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COMPARISON OF 2% CHLORHEXIDINE AND 5.25% SODIUM HYPOCHLORITE IRRIGATING SOLUTION ON POST OPERATIVE PAIN

Original Research

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ABSTRACT

Background: Postoperative pain is a common concern following dental procedures, affecting patient comfort and recovery. Effective pain management is crucial, with irrigating solutions playing a key role in endodontic treatments. Among these, 2% chlorhexidine and 5.25% sodium hypochlorite are widely used due to their antimicrobial and tissue-clearing properties, respectively. While chlorhexidine is known for its lower cytotoxicity, sodium hypochlorite offers stronger antibacterial effects but may increase pain. This study aims to compare the effectiveness of these two solutions in reducing postoperative pain, helping clinicians make informed choices to improve patient outcomes.

Objective: To determine the efficacy of 2%chlorhexidine and 5.25% Sodium Hypochlorite irrigating solution on post operative pain

Methods: This quasi-experimental interventional study was conducted at Sandeman Provincial Hospital Quetta from October 2021 to October 2023. A total of 312 patients experiencing postoperative pain were randomly assigned to two groups, each with 156 participants. Group A received 2% chlorhexidine as the irrigating solution, while Group B was treated with 5.25% sodium hypochlorite. Postoperative pain, the primary outcome measure, was assessed using the Visual Analog Scale (VAS) at baseline, on the 3rd day, the 7th day, and at a 2-week follow-up. Data were collected, entered, and analysed using SPSS version 26.0, with the chi-square test applied to assess group differences, considering $p < 0.05$ as statistically significant.

Results: Out of 312 patients, with 160 males (51.3%) and 152 females (48.7%). Patients were divided into 2 groups. Group A (2% chlorhexidine) reporting a mean VAS score of 6.3 (±1.2) and Group B (5.25% sodium hypochlorite) showing a mean score of 6.5 (±1.3). By the 2-week follow-up, both groups reported reductions in pain scores. Group A had a mean VAS score of 1.5 (±1.1), and Group B had a mean score of 2.8 (±1.4). A p-value of < 0.05 was considered statistically significant, which affirmed the effectiveness of 2% chlorhexidine over 5.25% sodium hypochlorite in managing postoperative pain.

Conclusion: 2% chlorhexidine is significantly more effective than 5.25% sodium hypochlorite in reducing postoperative pain following non-surgical root canal treatment

Keywords: chlorhexidine, sodium hypochlorite, dental irrigants, endodontic pain management, postoperative pain, root canal irrigation, Visual Analog Scale (VAS), wound healing.

INTRODUCTION

Postoperative pain is a significant concern in dental and surgical procedures, influencing patient satisfaction and recovery (1). Effective management of this pain is crucial for enhancing the overall treatment experience (2). Irrigating solutions play an essential role in endodontics, with 2% chlorhexidine and 5.25% sodium hypochlorite being among the most commonly used agents (3). Chlorhexidine is known for its broad-spectrum antimicrobial properties and lower cytotoxicity, making it a favorable option in many clinical settings (4). Conversely, sodium hypochlorite is renowned for its potent tissue dissolution capabilities and effective bacterial reduction (5).

The choice between these irrigating solutions can significantly impact postoperative outcomes, particularly pain levels (6). Previous studies have indicated that chlorhexidine may lead to less postoperative discomfort compared to sodium hypochlorite, suggesting a potential advantage in specific clinical scenarios (7). However, some research highlights that sodium hypochlorite's superior antibacterial properties might compensate for its higher cytotoxicity in terms of overall treatment effectiveness (8). This article aims to compare the effects of 2% chlorhexidine and 5.25% sodium hypochlorite on postoperative pain, drawing from a range of studies to assess their relative efficacy and safety (9). By understanding these differences, clinicians can make informed decisions about irrigating solutions to optimize patient outcomes (10). This article examines the comparative effectiveness of 2% chlorhexidine and 5.25% sodium hypochlorite as irrigating solutions in managing postoperative pain following dental procedures. Postoperative pain is a significant concern for patients and can impact recovery and satisfaction. By analyzing pain levels and clinical outcomes associated with each solution, the study aims to identify the more beneficial option for enhancing patient comfort. The findings could provide valuable insights for dental practitioners in selecting irrigation solutions, ultimately contributing to improved patient care and outcomes in endodontic and surgical procedures. Understanding these differences is crucial for optimizing postoperative pain management strategies.

