

## The Incidence of Dry Socket Development and Its Risk Factors

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**Abstract:** Dry socket (alveolar osteitis) is the most commonly encountered complication after tooth extraction in humans and this has been widely reported. Dry socket lesion although it is a self-limiting condition but the pain and discomfort that the patient complains of leads to lost days at work and many visits to the hospital. As the exact and confirmed etiopathogenesis for dry socket has not been well understood. The aim of this study were to find out the frequency, clinical picture, and risk factors for dry socket. A total of 995 patients were included in this study. There were 593 (59.6%) male patients and 402 (40.4%) female patients. The age of patients ranged from 14 -70 years with a mean of  $33.9 \pm 11.32$  years. from January 2013 to March 2015. All consecutive patients who were referred Oral surgery Department in Al-Karama specialized dentistry centre in Baghdad for consultation. A total of 995 patients were included in this study. Out of 995, 68 patients developed dry sockets (6.83%). Those patients who developed sockets et were between (18-67) years (mean  $33.9, sd+11.32$ ) most of them in the third decade of life, there were 593 (59.6%) male patients and 402 (40.4%) female patients with a higher percentage of dry sockets than the female group, 33(48.5%) of 68 cases who developed dry sockets had surgical extraction. There were significant differences in the development of sockets pocket between the removal of the two teeth done surgically (51.5%) or non-surgically (48.5%),  $p=0.033$ . The frequency of AO reported in this study is higher than the overall incidence of studies registered. There were significant differences concerning the age of the patient and dry socket, there is no relationship between smoking and the occurrence of dry socket found in the present study. It has been shown that the frequency of AO increases in patients with poor oral hygiene in the literature. Clinically the picture of the dry socket that includes pain, empty socket and exposed bone were found in all patients.

**Keywords:** Dry socket, Frequency, risk factor, oral hygiene surgical extraction

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### 1. Introduction

Dry socket (alveolar osteitis) is the most commonly encountered complication after tooth extraction in humans and this has been widely reported. there are many definitions for dry socket nearly the same which is "pain occurring postoperatively in the extraction site, usually after 24 to 72 hours after tooth removal, associated with the disintegration of blood clot partially or totally within the extraction socket"<sup>[1]</sup>. Other signs and symptoms that may occur are radiating pain towards the ear<sup>[2-3]</sup>, halitosis<sup>[2,4]</sup>, low-grade fever<sup>[2,3]</sup>, bare bone<sup>[5]</sup>, regional lymphadenopathy<sup>[2,3]</sup>. There has been considerable variability in the incidence of dry socket reported, it ranges between 0.5% to 5% For routine dental extractions<sup>[6,7]</sup>, while for surgical removal of lower third molars the incidence varies from 5% and 30%<sup>[8]</sup>. So surgical removal results in about 10 times higher incidence of dry socket and this has been well documented<sup>[1]</sup>. Dry socket lesion although it is a self-limiting condition but the pain and discomfort that the patient complains of leads to lost days at work and many visits to the hospital. Nowadays the success of any operation is estimated by the post-operative period; the shortest postoperative period is the most successful operation. A clear understanding of the condition will reduce the occurrence of it in patients undergoing dental extraction. As the exact and confirmed etiopathogenesis for dry socket has not been well understood, many factors have been enumerated. In one of the review articles<sup>[9]</sup>, the authors mentioned many of these risk factors and they divided the articles into supporting or refuting that factor. The following are some of the risk factors which are attributed to the development of dry sockets have been mentioned in that review

article,- Surgical Trauma and Difficulty of Surgery, Patient's Gender, Mandibular Third Molars, Physical Dislodgement of the Clot, Smoking, Age of the Patient, Local Anaesthetic with Vasoconstrictor, Excessive Irrigation or Curettage of Alveolus, Systemic Disease, Bacterial Infection, Lack of Operator Experience, Oral Contraceptives.

