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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

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

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

32 **Introduction**

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

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

45 The numerous treatments utilized for infection prevention include chlorhexidine rinse(4), local antiseptic
46 packs(5), fibrinolytic measures,(6) chlorhexidine mouthwash, systemic and topical antibiotics (5), and warm
47 saline rinse(4).To the best of the authors knowledge, there isn'tresearch that compares the effectiveness of
48 warm saline rinse with that of warm water-onlywithout salt mouthwash.(4) (7) This present study therefore
49 compares the effectiveness of warm saline rinse and warm water only mouthrinse on the occurrence of infection
50 after dental proceduresin a tertiary care hospital. A null hypothesis was developed, claiming that warm water
51 and warm saline mouthwash were equally effective in preventing post-operative infections.The present study
52 deals with the use of warm saline rinse and warm water-only mouthwash, being the most readily available and
53 easy-to-use regimen. If using warm water-only is found to be effective, it could be useful in managing
54 hypertensive patients where the use of saline solution maybe contraindicated thereby justifying this study

56 **Material and Methods**

57 The study was a prospective study conducted in the Oral and Maxillofacial unit of the Dental Department at the
58 University of Uyo Teaching Hospital, Uyo, from 2020 to 2023. Consecutive patients who presented with
59 pericoronitis were evaluated and those who met inclusion criteria were recruited for the study. The purpose of
60 the study was to compare the efficacy of warm water-only and warm saline mouth baths in oral wound healing.
61 The modality for the study which involved diagnosis, operculectomy procedure, post-operative instructions, and
62 recalls for review was explained to the patients, and consent was obtained before proceeding with the
63 study. Approval for the study was obtained from the ethical committee of the University of Uyo Teaching
64 Hospital, Uyo, before embarking on the study. The treatment procedures were performed and managed by the
65 same operator to avoid variations. The study sample was 96 patients with clinically diagnosed pericoronitis
66 who required excision of the operculum and relieved them of the acute problem. One hundred and five
67 patients (105) patients were initially recruited for the study. We had attrition effect of 9 ending up with 96
68 patients. They were randomly assigned to Group 1 and Group 2 of 48 each. Group 1 were operculectomy cases
69 managed post-operatively with a warm saline mouth bath while Group 2 comprised operculectomy cases treated
70 with warm water without salt. The inclusion criteria were patients reporting moderate to chronic recurrent
71 pericoronitis in the mandibular third molar region, who gave consent for the procedure, and who were fit for the
72 procedure under local anesthesia and proceeded with the further treatment. The exclusion criteria were patients
73 with underline medical co-morbid conditions, acute infection, and medically compromised patients that could
74 impair healing.

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

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90 **Results**

91 **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

110 *Given score only on 5 of 7 days. Highest weekly score used. Category

111 of infection - Total score 0-10: Satisfactory healing, 11-20: Disturbance of

112 healing, 20-30: Minor wound infection, 31-40: Moderate wound infection

113 >40: Severe wound infection (adapted from Wilson AP et al., Lancet 1986 (8))

114
115 Table 2. Frequency distribution of the patients based on their age group.

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

117 Total 96

118 Mean Age in Years 32 ± 10.66

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Table 3 . Gender distribution of score category

score	Frequency n= 96 (%)	male = 64 (%)	Female n=32 (%)	df	χ^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

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144 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

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

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147 Table 5: Wound healing score using warm water only

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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

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

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Table 6 . Comparative Effect Of Warm Water And Warm Saline

Score	Warm saline water n (%)		Warm water only n (%)		df	X ²	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	2.47	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

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161 Results

162 A total of 96 patients were involved in the study. They were grouped into 2 of 48 each. The age range of
163 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%)
164 were more involved in the study closely followed by age range of 28-37 (Table 2). The overall number of
165 female patients (n = 32) was less than that of male patients (n = 64) as shown in Table 3. Also in Table 3, the
166 majority of the subjects experienced satisfactory (0-10) with the males having higher values (27) than females
167 (19). It showed a significant difference in healing between males and females ($P = 0.057$, $\chi^2 = 0.064$) The most
168 satisfactory wound healing was found among males. (Table 3). Tables 4 and 5 show wound healing after days 5
169 and 7 with a higher percentage of satisfactory wound healing in both groups. Table 6 showed no
170 statistically significant difference in healing for both groups of patients who used warm saline and only warm
171 water mouth rinse across the different categories of the Asepsis Score.

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173 Discussion:

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

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

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

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

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

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

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

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202 Conclusion:

203 **Our findings show that men heal oral mucosal wounds faster than women.** According to this comparative study,
204 warm water mouthwashes and warm saline mouthwashes are equally helpful in speeding up the healing of oral
205 wounds. However, because saline has antibacterial, antiseptic, and anti-inflammatory qualities, using it to treat
206 oral wounds may have additional advantages. **As a result, the use of warm saline mouthwashes may be thought**
207 **of as a favored alternative in the care of oral wounds. However, warm water only can be useful in known**
208 **hypertensive patients where the use of salt may be contraindicated.**

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