METHODS

This quasi-experimental study was conducted on 312 patients between October 2021 and October 2023 over two years at the dental department of Sandeman Provincial Hospital Quetta. Patients referred for non-surgical root canal treatment were selected using consecutive sampling. Ethical approval was obtained from the Ethical Committee of Sandeman Provincial Hospital, Quetta, Pakistan, and written informed consent was gathered from all participants and, where applicable, from their guardians. The sample size was calculated based on the WHO sample size calculator, using a 95% confidence interval, a 5% margin of error, and a 28.3% prevalence rate of dental pain, resulting in a total sample of 312 participants (11). Eligible participants included adults aged 18 years and older undergoing endodontic treatment with either 2% chlorhexidine or 5.25% sodium hypochlorite as an irrigating solution. They were also required to report postoperative pain using validated pain assessment scales and provide informed consent. Exclusion criteria included patients with known hypersensitivity to either chlorhexidine or sodium hypochlorite, those with systemic conditions impacting pain perception, and individuals on medications that might alter pain response.

The study enrolled a total of 312 participants who were randomly divided into two groups, each containing 156 individuals. Group A was treated with 2% chlorhexidine as the irrigating solution, while Group B received 5.25% sodium hypochlorite. Postoperative pain served as the primary outcome measure and was assessed using the Visual Analog Scale (VAS) at multiple intervals: baseline, the third day, the seventh day, and the two-week follow-up. Pain levels were recorded by trained dental professionals using structured questionnaires, ensuring data consistency and accuracy. The VAS scale, ranging from 0 (no pain) to 10 (worst pain imaginable), allowed participants to indicate their pain levels, facilitating a detailed comparison of postoperative pain outcomes between the two groups. Data were collected, entered, and subsequently analyzed using SPSS software version 26.0. For quantitative variables, the mean and standard deviation (SD) were calculated, while for qualitative variables, frequency and percentage were determined. To assess changes in pain levels from baseline to the two-week follow-up, paired t-tests were employed, and independent t-tests were used to compare groups at each time point. A p-value of less than 0.05 was deemed statistically significant, establishing the effectiveness of the irrigating solutions in managing postoperative pain.

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RESULTS

Among the 312 enrolled participants, demographic data revealed a balanced distribution in terms of age and gender. The age range of participants varied from 18 to 65 years, with a mean age of 35.2 years (±12.5). The gender distribution was relatively equal, with 160 males (51.3%) and 152 females (48.7%). No significant demographic differences were noted between the two groups, which strengthens the validity of the comparative analysis.

Table I: Gender distribution of respondents

Variable	N (%)
Male	160 (51.3%)
Female	152(48.7%)
Total	312(100%)

Table 2 for Postoperative Pain Levels

Time Point	Group A (2% Chlorhexidine)	Group B (5.25% Sodium Hypochlorite)	p-value	Test Applied
Baseline	Mean VAS: 6.3 (±1.2)	Mean VAS: 6.5 (±1.3)	0.45	Independent t-test
Day 3	Mean VAS: 3.2 (±1.5)	Mean VAS: 4.8 (±1.6)	< 0.001	
Day 7	Mean VAS: 2.1 (±1.3)	Mean VAS: 3.9 (±1.5)	< 0.001	
2-Week Follow-Up	Mean VAS: 1.5 (±1.1)	Mean VAS: 2.8 (±1.4)	< 0.001	Paired t-test (within-group), Independent t-test (between-groups)

At baseline, the mean pain scores for both groups were comparable, with Group A (2% chlorhexidine) reporting a mean VAS score of 6.3 (±1.2) and Group B (5.25% sodium hypochlorite) showing a mean score of 6.5 (±1.3). Statistical analysis using an independent t-test indicated no significant difference in baseline pain levels between the two groups ($p = 0.45$), establishing a solid foundation for evaluating changes in pain levels over time.

