

# Dry Socket Following Teeth Extraction: Effect of Excessive Socket Saline Irrigation

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## Abstract

**Introduction:** Alveolar osteitis, “dry socket”, is reported among the most common complications following teeth extraction. Many controversies are present in the literature of the pathogenesis of alveolar osteitis, yet the exact mechanisms are not yet confirmed. Many factors in relation to alveolar osteitis were reported since 1963 including difficulty of surgery, lack of operator experience, location of the extracted tooth, patient’s age, gender, smoking habits, oral contraceptives, bacterial infection, excessive irrigation with saline, single extraction versus multiple extractions, the presence of systemic disease, and local anesthetic with vasoconstrictor. No clear data are available in the literature to show the incidence of dry socket due to excessive socket Irrigation with saline.

**Material and Methods:** A total of 574 of teeth were extracted from patients attending the clinic of oral and maxillofacial surgery for different reasons between 31 December 2012 and 30 April 2013. Patients who have unilateral tooth extraction, received chemo or radiotherapy, syndromic patients and pregnant women were excluded from the study. Age, gender, Medical history, location of tooth, difficulty of extraction and the presence of smoking habit were reported. The patients were divided into two groups, in the first group (286 extractions) the extracted socket was irrigated with 20 cc saline (done by the operator) and the second group (288 extractions) received no saline irrigation. All patients were followed up after extraction by one week and instructed to visit the clinic when they develop any signs or symptoms of discomfort related to the extraction site. Patients who developed alveolar osteitis were diagnosed according to the conventional sign and symptoms of dry socket and managed in the standard way.

**Result:** The total number of dry socket reported in this current study was 7 (1.2%) cases, 6 of the cases were females. All these cases were related to extractions in the mandible. Of All cases received excessive socket saline irrigation, only 2 cases developed dry socket.

**Conclusion:** Excessive socket saline irrigation with syringe after teeth extraction is not related to the development of dry socket as mentioned in the literature, other factors could share in that, but no clear reason could be related.

**Keywords:** Dry socket; Saline irrigation; Extraction

## Introduction

Extraction is a common procedure that encountered during routine dental practice. Complications following extraction vary as intraoperative, immediate and late [1]. Alveolar osteitis, “dry socket”, was reported among the most common complications following teeth extraction. It requires more visits to the surgeon and increases the cost of treatment in 45% of the patient [2,3]. Many terminologies for alveolar osteitis have been introduced in the literature due to controversy in understanding the cause of it. “Dry socket” was first described in 1896 by Crawford [4]. Following that many terminologies followed as “alveolar osteitis”, “alveolitis”, “localized osteitis”, “alveolitis sicca dolorosa”, “localized alveolar osteitis”, “fibrinolytic alveolitis”, “septic socket”, “necrotic socket”, and “alveolgia” [5-7].

Alveolar osteitis is an acute inflammation of the alveolar bone around the extraction site which is characterized by severe pain. It usually starts between the first and the third day after extraction accompanied by a partial or total disintegrated blood clot within the alveolar socket with or without halitosis [6].

Many signs and symptoms of alveolar osteitis were reported in the literature including severe pain, presence of bare bone with

empty socket, radiating pain towards the ear and temporal region, inflamed red gingival margin, possible low grade fever, halitosis, ipsilateral regional lymphadenopathy and possible grayish discharge [8-13,15].

The incidence of alveolar osteitis was reported in the literature between 0.5 to 5.6% and up to 30% in case of surgical extractions. In the study of MacGregor 1968, Field 1985 0.5% - 5% alveolar osteitis incidence was documented in routine teeth extractions [16,17]. While it was 1% to 37.5% after extraction of mandibular third molars in some other studies [10,18]. Blum 2002 reported the incidence of alveolar osteitis as 10 times more in surgical extraction than non-surgical. In the study of Younis and Abu Hantash 2011 the overall incidence of dry socket was 3.2% (40 dry sockets in 1305 extractions) [6,19].

Several factors have been reported in the literature regarding the pathogenesis of alveolar osteitis, yet the exact mechanisms are not yet confirmed.

Birn in his series of publications between 1963 and 1977 provided a better understanding of the pathogenesis of alveolar osteitis [8,20,21]. He suggested that the etiology of alveolar osteitis is due to an increased in local fibrinolysis leading to the disintegration of the clot. He explained that the fibrinolysis activity is the result of plasminogen pathway activation, which can be accomplished via direct (physiologic) or indirect (nonphysiologic) activator substances [8]. He justified that that direct activators are released after trauma to the alveolar bone cells caused by extraction while indirect activators are elaborated by bacteria present in the oral cavity [8].

