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Comparative Analysis of Post-Dental Surgery Outcomes: Focus on Dry Socket and Mouthwash Practices

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ABSTRACT

Objective: Dry socket, alveolar osteitis, or alveolitis also called fibrinolytic alveolitis is a common complication subsequent to tooth extractions, leading towards significant post-operative pain. While its particular cause remains indistinct, factors such as bacterial contamination and infection, smoking, traumatic extractions, and fibrinolytic activity contribute to its incidence. In this study it is intended to assess the effectiveness of 0.12% chlorhexidine mouthwash in pre-op extraction is effective in reducing the incidence of dry socket and post-extraction pain.

Materials and Methods: A total of 200 patients which required tooth extraction were included in study, with 102 assigned to the test group (mouthwash users) and 98 to the control group (non-mouthwash users). The test group rinsed with 10 mL of 0.12% chlorhexidine mouthwash 2x, twice daily for four weeks before the procedure of extraction. Pain was measured/ evaluated using the Visual Analogue Scale (VAS) at 72 hours post-extraction. Chi-square tests were used for statistical analysis (α=0.05).

Results: Dry socket frequency was significantly reduced/ lower in the mouthwash group by (13.7%) compared to the control group (71.4%) (p=0.001). Pain levels were also reduced, with approximately 53.9% of mouthwash users pre-op extraction were reporting no pain (VAS=0) versus 13.3% in the control group. Smoking and spitting were significantly associated with dry sockets (p=0.001), but there was no correlation found with respect to gender, age, extraction site, or extraction type.

Conclusion: Chlorhexidine mouthwash usage suggestively and significantly reduces alveolar osteitis/dry socket and therefore post-extraction pain. Smoking remains a chief risk factor, accentuating the importance of patient education on discarding smoking and usage of antiseptic mouthwash for improved healing.

Keywords: Alveolar Osteitis, Chlorhexidine, Mouthwashes, Pain, Postoperative, Tooth Extraction, Smoking

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INTRODUCTION

Dry socket is the most common complication that arises after tooth extractions and is also accompanied by a pain of a rather intense nature which starts after the tooth has been removed.[1] Dry socket, also known as alveolar osteitis, was initially identified in 1896 as a gradual healing process characterized by moderate to intense pain, occurring with no indication of infection, typically 2 to 4 days following the extraction of a tooth, most commonly an impacted mandibular third molar.[2] A clinical evaluation shows an empty socket lacking a blood clot or containing a compromised clot and exposed bone, resulting in a dull, throbbing pain that may radiate to the ears, neck, and temporal areas.[3]Furthermore, signs including marginal gingivitis, localized lymphadenopathy, necrotic tissue, foul breath, and an unpleasant taste in the mouth may also be noticed.[4] To sum it up "Postoperative pain that increases between the first day and third day following the extraction and is accompanied by a dissolving blood clot in the alveolar socket, whether halitosis is present or not" is the most recent definition of Alveolar Otitis.[5]

The pathogenesis of dry socket involves multiple pathogenic factors although no clear etiology has been proposed. Nonetheless, high oral bacterial load before and after surgery, smoking, gender, use of oral contraceptives, pericoronitis, inadequate irrigation, tooth location and operator ability and experience are considered to be risk factors. Another theory is that bacteria either cause or prolong dry socket lesions.[6,7] Dry socket lesions are more common after traumatic extractions, where strong luxation and forceps forces are needed to extract teeth[1]. According to observations, one of the primary etiological factors in the development of dry socket is fibrinolytic activity. An increase in fibrinolytic activity following extraction may result in an early loss of intra-alveolar blood clot.[8] Fibrinolysis occurs when the plasminogen pathway is activated, which can be accomplished by substances that are physiologically (directly) or non-physiologically (indirectly) activated.[9] Direct activators are released by alveolar bone cells following trauma, whereas indirect activators are released by bacteria. Despite playing a crucial part in fibrinolytic processes, the precise cause of dry socket is still unknown.[10]

Finding a reliable method of lowering the prevalence of dry socket has always been a challenge. In comparison to use of antifibrinolytic drugs, antibacterial strategies(antibiotics, topical gels, mouthwashes) have generally proven a greater promise.[11,12] The current study was inspired by the desire to prevent dry socket in general practice after extraction. Post operative mouth wash use is a common practice, however the use of mouth wash prior to the surgery for a minimum of one month to create an aseptic oral environment is undetermined and hence the focus of the present study.

