

Original Article

Prevention of Alveolar Osteitis After Third Molar Surgery: Comparative Study of the Effect of Warm Saline and Chlorhexidine Mouth Rinses

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ABSTRACT

Background: Chlorhexidine mouth rinses have a proven efficacy for the prevention of alveolar osteitis after third molar surgery. This study compares the efficacy of warm saline rinse, a component of postextraction instructions, with that of chlorhexidine in our institution over a period of 2 years. **Patients and Methods:** Apparently healthy patients who were referred to the Oral Surgery Clinic of our institution, with an indication for surgical extraction of lower third molar were prospectively, consecutively, and uniformly randomized into warm saline and chlorhexidine groups. The experimental group ($n = 50/100$) were instructed to gargle twice daily with warm saline, whereas the chlorhexidine group ($n = 50/100$) were instructed to gargle with 0.12% chlorhexidine. Information on demographic, types and level of impaction, indications for extraction, and development of alveolar osteitis were obtained and analyzed. Comparative statistics were done using Pearson's Chi-square, Fisher's exact, or Mann-Whitney U-tests as appropriate. $P < 0.05$ was considered statistically significant. **Results:** The demographic, types and level of impaction as well as indications for extractions were comparable between the study groups ($P > 0.05$). The overall prevalence of alveolar osteitis was 5%. There was no statistically significant difference between application of warm saline and 0.12% chlorhexidine rinse with respect to the development of alveolar osteitis ($P = 0.648$). **Conclusion:** Warm saline mouth rinse is equally as effective as chlorhexidine mouth rinse, as prophylaxis against prevention of alveolar osteitis after third molar surgery.

KEY WORDS: Alveolar osteitis, chlorhexidine, prevention, warm saline

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INTRODUCTION

Alveolar osteitis is a common postextraction complication, and its incidence following routine and complicated extractions of teeth is around 1% to 70%.^[1,2] The distressful nature of the condition has, over the years, led to enormous research with a view to finding the best ways of preventing the complication. Thus, several methods of minimizing the incidence of alveolar osteitis following dental extractions have been described as revealed by the existing literature. These include chlorhexidine mouth rinse,^[3] systemic and topical antibiotics,^[4] fibrinolytic agents,^[5] local antiseptic packs,^[6] and warm saline rinse.^[7]

In the developed world, chlorhexidine is the most commonly used of all these medicaments, and its preventive efficacy has been extensively discussed.^[3,7-10] Some authors have also recommended warm saline oral

rinse as one of the ways of preventing the development of alveolar osteitis, and it is thought to enhance smooth recovery after dental extractions as evidenced by reports across the globe.^[1,7,11] An objective assessment of the efficacy of warm saline rinse, as a postextraction medicament, was recently carried out in a randomized controlled study.^[11] Its ability to prevent the development of alveolar osteitis was conclusively proven by the study, and this has further strengthened its continuous use as a postextraction medicament.^[11] Comparative studies of efficacy of warm saline rinse with other modality such as chlorhexidine mouth rinse is sparse. Delilbasi *et al.*^[7]

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observed similar percentages of alveolar osteitis using mouthwashes of warm saline and 0.2% chlorhexidine (23.7% and 20.9%, respectively) in a randomized controlled study.

The use of warm saline rinse is a common postextraction instruction among dentists and oral surgeons in Nigeria and other parts of sub-Saharan Africa. Although the preventive efficacy of warm saline rinse, with regards to development of alveolar osteitis, was previously compared with that of chlorhexidine in a study carried out by Debilasi *et al*^[7] in the developed world, similar comparative study has not been done in this part of the globe. In our environment, because of the problem of affordability, chlorhexidine is not readily available making accessibility difficult, and this has made its routine use after oral surgical procedures not to be common. Consequently, the aim of this study was to compare the efficacy of warm saline rinse with 0.12% chlorhexidine gluconate rinse on the development of alveolar osteitis following dental extractions in a Nigerian teaching hospital. A null hypothesis that warm saline mouth rinse was not as efficacious as 0.12% chlorhexidine in the prevention of alveolar osteitis was formulated.

PATIENTS AND METHODS

This was a randomized prospective single-blind study conducted at the oral surgery clinic of our institution. Patients who required surgical extractions of impacted mandibular third molars were studied. The study was conducted in accordance with the Declaration of Helsinki 1975, as revised in 2000, and was approved by the Ethics Committee of our institution. Inclusion criteria included patients who presented consecutively to the clinic between January 2010 and December 2011 and had no previous history of dental extraction(s). All the surgical dental extractions included were completed within 30 min. Patients with a history of uncontrolled diabetes mellitus, facial cellulitis, impacted third molars associated with tumors, liver diseases, kidney diseases, current steroid therapy, HIV/AIDS, smokers, as well as previous radiotherapy to the head and neck region were excluded from the study.

All the extractions were performed by the same surgeon under local anesthesia using 2% lignocaine hydrochloride with 1:80,000 adrenaline. All patients received the same oral medications (amoxicillin 500 mg 8 hourly for 5 days; metronidazole 200 mg 8 hourly for 5 days; and naproxen sodium 550 mg 12 hourly for 5 days). The patients were consecutively randomized into warm saline and 0.12% chlorhexidine groups. The warm saline group was instructed to gargle twice daily, whereas the

chlorhexidine group was asked to gargle twice daily with 0.12% chlorhexidine gluconate rinse.

