Original Research Article

Comparative efficacy of warm water-only and warm saline mouth bath in oral wound healing

Abstract

Aim: The management of oral wounds is aimed at ensuring fast and efficient healing while preventing secondary infections. Warm water and warm saline mouth baths are commonly used for oral wound management, but the comparative efficacy of these two options remains unclear. The aim of the study is to compare the effectiveness of warm saline rinse and warm water-only mouth rinse on the occurrence of infection after dental procedures in a tertiary care hospital.

Study design: A prospective study conducted in the Oral and Maxillofacial unit of the Dental Department at the University of Uyo Teaching Hospital, Uyo. from 2020 to 2023.

Methodology :The study sample was 96 patients with clinically diagnosed pericoronitis who required excision of the operculum and relieved them of the acute problem. They were randomly assigned to Group 1 and Group 2 of 48 each. Group 1 were operculectomy cases managed post-operatively with a warm saline mouth bath while Group 2 comprised operculectomy cases treated with warm water without salt. Comparison of data was done using Pearson's Chi-square, Fisher's exact, or Mann–Whitney U-tests, as applicable. Statistical significance was set at $P = 0.05$.

Results: Mean age of study group was 32 ± 10.66 . The overall number of female patients (n = 32) was less than that of male patients (n = 64) . The most satisfactory wound healing was found among males on the Asepsis score . Wound healing after day 5 and 7 with higher percentage of satisfactory wound healing in both groups. There was no significant difference in healing for both groups of patients who used warm saline and only warm water mouth rinse .

Conclusion: Warm water-only mouthwashes and warm saline mouthwashes are equally helpful in the healing of oral wounds. However, because saline has antibacterial, antiseptic, and anti-inflammatory qualities, using it to treat oral wounds may have additional advantages. As a result, the use of warm saline mouthwashes may be

thought of as a favored alternative in the care of oral wounds. However, warm water only can be useful in known hypertensive patients where the use of salt may be contraindicated.

Keywords: Warm water, Saline, Mouth rinse, Healing.

Introduction

Oral wounds are common occurrences and can result from different causative factors including trauma, infections, and surgical interventions. The management of oral wounds is aimed at ensuring fast and efficient healing while preventing secondary infections (1). A preventive approach should be taken in the management of potential complications that may arise following an operative procedure, regardless of how simple it appears; this is why warm saline mouth rinse is commonly recommended following certain procedures that may necessitate oral wound healing.(2) When an intraoral surgical site is bathed in this manner, the heat of the solution produces a therapeutic increase in blood flow to the affected area, which promotes wound healing.(3) Because antibiotic resistance is on the rise, it is critical to investigate therapeutic and relatively inexpensive solutions that may be effective in preventing complications. (2)

Water and warm saline mouth baths are commonly used for oral wound management, but the comparative efficacy of these two options remains unclear. This article provides a comparative analysis of the effectiveness of warm water-only and warm saline mouth baths in oral wound healing.

The numerous treatments utilized for infection prevention include chlorhexidine rinse(4), local antiseptic packs(5), fibrinolytic measures,(6) chlorhexidine mouthwash, systemic and topical antibiotics (5), and warm saline rinse(4).To the best of the authors knowledge, there isn't research that compares the effectiveness of warm saline rinse with that of warm water-only without salt mouthwash.(4) (7) This present study therefore compares the effectiveness of warm saline rinse and warm water only mouth rinse on the occurrence of infection after dental procedures in a tertiary care hospital. A null hypothesis was developed, claiming that warm water and warm saline mouthwash were equally effective in preventing post-operative infections. The present study deals with the use of warm saline rinse and warm water-only mouthwash, being the most readily available and easy-to-use regimen. If using warm water-only is found to be effective, it could be useful in managing hypertensive patients where the use of saline solution may be contraindicated thereby justifying this study

Material and Methods

The study was a prospective study conducted in the Oral and Maxillofacial unit of the Dental Department at the University of Uyo Teaching Hospital, Uyo. from 2020 to 2023. Consecutive patients who presented with pericoronitis were evaluated and those who met inclusion criteria were recruited for the study.The purpose of the study was to compare the efficacy of warm water-only and warm saline mouth baths in oral wound healing. The treatment procedures were performed and managed by the same operator to avoid variations. The study sample was 96 patients with clinically diagnosed pericoronitis who required excision of the operculum and relieved them of the acute problem. One hundred and five patients(105) patients were initially recruited for the study . We had attrition effect of 9 ending up with 96 patients . They were randomly assigned to Group 1 and Group 2 of 48 each. Group 1 were operculectomy cases managed post-operatively with a warm saline mouth bath while Group 2 comprised operculectomy cases treated with warm water without salt. The inclusion criteria were patients reporting moderate to chronic recurrent pericoronitis in the mandibular third molar region, who gave consent for the procedure, and who were fit for the procedure under local anesthesia and proceeded with the further treatment. The exclusion criteria were patients with underline medical co-morbid conditions, acute infection, and medically compromised patients that could impair healing.