Many factors in relation to alveolar osteitis were reported since 1963 [22]. In a thorough review conducted by Kolokythas and coworkers 2010 many risk factors were mentioned such as difficulty of Surgery, lack of Operator Experience, location of the extracted tooth as mandibular third molars, systemic disease, Oral Contraceptives, patient's Gender, smoking, physical dislodgement of the Clot, bacterial Infection, excessive Irrigation or curettage of alveolus, age of the Patient, single extraction versus multiple extractions and local anesthetic with vasoconstrictor [23]. The relation of dry socket and excessive saline irrigation after teeth extraction is not clear in the literature [24,25].

The aim of this study was to explore the effect of through socket saline irrigation after teeth extraction on the development of dry socket.

**Hypothesis:** There is no significant difference between the extracted socket irrigated thoroughly with saline by the operator and the one who didn't receive irrigation in the development of dry socket.

**Nile Hypothesis:** There is a significant difference between the extracted socket irrigated thoroughly with saline by the operator and the one who didn't receive irrigation in the development of dry socket.

## Materials and Methods

A total of 574 teeth were extracted in the clinic of oral and maxillofacial surgery for different reasons in the period between the 31<sup>st</sup> December 2013 and the 30<sup>th</sup> April 2014.

Inclusion criteria included a healthy and medically compromised patient with bilateral extraction, while exclusion criteria included, unilateral tooth extraction, patients receiving chemo or radiotherapy, syndromic patients, and pregnant patients.

The age, gender, Medical history, number of teeth, the difficulty of extraction and the presence of smoking habit were reported.

The patients were divided into two groups; one group received a through socket irrigation of the extracted socket with 20 cc of saline in a disposable syringe which was completed by the maxillofacial surgeon who extracted the teeth (286 extractions). The other group (288 cases) received no irrigation after extraction. All patients had bilateral extraction, where they received through socket irrigation with a 20 cc of saline in a disposable syringe immediately after extraction in one side while the other side received none.

All patients were consented before treatment where a brief discussion done and a choice given to them to participate in the study. Any patient who didn't agree to precipitate in the study was treated as planned.

Patients were given a regular post-operative instruction as they were advised precisely to have gentle irrigation after six hours of extraction with a cup of water and quarter spoon of salt once only. On the next three days they were advised to do a gentle irrigation 3-4 times a day. A follow-up appointment was given after one week for each patient. Patients were very compliance with the instruction.

The criteria for diagnosing the presence of dry socket included: 1- Presence of mild to severe pain. 2- Presence of halitosis. 3- Presence of inflamed red gingiva area. 4- Presence of bear bone with empty socket 5- Presence of radiating pain to the ear and temporal area 6- Presence of ipsilateral lymphadenopathy. If any sign of dry socket appears before the review visit, patients were instructed to contact the clinic for urgent management.

Patients who developed alveolar osteitis were seen in the clinic and diagnosed according to the criteria mentioned above of dry socket. The onset of developing the symptoms and the severity of pain were reported. The severity of pain was graded as mild, moderate, severe, very severe and extremely severe.

All procedures were done by one operator.

The research was registered at the College of Dentistry Research Centre, King Saud University with ethical approval number FR0175. Data were analyzed using SPSS software version 20 and for data comparison, a simple T- test was used where P value of <0.05 was considered significant.

## Results

A total of 574 teeth extractions were done in the study for patients whose age ranged from 10 to 60 years. Out of the 574 cases 448 (78%) were female and 126 (22%) male. The total number of dry socket reported in this clinical study is 7 (1.2%) cases (Table 1 and 2). Two cases were reported in the age group of 21-30, three cases in the age group 31-40, one case in the age group of 41-50 and one case in the age group above 60 years (Table 3). Of all dry socket cases reported in the current study, six were in females (1.04%) and one in male (0.2%) (Table 4).

Dry socket	Irrigation		
	Yes	No	Total
Yes	2	5	7
No	284	283	567
Total	286	288	574

Table 1: Dry socket and saline irrigation

Dry socket	Value	df	Asymp. Sig (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.281	1	.258		
Continuity Correction	564	1	.542		
Likelihood Ratio	1.323	1	.250		
Fisher's Exact Test				.450	.228
Linear-by-Linear Association	1.278	1	.258		
N of Valid Cases	574				

Table 2: Chi-Square Tests

Dry socket	Age						Total
	10-20	21-30	31-40	41-50	51-60	>60	
Yes	0	2	3	1	0	1	7
No	100	256	99	57	16	39	567
Total	100	258	102	58	16	40	574

Table 3: Dry socket and age

Dry socket	Gender		
	Male	Female	Total
Yes	1	6	7
No	125	442	567
Total	126	448	574

Table 4: Dry socket and gender

All dry sockets were seen in healthy patients while only one case is seen in the diabetic patient. The seven cases of dry socket were reported in the mandibular teeth mainly the first and second molars (4 cases) while two in mandibular premolars and one in mandibular canine. None was reported in the maxilla. All cases of dry socket were reported by the second to third day post extraction.