MATERIALS AND METHOD

The study is Quasi-experimental study and was carried at Foundation University College of Dentistry & Hospital for a period of 1 month. It included 200 patients (Corresponding to the sample size calculator on calculator.net) who required teeth extraction due to decay or other reasons. Out of, 39(19.5%) were male and 161(80.5%) were female patients. Patients who declined to take part in the study, females who were pregnant or on oral contraceptives, patients with any underlying disease, and children were not taken into the study. Patients were randomly allocated to control (98) and test groups (102). Test groups were asked to do 10 ml (0.12% chlorhexidine) rinse twice daily after brushing for 60 seconds, 4 weeks before the extraction. Data entry was done to Statistical Package for the Social Sciences (SPSS, IBM, IL, USA) and statistical analysis (α=0.05) was done using chi-square test.

Visual Analogue score of patients who underwent extractions was determined. The level of pain patients experienced was significantly reduced in the test groups (mouthwash users) when compared with control group (non-mouthwash users) pain was evaluated using VAS score. Patients were assessed at office on the third post-operative day(72h) after the tooth extraction. The VAS was converted into a scale for measuring pain intensity, possessing 10 distances of equal length, each starting from 0 to 9 (score 0: no pain, score 10: intolerable pain).[13]

VAS Score Range	Pain Intensity	Description

The VAS scale is categorized into four distinct levels of pain intensity for easier assessment:

- **No pain (0)**: The individual experiences no pain.
- **Mild pain (1-3)**: Pain is very mild or barely noticeable.
- **Moderate pain (4-7)**: Pain is noticeable, and it might interfere with some activities.

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Severe pain (8-10): Pain is intense and can be incapacitating

RESULTS

Table No 1: Visual Analogue Score of Pain

visual analogue score of pain	0 (no pain)	1-3 (mild)	4-7 (moderate)	8-10 (severe)	Total
mouthwash users	55(53.9%)	33(32.4%)	1(1%)	13(12.7%)	102(100%)
non-mouthwash users	13(13.3%)	15(15.3%)	22(22.4%)	48(49%)	98(100%)

The association between incidence of dry socket and extraction site as shown in table 2 was not significant (p=0.06) after the surgery. According to Chi-Square testing no significant difference (p=0.55) was observed between the genders.

Table No 2: Dry Socket With Regards Extraction Site

Extraction site	incisors	canine	first premolar	Second premolar	First Molar	Second Molar	Third Molar	Total
With Dry socket	2(1%)	4(2%)	2(1%)	9(4.5%)	28(14%)	8(4%)	31(15.5%)	84(42%)

The Age range of the patients was from 20 to 60 years old and there was not a significant effect (p=0.89) on the patients having dry socket, it was more prevalent in the ages above 30 years.

No significant correlation was found between the types of extraction methods used (p=0.297). There was no significant difference in the surgically extracted and the simple extractions. Dry socket occurred 84 patients 12 men (46.2% of total men), and 49 women (41% of total women) as indicated in table3.

Table No 3: Dry Socket With Regards Gender, Age, Type of Extraction

Patients		Gender		Age			Type Of Extraction	
	Total	Male	Female	20-33	34-47	48-60	simple	surgical
With Dry Socket	84	12 (46.2%)	49 (41%)	26 (40.6%)	31 (44.3%)	27 (40.9%)	35 (38%)	49 (45.4%)
Without Dry socket	116	27 (53.8%)	112 (59%)	38 (59.4%)	39 (55.7%)	39 (59.1%)	57 (62%)	59 (54.6%)
TOTAL	200 (100%)	39 (19.5%)	161 (80.5%)	64 (32%)	70 (35%)	66 (33%)	84 (46%)	116 (54%)

There was a total of 84 patients who had dry socket out of which 66(36.5% within the non-smokers) were non-smokers and 18 (94.7% of total smokers) were smokers it was statistically significant (P=0.001) as shown in the table 4.

Table No 4: Dry Socket with Regards Smoker And Non-Smoker

Patients	Smokers	Non-Smokers	Total
With Dry Socket	18 (94.7%)	66 (36.5%)	84 (42.0 %)

The prevalence of dry socket was much lower in the test group than in the control group, and the p value was statistically significant in mouthwash users (P=0.001).