The region was prepared with betadine using antiseptic procedures to avoid post-operative infection.
In both Groups 1 and 2, local anaesthetic was administered. The pericoronal flap was then held using Adson's tissue holding forceps and excision was done with a bard parker blade 15. Hemostasis was achieved by applyin g direct pressure ~~to the empty space and~~ using sterile gauze. Wound debridement was done with betadine. Patients were recommended to take paracetamol 500 mg twice a day for 3 post-operative days. They were told to follow a soft diet and abstain from smoking and hot and spicy foods for the following 24 hours. Group 1 patients were advised to maintain oral hygiene and rinse every 8 hours a day with warm saline mouth bath solution for a week. Group 2 patients were advised to rinse with just warm water without salt, 8 hourly for a week Patients were recalled after days 5 and 7 following the procedure, and during every follow-up patient were evaluated for healing using Asepsis wound scoring. Comparison of data was done using Pearson's Chi-square, Fisher's exact, as applicable. Statistical significance was set at $P = 0.05$. . Data were analyzed using SPSS version 27 for Windows (SPSS, Inc, Chicago, Il)

Results

Table I: Asepsis wound scoring system

Wound characteristic	Proportion of wound affected					
	0	<20	20-39	40-59	60-79	>80
Serous exudates	0	1	2	3	4	5
Erythema	0	1	2	3	4	5
Purulent exudates	0	2	4	6	8	10
Separation of deep tissues	0	2	4	6	8	10

Points are scored for daily wound inspection

Criterion	Points
Additional treatment	
Antibiotics	10
Drainage of pus under local anesthesia	5
Debridement of wound (general anesthesia)	10
Serous discharge*	Daily 0-5
Erythema*	Daily 0-5
Purulent exudate*	Daily 0-5
Separation of deep tissues*	Daily 0-5
Isolation of bacteria	10
Stay as inpatient prolonged over 14 days	5

*Given score only on 5 of 7 days. Highest weekly score used. Category of infection - Total score 0-10: Satisfactory healing, 11-20: Disturbance of healing, 20-30: Minor wound infection, 31-40: Moderate wound infection >40: Severe wound infection (adapted from Wilson AP et al., Lancet 1986 (8)

Table 2. Frequency distribution of the patients based on their age group.

Age range	Frequency (n= 96) (%)
18-27	36
28-37	25
38-47	14
48-57	9
58-67	11
68-77	1

Total 96

Mean Age in Years 32±10.66

Table 3 . Gender distribution of score category

score	Frequency n= 96 (%)	male = 64 (%)	Female n=32 (%)	df	X^2	P value
Satisfactory Wound Healing (0-10	46(47.92)	27 (17.28)	19 (12.16)	3	0.064	0.0572
Disturbance of Healing (11-20)	26(27.10)	19(12.16)	7 (4.48)	1	0.073	0.0595
Minor wound infection (20-30)	14(14 58)	9 (5.76)	5 (3.2)	1	2.375	0.166
Moderate wound infection (30-40)	7(7.29)	6 (3.84)	1 (0.64)	1	2.215	0.316
Severe wound Healing (>40)	3(3.12)	3 (1.92)	0 (0)	1	2.132	0.273

Table 4: Wound healing score using warm saline water

Day	Satisfactory healing score 0-10 (%)	Disturbance healing score 11-20 (%)	Minor wound infection score 20-30 (%)	Moderate wound infection score 30-40 (%)	Severe wound infection score >40 (%)	Mean* Rank
5	36 (75.00)	10 (20.83)	2 (4.17)	0 (0)	0 (0)	51.15
7	41 (90.91)	7 (4.55)	0 (0)	0 (0)	0 (0)	48.85