Most of the dry socket cases developed in simple extractions cases with a low grade of difficulty (Table 5). Only two cases out of 286 developed dry socket where excessive irrigation with saline was used (P value > 0.05).

Dry socket	Difficulty				
	Grade1	Grade2	Grade3	Grade4	Total
Yes	5	1	1	0	7
No	510	44	7	6	567
Total	515	45	8	6	574

Table 5: Incidence of dry socket to due difficulty of extraction

There was no dry socket developed in the quadrant where multiple extractions took place.

## Discussion

The intention of this study was to explore the relation of through socket irrigation with saline after teeth extraction on the development of dry socket. In the literature, no documented evidence was found to correlate the effect excessive saline socket irrigation (saline irrigation established by the operator) and the development of dry socket. Although it was shown that excessive mouthwash will result in wash out of the clot from the extracted socket, there is no clear evidence to support its relation to the development of dry socket [1,8,28]. In the current study, out of 286 patients received excessive saline socket irrigation after teeth extractions, only two developed dry socket; while out of 288 patients received no immediate clinical saline irrigation, five developed dry socket. Therefore, the use of through socket irrigation with saline after teeth extraction has no positive relation to increase risk of developing of alveolar osteitis (Table 1).

The comparison using chi-square test showed no significant difference (Table 2).

The number of patients in this study is similar to other studies which investigated the development of dry socket [19,26,27]. The high numbers of female patients in the current study (78%) was related to the fact that female patients prefer to be treated by a female dentist in our society.

The percentage of dry socket in the current study was reported to be 1.2%, which is in consistent with other studies [14,16,17]. Field and coworkers 1985, MacGregor 1968, reported an incidence of dry socket of 0.5% - 5%. While it was 1% to 37.5% after extraction of mandibular third molars in some other studies [10,18]. It was 2.3% in the study of Partbasatbi and coworkers 2011. Momeni and coworkers in 2011 reported only 0.6% of dry socket in their study; they explain their lower percentage by the difference in racial and geographical factors [28].

Some studies were able to correlate age and increase in the incidence of alveolar osteitis [5,28]. In the current study, most of the cases occurred in patients between 20-50 years of age (Table 3). Dry socket in the current study was reported as six cases in female patients (1.04%) and only one case in male (0.2%), (Table 4). This is in consistent with many studies were more dry socket was seen in females compared to males [15,28]. The study of Abu Younis and Abu Hantash in 2011 reported no statistically significant association between the development of dry socket and patient's gender [19].

The medical condition of the patients has no influence on the development of dry socket in the current study as six cases were reported in healthy patients while one was reported in diabetic patients. This is consistent with Abu Younis and Abu Hantash 2011; while it contrasts the findings of other studies [7-9,19].

All dry socket cases in the current study were seen in mandibular teeth mainly molars and premolars. No cases were reported in maxilla. This is similar to the study of Momeni and coworkers 2011, where the incidence of dry socket in mandible was more than maxilla (0.07 versus 0.05) but it was not statistically significant [28]. Khorasani and coworkers 2006, reported in their study an incidence of 2:5 times maxilla to the mandible [30]. Other studies reported a high incidence of dry socket in relation to the third molar area [6,31].

In the current study, there was no relation between the difficulty of extraction and the increase in the incidence of dry socket. Five cases were reported in simple extraction while one developed after difficult extraction and one after surgical extraction (Table 5). This is inconsistent with many studies [5-7,16,28,32,33]. Brin 1973, explained the increase of dry socket in difficult extractions by the activation of activators secondary to bone inflammations which result in lysis of the clot [8]. In the study of Abo Younis & Abu Hantash 2011, alveolar osteitis incidence following non-surgical extraction of teeth was 1.7% while following surgical extraction was 12% [17]. In a study included 189 patients with 256 impacted third molars surgeries, the incidence of dry socket reported was 19.14% which is inconsistent with the current study [34].

In the current study, only 18 out of 574 cases were smokers but none of them reported having post extraction dry socket. Smoking showed no prevalence in the incidence of dry socket in the current study. This is in consistent with the study of Johnson and Blanton 1988 [35]. While it is inconsistent with many studies [17,21,22,28,33,36]. Sweet and Butler 1979, evaluate the incidence of dry socket and smoking among 4000 surgically removed mandibular third molars. They reported that patients who smoked half-pack of cigarettes a day had an increase in the incidence of dry socket 12% versus 2.6% when compared to nonsmokers while it increased to more than 20% among patients who smoked a pack per day and 40% among patients who smoked on the day of surgery [37].

## Conclusion

Dry socket is a reported problem in the literature where many factors such as age, gender, site of extraction, the difficulty of extraction, medical condition and smoking have been investigated. In the current study, excessive socket irrigation with saline (completed by the operator) of the extracted socket has no positive relation to the increased incidence of dry socket.

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