The patients were evaluated postoperatively for the presence of alveolar osteitis by a blinded observer. Alveolar osteitis was diagnosed on the basis of persistent throbbing pain and exposure of bare alveolar bone, within 3–7 days postextraction.^[12]

The data were analyzed using the Statistical Package for Social Sciences (SPSS version 13; SPSS Inc., Chicago, IL, USA). Analysis included means, standard deviation, and cross tabulation. Comparative statistics was done using Pearson's Chi-square test, Fisher's exact test, or nonparametric Mann-Whitney U-test as appropriate. $P < 0.05$ was considered statistically significant.

RESULTS

A total of 100 patients, evenly distributed between the 2 groups, were included in the study. The ages ranged from 18 to 45 (29.8) years. The difference between the mean ages of the patients in the warm saline group (27.1 [5.9]) years and chlorhexidine group (26.4 [5.1]) years was not significant ($P = 0.53$). Overall, there were slightly more females ($n = 54$) than males ($n = 46$), and more impacted teeth were found on the left than the right side [Table 1]. Mesioangular impaction was as common as distoangularly impacted teeth. Vertical impaction was the least represented across the series. Recurrent pericoronitis was the most common indication for surgical extractions

Table 1: Demographic, clinical characteristics and indications for surgical extraction (n=100)

Variables	Warm saline (n=50)	Chlorhexidine (n=50)	df	χ^2	P
Gender					
Male	22	24	1	0.161	0.688
Female	28	26			
Side					
Left	30	26	1	0.420	0.546
Right	20	24			
Impaction type					
Mesioangular	17	16	3	0.538	0.911
Distoangular	15	18			
Horizontal	15	14			
Vertical	3	2			
Impaction level					
Partial bony	27	30	1	0.367	0.545
Full bony	23	20			
Surgical indication					
Dental caries	14	13	3	1.621	0.655
Apical periodontitis	13	18			
Pericoronitis	19	17			
Neuralgic pain	4	2			

Table 2: Comparative statistics for development of alveolar osteitis between warm saline and chlorhexidine groups

Treatment group	n	Mean rank	Sum of ranks	Mann-Whitney U-test	Z	P
Warm saline	50	51.00	2550.00	1225.000	-0.457	0.648
Chlorhexidine	50	50.00	2500.00			

across both study population [Table 1]. The distribution of demographics and clinical characteristics as well as indications for surgical extractions of the lower third molar teeth was comparable between both study groups [Table 1]. There was an overall prevalence of 5% for alveolar osteitis, and this complication was not significantly different between the warm saline and the chlorhexidine groups ($Z = -0.457$; $P = 0.648$) [Table 2].

DISCUSSION

This study compared the efficacy of warm saline mouth rinse and 0.12% chlorhexidine gluconate rinse on the prevention of alveolar osteitis after impacted third molar surgery. The inclusion and exclusion criteria, with particular reference to the inclusion of patients whose procedure was completed within the duration of 30 min, were influenced by the results of previous studies.^[3,13,14]

The prevalence of alveolar osteitis observed in this study was 5% and it is comparable to the result obtained by Swanson.^[15] The similarity may be explained in terms of application of postextraction medicaments: Chlorhexidine and warm saline rinses in this study, and tetracycline dressings on the extraction sockets in the study carried out by Swanson. The prevalence values of 20–30% often stated for surgical extraction of impacted third molars by some authors may be due to a number of factors which include differences in diagnostic criteria, level of experience of the surgeon, nonplacement of socket dressings or antiseptic rinses, patients' compliance with the postoperative instructions among others.^[1,2,16,17]

The observed prevalence of alveolar osteitis was comparable between the warm saline and the chlorhexidine groups (3% versus 2%) ($P > 0.05$). Warm saline rinse is usually prepared by dissolving one level teaspoon of salt in a glass of warm water (300–350 ml) and the resulting hypertonic solution has been reported to reduce facial edema postoperatively.^[18] Although the mechanism of action of warm saline rinse is not completely understood, its proven efficacy may be explained in terms of the hypertonic nature of the solution which is believed to inhibit bacteria activity but encourage the growth of oral commensal microorganisms. The bacteriostatic effect occurs when the bacterial

intracellular fluid is drawn out through the bacterial cell wall, which acts as a semipermeable membrane, by the relatively more concentrated hypertonic saline solution in a process called plasmolysis. The thermal effect of the warm saline rinse encourages smooth and uncomplicated healing by inducing vasodilatation of the vasculature of oral cavity, and thus enhances migration of phagocytes to the extraction site.^[11,18] Our result is similar to that obtained by Delilbasi *et al.*,^[7] who found comparable efficacy for warm saline rinse and 0.2% chlorhexidine with respect to prevention of alveolar osteitis.

Chlorhexidine is a broad-spectrum biocide effective against Gram-positive and Gram-negative bacteria as well as fungi. In oral applications, chlorhexidine bind to the oral tissues including the dentition. It is then released over time to kill bacteria and fungi which helps to reduce the bacterial count and prevents the reaccumulation of dental plaque.^[19] Chlorhexidine rinse has become the gold standard in dentistry due to its ability to adhere to soft and hard tissue and maintain a potent sustained release.^[20] However, warm saline rinse is cheaper, easy to prepare, and is devoid of the side effects associated with oral chlorhexidine rinse. These side effects include staining of oral tissues and appliances, dental calculus, altered sense of taste, and oral mucosal irritation.^[20] Cases of parotid gland swelling and inflammation of the salivary glands (sialadenitis) have also been reported with the use of chlorhexidine.^[21]

CONCLUSION

This study has shown that warm saline mouth rinse could be a useful substitute to chlorhexidine rinses after dental extractions. This is important because it is readily available, cheap, and easy to prepare, especially in resource-limited countries such as Nigeria, where affordability of chlorhexidine is a problem.

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Conflicts of interest

There are no conflicts of interest.

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