*Kruskal–Wallis test: $\chi 2$ =7.58 df=4, P=0.056

Table 5: Wound healing score using warm water only

Day	Satisfactory healing Score 0-10 (%)	Disturbance healing Score 11-20 (%)	Minor wound infection Score 20-30 (%)	Moderate wound infection score 30-40 (%)	Severe wound infection Score >40 (%)	Mean* Rank
5	33 (68.75)	12 (25)	3 (6.25)	0 (0)	0 (0)	51.30
7	37 (77.08)	10 (20.83)	1 (2.08)	0 (0)	0 (0)	46.93

*Kruskal–Wallis test: $\chi 2$ =8.479, df=4, P=0.051

Table 6 . Comparative Effect Of Warm Water And Warm Saline

Score	Warm saline water n (%)		Warm water only n (%)		df	X2	P value
	Day 5	Day 7	Day5	Day 7			
Satisfactory healing score 0-10	36 (75.00)	41 (90.91)	33 (68.75)	37 (77.08)	4	4.80	0.080
Disturbance healing score 11-20	10 (20.83)	7 (4.55)	12 (25)	10 (20.83)	4	2.4 7	0.711
Minor infection score 20-30	2 (4.17)	0(0)	3 (6.25)	1 (2.08)	4	2.81	0. 722
Moderate infection score 30-40	0 (0)	0(0)	0 (0)	0 (0)	4	2.81	0.642
Severe infection >40	0 (0)	0 (0)	0 (0)	0 (0)	4	8.26	0.511

Results

A total of 96 patients were involved in the study. They were grouped into 2 of 48 each. The age range of patients was 18 to 77 years. The mean age of the study group was 32 ± 10.66 and the age group of 18-27 (36%) were more involved in the study closely followed by age range of 28-37 (Table 2). The overall number of female patients (n = 32) was less than that of male patients (n = 64) as shown in Table 3. Also in Table 3, the majority of the subjects experienced satisfactory (0-10) with the males having higher values(27) than females (19). It showed a significant difference in healing between males and females ($P_=$ 0.057, $x^{2,}$ 0.064) The most satisfactory wound healing was found among males. (Table 3). Tables 4 and 5 show wound healing after days 5 and 7 with a higher percentage of satisfactory wound healing in both groups. Table 6 showed no statistically significant difference in healing for both groups of patients who used warm saline and only warm water mouth rinse across the different categories of the Asepsis Score.

Discussion:

This study showed an average age range of 32± 10.66. This is in agreement with Osunde et al (9) who observed a similar trend. It was observed from the study that males had a higher percentage of satisfactory healing than females. This is in contrast to a study with females having better healing than males. (10) Sex has been linked to wound healing, with some studies 16 showing a clear female prevalence in healing rates. However, these findings are based primarily on dermal wound studies, and there is no evidence of a female advantage in nondermal wound healing

Other studies (11,12) on the other hand, found no gender difference in oral mucosa healing. Studies that looked at the healing of mucosal tissues after third-molar surgery found that women healed significantly slower(13,14) and required more post-surgery treatment(14,15) than men.

Sex hormones, which have been demonstrated to play a role in both cutaneous wound healing (16) and periodontal disease, are expected to affect oral mucosal wound healing. Other authors opined that sex hormones affect both oral mucosal and cutaneous wound healing, but in distinct ways, potentially pushing healing in opposite directions. (17)

Healing with satisfactory Asepsis score was found in both methods of mouth rinse almost at the same level. However, it was observed that healing was slightly better using a warm saline solution as against using only warm water although there is no significant difference

Postoperative facial edema can be lessened by making a hypertonic solution with one teaspoon of salt and a glass of lukewarm water (18). The hypertonicity of the warm water, which can both inhibit bacterial growth and encourage the proliferation of commensal bacteria in the mouth, is the likely mechanism of action for this.

The bacteriostatic action occurs when the substantially more concentrated hypertonic saline solution draws bacterial intracellular fluid out through the bacterial cell wall, which acts as a semipermeable membrane, in a process known as plasmolysis. (19)

The research investigated the effectiveness of warm water-only mouthwashes with warm saline mouthwashes in comparative tests. Both subjective and objective markers of healing were reported in every study group. The study found no discernible difference in the healing of oral wounds between warm water mouthwashes and warm saline mouthwashes. Warm saline mouthwashes, however, were more successful in lowering swelling and hastening the recovery of oral lesions.

Conclusion:

Our findings show that men heal oral mucosal wounds faster than women. According to this comparative study, warm water mouthwashes and warm saline mouthwashes are equally helpful in speeding up the healing of oral wounds. However, because saline has antibacterial, antiseptic, and anti-inflammatory qualities, using it to treat oral wounds may have additional advantages.