Postoperative Pain Analysis: By the 3rd day post-treatment, notable differences in pain levels emerged between the two groups. Group A reported a mean VAS score of 3.2 (±1.5), while Group B's mean score was 4.8 (±1.6). The difference in pain levels was statistically significant, with a p-value of < 0.001, indicating that patients treated with 2% chlorhexidine experienced significantly less postoperative pain compared to those treated with 5.25% sodium hypochlorite. At the 7th-day follow-up, Group A continued to show lower pain levels, reporting a mean VAS score of 2.1 (±1.3), while Group B had a mean score of 3.9 (±1.5). This difference remained statistically significant ($p < 0.001$), further supporting the hypothesis that chlorhexidine is more effective in reducing postoperative pain. By the 2-week follow-up, both groups reported reductions in pain scores. Group A had a mean VAS score of 1.5 (±1.1), and Group B had a mean score of 2.8 (±1.4). Although pain levels decreased in both groups, the difference was still statistically significant ($p < 0.001$), indicating that patients who received 2% chlorhexidine experienced lower levels of discomfort even weeks after the procedure. Paired t-tests were used to compare pain levels at baseline and the 7th day for each group, while independent t-tests assessed differences between the two groups at each time point. A p-value of < 0.05 was considered statistically significant, which affirmed the effectiveness of 2% chlorhexidine over 5.25% sodium hypochlorite in managing postoperative pain.

DISCUSSION

This study compared the efficacy of 2% chlorhexidine and 5.25% sodium hypochlorite as irrigating solutions in managing postoperative pain following non-surgical root canal treatment. The findings indicated that patients treated with 2% chlorhexidine experienced significantly lower pain levels compared to those who received 5.25% sodium hypochlorite at various follow-up points. This aligns with previous research suggesting chlorhexidine's potential as an effective analgesic in endodontic procedures (12). Demographic data

revealed a balanced distribution of age and gender among the participants, which strengthens the validity of the findings (13). At baseline, the mean pain scores were comparable between the two groups, ensuring a solid foundation for evaluating postoperative pain (14). The lack of significant differences at baseline underscores the reliability of subsequent measurements in determining the effectiveness of the treatments.

By the third day post-treatment, a marked difference in pain levels was observed, with the chlorhexidine group reporting a significantly lower mean VAS score compared to the sodium hypochlorite group (15). This finding suggests that chlorhexidine may have an immediate analgesic effect that enhances patient comfort during the critical early recovery period (16). Studies have previously noted that chlorhexidine's anti-inflammatory properties might contribute to its efficacy in pain management (17). The trend continued at the seven-day follow-up, where the chlorhexidine group still reported significantly lower pain levels (18). This sustained difference indicates that chlorhexidine may provide prolonged relief from postoperative discomfort, which is essential for patient satisfaction and compliance with postoperative care (19). Additionally, the two-week follow-up results reaffirmed that patients who received chlorhexidine experienced less pain, highlighting its long-term benefits (20). Statistical analyses confirmed that the differences in pain scores between the two groups were significant at all follow-up points, reinforcing the conclusion that 2% chlorhexidine is superior to 5.25% sodium hypochlorite in managing postoperative pain (21). These findings emphasize the importance of selecting the appropriate irrigating solution to optimize patient outcomes in endodontic treatments.

CONCLUSION

This study demonstrated that 2% chlorhexidine is significantly more effective than 5.25% sodium hypochlorite in reducing postoperative pain following non-surgical root canal treatment. Patients who received chlorhexidine reported lower pain levels at multiple follow-up intervals, indicating its potential as a preferred irrigating solution for enhancing patient comfort during the recovery phase. These findings underscore the importance of selecting appropriate irrigants in endodontic procedures to improve clinical outcomes and patient satisfaction. Further research is warranted to explore the underlying mechanisms of chlorhexidine's analgesic effects and its long-term implications in dental practice.

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