The term dry socket describes the condition of the extraction socket of the tooth when the pain begins. On examination, the extraction socket appears to be empty, the blood clot is either partially or lost, and some surfaces of the socket bone are exposed. This bone is sensitive and painful to touch. The area of the socket has a bad odor. Frequently complains of a foul taste<sup>[5]</sup>. The objective of this study was to determine the prevalence and risk factors of dry sockets as a complication of tooth extraction in the Al-Karama specialized dentistry center in Baghdad for consultation.

## 2. Materials and Methods

### 2.1. Samples

This represents a prospective observational study. Oral surgery Department in Al-Karama specialized dentistry center in Baghdad for consultation. It varied out from January 2013 to March 2015. All consecutive patients who were referred to our center for dental extractions under local anesthesia were included in this study. Patients who had only deciduous teeth extracted were not included in the study.

A total of 995 patients were included in this study. There were 593 (59.6%) male patients and 402 (40.4%) female patients. The age of patients ranged from 14 -70 years with a mean of  $33.9 \pm 11.32$  years.

### 2.2. Data collection

The following data were recorded for each patient: biodata, medical history, the reason for extraction, number and type of teeth extracted, time is taken for the extraction to be done, amount and technique of local anesthesia, smoking habits, use of oral contraceptives, oral hygiene status, and postoperative medications. If the extracted tooth was an impacted third molar, its depth and angulation were also recorded. All the extractions were carried out under local anesthesia; 2% lignocaine with 1: 80,000 adrenaline. The patients were instructed to return to the clinic if there is any increased or persistent pain in the extraction socket within 7 days.

### 2.3. Diagnosis of dry socket

The term dry socket describes the appearance of the tooth extraction socket when the pain begins. On examination, the tooth socket appears to be empty, with a partially or completely lost blood clot, and some bony surfaces of the socket are exposed. The exposed bone is sensitive and is the source of the pain. The area of the socket has a bad odor and the patient frequently complains of a foul taste<sup>5</sup>. The following data were recorded for those with a diagnosis of dry socket: bio data, day of presentation, day of onset of dry socket, and teeth involved.

### 2.4. Data Analysis

Data were then analyzed using SPSS® for Windows (version 20; SPSS Inc, Chicago, IL, USA). Descriptive statistics and bi-variant data analysis using chi-square tests were done as appropriate. The critical level of significance was set at  $P < 0.05$ .

## 3. Results

A total of 995 patients were included in this study. Out of 995, 68 patients developed dry sockets (6.83%). Those patients who developed sockets were between (18-67) years ( $33.9 \pm 11.32$ ) most of them in the third decade of life (Table 1).

**Table 1.** Distribution of dry socket by age group

Age group	No.	%
< or=20	5	7.353
21 to 30	29	42.65
31 to 40	13	19.12
41 to 50	17	25
>50	4	5.882
Total	68	100

There were 593 (59.6%) male patients and 402 (40.4%) female patients with a higher percentage of dry sockets than the female group (table 2). 288 (28.9%) of these patients were smokers of whom 235 (81.3% of the total sample) were heavy smokers (smoked more than 20 cigarettes per day), and

19(27.1%) of the smoker patients developed dry socket, while the non-smoker patients who developed dry sockets were 49(72.1%) this means that there is no correlation between the dry socket and cigarette smoking table(2). 87 anterior teeth and 908 posterior teeth were extracted. All dry sockets developed from the extraction of posterior teeth except for three anterior teeth ( $p=0.004$ ). 26(38.3%) maxillary teeth out of 434(43.62%) developed dry socket while there were 42(61.7%) mandibular teeth out of 561(56.38%) developed dry socket ( $p=0.017$ )(Table2). A total 19(27.94%) of 68 who developed dry sockets had good oral hygiene while the remaining patients had poor oral hygiene, 72.06% ( $p=0.049$ ), (Table 2). In this study according to the technique of local anesthesia, patients develop dry sockets more with block anesthesia (61.76%) than with infiltration anesthesia (38.24%). also when the numbers of the cartridges increase the incidence of dry socket increases (Table 2).