Ethical Approval:

Approval for the study was obtained from the ethical committee of the University of Uyo Teaching Hospital, uyo, before embarking on the study.

Consent:

The modality for the study which involved diagnosis, operculectomy procedure, post-operative instructions, and recalls for review was explained to the patients, and consent was obtained before proceeding with the study.

REFERENCES

1. Swanson AE. Prevention of dry socket: an overview. Oral Surg Oral Med Oral Pathol 1990 Aug;70(2):131
2. Adegbayi Adeola Adekunle, Uchenna Patrick Egbunah, Olufemi Akinwunmi Erinoso, Wasiu Lanre Adeyemo,Effectiveness of warm saline mouth bath in preventing alveolar osteitis: A systematic review and meta-analysis,Journal of Cranio-Maxillofacial Surgery, Volume 49, Issue 10,2021,Pages 980-988, https://doi.org/10.1016/j.jcms.2021.09.001.

3. Matthews, R. Hot salt water mouth baths. *Br Dent J* **195**, 3 (2003). https://doi.org/10.1038/sj.bdj.4810318
4. Delilbasi C, Saracoglu U, Keskin A. Effects of 0.2% chlorhexidine gluconate and amoxicillin plus clavulanic acid on the prevention of alveolar osteitis following mandibular third molar extractions. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2002 Sep;94(3):301-304.
5. Bloomer CR. Alveolar osteitis prevention by immediate placement of medicated packing. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2000 Sep;90(3):282-284
6. Schatz JP, Fiore-Donno G, Henning G. Fibrinolytic alveolitis and its prevention. Int J Oral Maxillofac Surg 1987 Apr;16(2):175-183.
7. Bergdahl M, Hedström L. Metronidazole for the prevention of dry socket after removal of partially impacted mandibular third molar: a randomised controlled trial. Br J Oral Maxillofac Surg 2004 Dec;42(6):555-558.
8. Wilson AP, Webster A, Gruneberg RN, Treasure T, Sturridge MF. Repeatability of asepsis wound scoring method. Lancet 1986;1:1208-9.
9. Osunde OD, Anyanechi CE, Bassey GO. Prevention of alveolar osteitis after third molar surgery: a comparative study of the effect of warm saline and chlorhexidine mouth rinses. Niger J Clin Pract 2017 Apr;20(4):470-473
10. Ashcroft GS, Ashworth JJ. Potential role of estrogens in wound healing. Am J Clin Dermatol. 2003;4:737-743
11. Yumiba T, Ito T, Ikushima H, et al. Effect of mucosal suture on the healing of mucosal defect in laparoscopic intragastric surgery. Gastric Cancer. 2003; 6:96-99.
12. Lopez R, Fernandez O, Jara G, Baelum V. Epidemiology of necrotizing ulcerative gingival lesions in adolescents. J Periodontal Res. 2002;37:439-444.
13. Conrad SM, Blakey GH, Shugars DA, Marciani RD, Phillips C, White RP Jr. Patients' perception of recovery after third molar surgery. J Oral Maxillofac Surg. 1999;57:1288-1294
14. Phillips C, White RP Jr, Shugars DA, Zhou X. Risk factors associated with prolonged recovery and delayed healing after third molar surgery. J Oral Maxillofac Surg. 2003;61:1436-1448.
15. Benediktsdottir IS, Wenzel A, Petersen JK, Hintze H. Mandibular third molar removal: risk indicators for extended operation time, postoperative pain, and complications. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2004;97: 438-446
16. . Ashcroft GS, Mills SJ. Androgen receptor-mediated inhibition of cutaneous wound healing. J Clin Invest. 2002;110:615-624
17. Christopher G. Engeland,;Jos A. Bosch, John T. Cacioppo, Phillip T. Marucha. Mucosal wound healing'. The role of age and sex Arch Surg. 2006;141:1193-1197)
18. Larsen PE. Alveolar osteitis after surgical removal of impacted mandibular third molars. Identification of the patient at risk. Oral Surg Oral Med Oral Pathol 1992 Apr;73(4):393-397
19. Naik C, Dany SS, Satpathy AK. Efficacy of Warm Saline and Chlorhexidine Mouth Rinses in the Prevention of Alveolar Osteitis after Third Molar Surgery: A Comparative Study. Int J Oral Care Res 2017;5(4):270-2