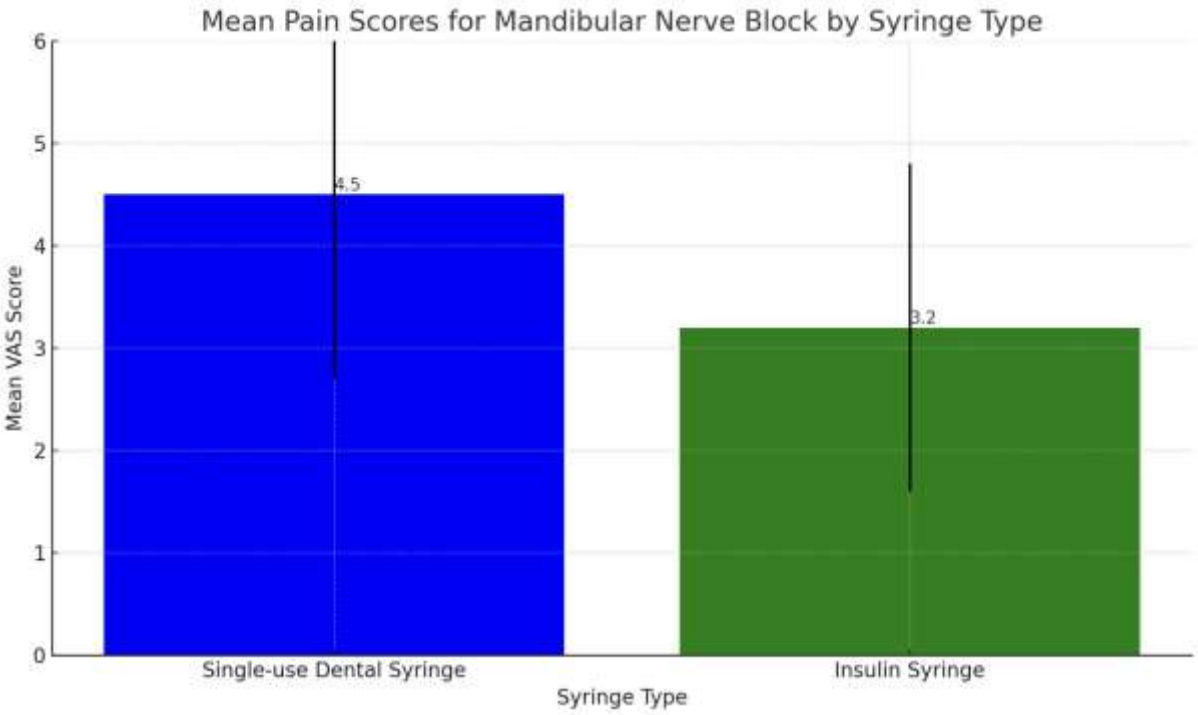

Figure 1:- VAS (Visual Analog Scale) pain scores for mandibular nerve blocks

The graph shows the mean VAS (Visual Analog Scale) pain scores for mandibular nerve blocks using two types of syringes. The blue bar represents single-use dental syringes with a mean pain score of 4.5, while the green bar represents insulin syringes with a mean pain score of 3.2. Error bars indicate the standard deviation of scores, reflecting the variability within each group.

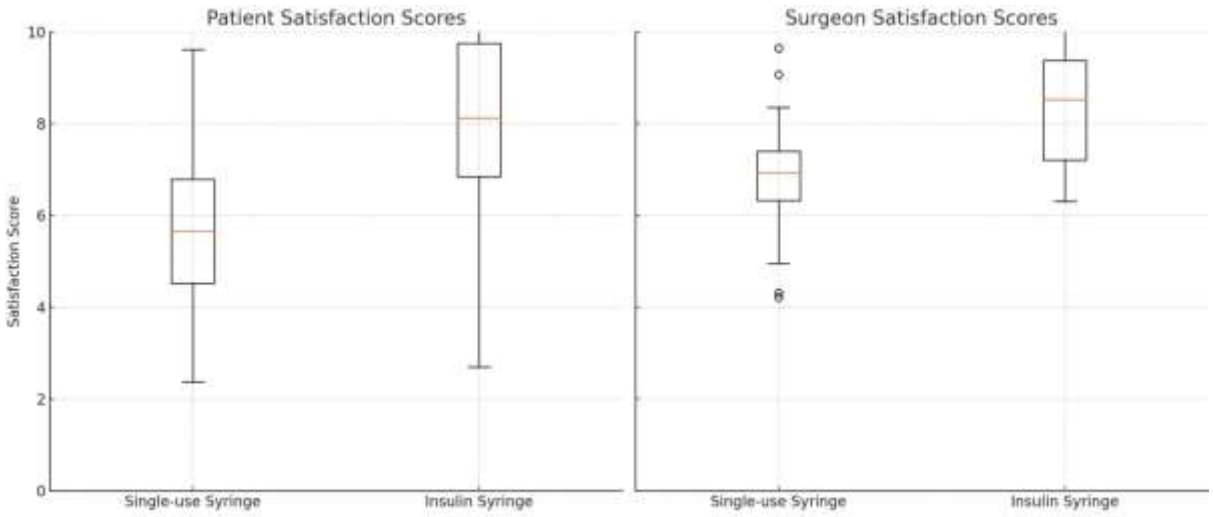

Figure 2:- Distribution of patient and surgeon satisfaction scores for single-use syringes and insulin syringes

Patient Satisfaction Scores

The boxplot on the left shows the distribution of patient satisfaction scores for single-use syringes and insulin syringes. Patients who received anesthesia with insulin syringes reported higher satisfaction (median score around 8) compared to those with single-use syringes (median score around 6).