There was a statistically significant correlation between test (mouthwash users) and control groups (non-mouthwash users) (P=0.001) with the prevalence of dry socket in the test group being significantly lower than the control group.

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Table No 5: Dry Socket with Regards Mouth Wash Users and Non Users.

Patients	Test Group (Mouthwash Users)	Control Group (Non-Mouthwash Users)	Total
With Dry Socket	14 (13.7%)	70 (71.4%)	84 (42.0 %)
Without Dry socket	88 (75.9%)	28 (28.6 %)	116 (58.0 %)

DISCUSSION

According to the study's findings, using mouthwash considerably lowers the risk of developing dry socket after dental extractions. Mouthwash users had a significantly lower visual analogue score (VAS) of pain, with a greater percentage reporting no pain (53.9%) than non-mouth wash users (13.3%). Furthermore, compared to mouthwash users (12.7%), non-mouth wash users (49%) had a substantially higher prevalence of severe pain (VAS score 8–10). This implies that mouthwash's antibacterial qualities could aid in better post-extraction healing and decreased inflammation.[14]

Additionally, 42% of the total patient population had dry sockets, according to the findings. Nevertheless, no statistically significant association was there between the extraction site and the occurrence of dry socket (p=0.06). In line with earlier research showing that posterior teeth, especially molars, are more vulnerable because of anatomical and procedural variables[15], the highest frequency of dry socket was linked to the extraction of third molars (15.5%) and first molars (14%).

Likewise, there were no discernible variations in the occurrence of dry socket between patients who were male and those who were female (p=0.55). This difference was not statistically significant, even though males had a slightly larger percentage of dry socket instances (46.2%) than women (41%). Similarly, the incidence of dry socket was not significantly impacted by age (p=0.89), however the prevalence was somewhat higher in patients over 30.[16]

In terms of extraction type, there was no obvious difference in the occurrence of dry socket between basic and surgical extractions (p=0.297), suggesting that process complexity does not always affect the risk.[17] This data raises the possibility that other elements, like post-operative care and patient-related variables, may be more important in the development of dry socket.[18]

Smoking and the occurrence of dry sockets were found to be significantly correlated (p=0.001). The well-established link between smoking and delayed wound healing was further supported by the fact that 94.7% of the patients who developed dry socket were smokers.[19,20] Because smoking is known to decrease blood flow, hinder the development of clots, and bring toxic substances into the healing region, smokers are more likely to experience dry socket.[21]

Most significantly, there was a statistically significant relationship (p=0.001) between the occurrence of dry socket and mouthwash use. The incidence of dry socket was significantly lower in the test group of patients who used mouthwash (13.7%) than in the control group of patients who did not use mouthwash (71.4%). This research emphasizes how using mouthwash before planning an extraction can play a valuable contribution as part of post-extraction preventive measure to reduce issues like dry socket. The evaluation of pain and dry socket incidence was limited to 72 hours post-extraction. Late-onset complications or prolonged healing responses were not assessed. Self-Patient adherence to the prescribed chlorhexidine mouthwash regimen (twice daily for four weeks) was based on self-reporting, which may introduce bias and affect the reliability of outcomes. The study was conducted at a single institution, limiting the generalizability of the findings to other populations or settings with different clinical protocols. Pain was measured using the Visual Analogue Scale (VAS), which, while commonly used, is inherently subjective and may vary with individual pain thresholds and psychological factors.

CONCLUSION

The results of the study support the use of mouthwash in post-operative treatment by indicating that it greatly lowers the likelihood of dry socket and post-extraction pain. Furthermore, smoking is still a significant risk factor for dry socket, which emphasizes the necessity of patient education and guidance on quitting smoking before having dental extractions. The overall findings

emphasize the significance of preventive measures such using antiseptic mouthwash and quitting smoking to enhance post-extraction outcomes, even if extraction site, gender, age, and extraction type were not significantly linked to dry socket.

DISCLAIMER
None.

CONFLICT OF INTEREST
None to declare.

ETHICAL STATEMENT
An ethical clearance letter was obtained from the Ethical Review committee of Foundation University School of Health sciences Ref no: FF/FUMC/216-618Phy/25

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