**Table 2.** Relationship of gender, tobacco smoke, site of extraction, oral hygiene, amount and technique of local anesthesia, method of extraction, extraction time and dry socket

Factor	Group	AO	Total	P value
Gender	Male	31 (45.6%)	593 (59.6%)	0.049
	Female	37 (54.4%)	402 (40.4%)	S
Tobacco smoke	Smoker	19(27.9%)	288(28.9%)	0.049
	Non-smoker	49(72.1%)	707(71.1%)	S
Site of extraction	Maxilla	26(38.3%)	434(43.6%)	0.017
	Mandible	42(61.7%)	561(56.4%)	S
Oral hygiene	Good	19(28%)	613(61.6%)	0.049
	Poor	49(72%)	382(38.4%)	S
Amount of local anaesthesia	<2	31(45.6%)	690(69.35%)	0.049
	>=2	37(54.4%)	305(30.65%)	S
Technique of local anesthesia	Infiltration	26(38.24%)	466(46.8%)	0.005
	Block	42(61.76%)	529(53.2%)	HS
Method of extraction	Non-surgical	33(48.5%)	752(75.6%)	0.033
	Surgical	35(51.5%)	243(24.4%)	S
Extraction time	>10	54(79.4%)	380(38.2%)	0.049
	=<10	14(20.6%)	615(61.8%)	S

33 (48.5%) of 68 cases who developed dry sockets had surgical extraction. There were significant differences in the development of sockets pocket between the removal of the two teeth done surgically (51.5%) or nonsurgically (48.5%),  $p=0.033$  (Table2). Caries and their sequelae were the indications for tooth extraction in 58.82% of teeth with dry sockets, the least percent of dry sockets occurs in teeth with advanced periodontitis (3%), (Table3). Regarding the clinical picture of dry socket, pain, empty socket, and exposed bone were present in 68 (100%) of cases, halitosis was present in 29 (42.64%) of cases, foul taste in 30 (44.11%) of cases, edema of surrounding tissue 52(76.47%) of cases. Regional lymphadenopathy 30 (44.11%) of cases and only 10 (14.7%) cases presented with fever. We divided the time for removal of the teeth into two groups below 10 minutes and above or equal to 10 minutes, there was a significant difference ( $p=0.049$ ) between these groups; the more the time taken for removal of teeth the more the incidence of dry socket (Table2). As far as the pain severity is concerned; 48 patients (70.58%) had severe pain. The remaining patients had moderate pain. Some of those patients describe other symptoms of pain like throbs (22.05%) and radiating (41.7%).

**Table 3.** Indications for extraction

Indications for Extraction	Dry socket	total no. of patient
advanced caries	40(58.82%)	793(79.69%)
advanced Periodontitis	3(4.4%)	96(9.65%)
orthodontic treatment	10(14.7%)	13(1.3%)
Pericoronitis	15(22.06%)	93(9.35%)

#### 4. Discussion

Dry socket is the most common and painful complication in the healing of extraction wounds defined as focal osteomyelitis in which the blood clot has disintegrated or been lost with the production of a foul odor and severe pain but no suppuration [4], probably the two most commonly cited Pathogenesis for dry socket lesions are trauma inflicted during extraction of the teeth and the risk of infection [5-7]. Mamoun [10] implies that inflammation does not fundamentally cause dry socket le-

sions and he proposes a different model for initiation and pathogenesis of the lesion. depending on his model He suggests another terminology for this phenomenon: “post-extraction peri-alveolar exposed bone ostealgia syndrome.”

The frequency of AO reported in this study(6.83% ) is higher than the overall incidence of 0.5% to 5% registered in the literature<sup>[6,7]</sup>, This difference could be attributed to variations in the diagnostic criteria required by different researchers, also this incidence includes both surgical and nonsurgical cases; if we take only nonsurgical cases the incidence will be 4.3% and this will be within the reported range. It has been well documented those surgical extractions result in about 10 times higher incidence of AO<sup>[1,11]</sup>.

Although this is similar to the findings of several other studies,<sup>[12,13]</sup> including MacGreger<sup>[6]</sup> who reported a 50% greater incidence of AO in women than that in men in a series of 4000 extractions t is in disagreement with the results of, Nusair and Abu Younis<sup>[14]</sup> , usually the possible explanation written in the literature that women use contraceptive pills but thaws were no significant difference in our study concerning the use of these pills and the occurrence of dry socket. the incidence of the dry socket has been reported to increase in females when extraction occurs on days 1 to 22 of the menstrual cycle in non-menopausal women in both the Oral Contraceptive users and nonusers<sup>[15,16]</sup>.