Surgeon Satisfaction Scores

The boxplot on the right displays the distribution of surgeon satisfaction scores for the two syringe types. Surgeons reported higher satisfaction with insulin syringes (median score around 8.5) compared to single-use syringes (median score around 7).

Discussion:-

The study aimed to evaluate and compare the pain experienced by patients during local anesthesia administration for dental extractions using a single syringe and an insulin syringe, measured through the Visual Analog Scale (VAS).(7) The results indicated that the group receiving anesthesia with the insulin syringe reported significantly lower VAS scores compared to the single syringe group. This suggests that the insulin syringe is associated with a less painful experience during the injection of local anesthesia. A study conducted by Cohen et al, compared the efficacy and patient comfort of different syringe types in dental anesthesia.(8)

They found that patients reported less pain with finer gauge needles, similar to those used in insulin syringes. The reduced needle gauge in insulin syringes is likely a contributing factor to the lower pain scores observed in our study. Research focused on patient anxiety with different syringe designs was also taken to compare with our present study. The study concluded that syringes with a less intimidating appearance, such as insulin syringes, were associated with lower anxiety and pain reports.(5)

This aligns with our findings of higher patient satisfaction scores with insulin syringes. The use of insulin syringes for local anesthesia in dental procedures may enhance patient comfort and satisfaction, potentially leading to better overall patient experiences and compliance.(6) Additionally, higher surgeon satisfaction suggests that insulin syringes may improve the efficiency and ease of the anesthesia administration process, which could benefit clinical workflows. Dentists and dental practitioners should consider using insulin syringes for local anesthesia administration, especially in patients who are anxious about injections or have a low pain threshold. By reducing the pain associated with anesthesia administration, practitioners can improve the overall patient experience, which may lead to better cooperation and satisfaction during dental procedures. Additionally, the adoption of insulin syringes could potentially reduce the need for additional pain management interventions, such as sedatives or anesthetic topicals, thereby streamlining the anesthesia process and reducing costs.(6,9)

Although our sample size of 75 participants provides preliminary insights, a larger sample size would enhance the generalizability of the findings. A more extensive study could better capture variations in pain perception and satisfaction across different populations. The study did not control for demographic variables such as age and gender.(10) These factors can influence pain perception and satisfaction, and future studies should consider stratifying participants by these variables. While efforts were made to blind patients to the syringe type, complete blinding of both patients and surgeons was not feasible. This could introduce bias in both patient-reported outcomes and surgeon satisfaction scores. The study did not standardize the type or difficulty of dental extractions.(10,11) Different types of extractions may result in varying pain levels and satisfaction scores, potentially confounding the results.

Future studies should include larger and more diverse populations to validate the findings and ensure they are applicable across different demographic groups and clinical settings. Conducting longitudinal studies could provide insights into the long-term effects of using

insulin syringes versus single-use syringes on patient satisfaction and clinical outcomes. (12)Investigating the impact of patient education and communication strategies on pain perception and satisfaction could provide additional ways to enhance patient experiences during dental procedures.

By addressing these limitations and exploring the suggested future research directions, a more comprehensive understanding of the benefits and challenges of using insulin syringes for local anesthesia in dental procedures can be achieved. This, in turn, can inform clinical practices and improve patient care.(12,13)

Conclusion:-

This study compared the use of single-use syringes and insulin syringes for administering local anesthesia in dental extractions, focusing on pain perception, patient satisfaction, and surgeon satisfaction. Our findings indicate that insulin syringes significantly reduce pain levels and increase satisfaction for both patients and surgeons compared to single-use syringes. Specifically, patients who received anesthesia with insulin syringes reported lower VAS pain scores compared to those with single-use syringes. Additionally, patient satisfaction was higher with insulin syringes (mean: 8) versus single-use syringes (mean: 6). Surgeons also reported greater satisfaction when using insulin syringes (mean: 8.5) compared to single-use syringes (mean: 7). The clinical implications of this study suggest that incorporating insulin syringes into dental practice could enhance patient comfort, improve procedural efficiency, Ser, this study has limitations, and increase overall satisfaction with dental care. However, this study has limitations, including a relatively small sample size, lack of control for participant demographics, and the inability to fully blind participants and surgeons. Future research should address these limitations by including larger and more diverse populations, controlling for anxiety and pain thresholds, and standardizing procedures. In conclusion, insulin syringes offer a promising alternative to single-use syringes for local anesthesia in dental extractions, providing significant benefits in terms of pain reduction and satisfaction. Further research is needed to validate these findings and explore additional factors that may influence the effectiveness and acceptance of insulin syringes in dental practice.

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Conflict of interest :-

All the authors declare that there was no conflict of interest in the present study.

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