There were significant differences concerning the age of the patient and dry socket, The peak age incidence of dry socket in this study was 21-30 years. This is similar to reports by Ogunlewe<sup>[13]</sup> and Oginni et al,<sup>[17]</sup> but is at variance with the report of Eshghpour<sup>[1]</sup> . The reasons for this particular age predilection may be due to surgical trauma when removing these teeth considering the amount of bone that should be removed (increased number of third molar extractions in this age group) and a greater prevalence of smoking at this age. there is no relationship between smoking and the occurrence of dry socket found in the present study which is similar to the findings of Parthasarathi et al<sup>[19]</sup> Other studies found that a high incidence of alveolar osteitis is evident in those who smoke at least 5 cigarettes daily.<sup>[20]</sup>

Halabi et al<sup>[21]</sup> found that published evidence on this risk factor is Scarce and more research a needed to analyze the cumulative effect of smoking on the development of dry sockets also suggested measuring Tabaco use on the day after that extraction. Many workers reported site-specificity in the occurrence of the socket with the mandibular molar area being the most commonly affected site<sup>[6, 7]</sup>. This is in agreement with the findings of our study where there is significant differ then the occurrence of socketed in mandibular posterior teeth this be due to surgical trauma (difficulty of extraction) of posterior teeth Traumatic extraction was found to be the great risk factor associated with the development of alveolar osteitis.<sup>[21]</sup> difficult extraction lead to by compression of the socket and possible thrombosis of the underlying vessels, reducing blood perfusion. Some associate trauma with a reduction in tissue resistance and consequently wound infection by anaerobes<sup>[1]</sup>. and that's why dry socket occurs more in surgically removed teeth(14.4%) than nonsurgical removal(4.4% ) and also occur when the time is taken for removal of teeth increased.

However, other reports<sup>[22,23]</sup> found no such difference; Mandibular and maxillary teeth were affected almost equally by dry sockets.

It has been shown that the frequency of AO increases in patients with poor oral hygiene<sup>[24]</sup> this is in agreement with the findings of our study, although some report no difference in the incidence of the Dry socket concerning oral hygiene status (poor versus good)<sup>[13]</sup>. The literature is divided concerning the effects of local anesthetic on the incidence of dry sockets. The common belief that local anesthesia with a vasoconstrictor is one of the causative factors in the occurrence of dry socket due to ischemia caused by the action of a vasoconstrictor had been rejected by the fact that ischemia lasts for approximately two hours and is then followed by a reactive hyperaemia<sup>[9, 25]</sup>. This is in agreement with the result of our study where more cases of dry socket occur when block anesthetic, not infiltration technique was used. The explanation for this may be due to the difficulty of extraction and extraction of posterior teeth (that required block anaesthesia) not the action of vasoconstrictor in local anaesthesia. Clinically the picture of the dry socket that includes Pain, empty socket and exposed bone were found in all patients, which is in agreement with the findings of several other studies<sup>[3, 5]</sup>.

## 5. Conclusions

There were significant differences concerning the age of the patient and dry socket, It has been shown that the frequency of AO increases in patients with poor oral hygiene, Clinically the picture of the dry socket that includes Pain, empty socket and exposed bone were found in all patients, there is significant differ then the occurrence of socketed in mandibular posterior teeth than other teeth. there is no relationship between smoking and the occurrence of dry socket, teeth Traumatic extraction was found to be the great risk factor

**Author Contributions:** Conceptualization, methodology, E.H.A.; validation, formal analysis and investigation, E.H.A and S.A.M.A.; data curation; writing-original draft preparation, and editing, F.A. and K.T. H.; All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Institutional Review Board Statement:** The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Ethics Committee of Ibn Sina University of Medical and Pharmaceutical Sciences, Baghdad, Iraq.

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Conflicts of Interest:** The authors declare no conflict of interest.

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