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Incidence of dry socket after extraction and its associated factors Experience at BPKIHS

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Abstract

Background: Dry socket is one of the most common complications of tooth extraction, and its prevalence may reach up to 35%. Several contributing factors have been reported to be associated with an increased risk of developing dry socket. The objective of this study was to evaluate the incidence of dry socket after extraction and to assess the factor associated with its occurrence.

Materials and methods: This study included all patients visiting the Department of Oral and Maxillofacial Surgery, BP Koirala Institute of Health Sciences for routine extraction from December 2016 to June 2017. Information regarding gender, oral hygiene status, type of extraction, operator experience, cause of extraction and associated medical conditions were recorded along with the occurrence of dry socket. Further statistical analysis was conducted to explore the association of these factors with the occurrence of dry socket.

Results: During the study period, 2151 teeth were extracted from 1636 patients. Only 68 patients developed dry sockets, giving an incidence of 4% among patient treated and 3.2 % of the teeth extracted. The frequency of dry socket for males and females was 25 (4.4%) and 43 (4.0%) respectively. This difference was found to be statically insignificant ($\chi 2 = 0.18$; $p = 0.669$). There were 13 (19%) cases of dry socket with significant medical conditions and 55 (81%) cases of dry socket with single extractions.

Conclusion: There were no significant association of dry socket with gender, oral hygiene, type of extraction and operators.

Keywords: Dry socket, Incidence, Risk factors, Tooth Extraction

Declarations

Ethics approval and consent to participate: Eg: This study was conducted with prior ethical approval from Institutional Review Committee of BPKIHS, Dharan (IRC No. 113/073/074-IRC) Informed consent has been obtained from participants prior to the enrollement..

Consent for publication: Informed consent was obtained from the patient for the publication of identifying features along with the manuscript.

Availability of data and materials: The full data set supporting this research is available upon request by the readers.

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BACKGROUND

Dry socket is one of the most common complications of tooth extraction, characterized by severe postoperative pain that usually begins on the second or third day after extraction. Its prevalence has been reported to vary and may exceed 35% [1] . The exact pathogenesis of dry socket is not well understood, however, the disintegration of the blood clot due to fibrinolysis remains the most widely accepted theory [2].

Several contributing factors have been reported to be associated with an increased risk of dry socket. These include traumatic extraction, preoperative infection, smoking, sex, site of extraction, use of oral contraceptives, administration of local anesthetics with vasoconstrictors, inadequate postoperative irrigation, and low level of operator experience. Several methods have been proposed to reduce the incidence of dry socket, including the use of antiseptic mouthwashes, antifibrinolytic agents, antibiotics, steroids, clot supporting agents, and other intra-alveolar dressings [3-7]. Although the exact etiology of this condition cannot be fully established, its management is generally simple and effective. It usually involves reassuring the patient, gentle cleaning and irrigation of the affected socket, and placement of a medicated dressing.

The aim of the present study was to determine the incidence of dry socket, and to evaluate its association with sex, type of extraction, oral hygiene and experience of operators.

MATERIAL AND METHODS

This was a prospective observational study conducted in the Department of Oral and Maxillofacial Surgery at B. P. Koirala Institute of Health Sciences, Dharan, Nepal. All patients visiting the department for routine extraction from December 2016 to June 2017 were enrolled, while the children (less than 13 years) and uncooperative patients were excluded. Similarly, this study did not include extraction of impacted teeth. Patients who presented to this department with post extraction pain following treatment elsewhere were excluded. Informed consent was obtained from all patients prior to inclusion in this study. Ethical clearance was taken from the Institutional Review Committee, BPKIHS (113/073/074-IRC).

The extractions were performed by operators with different levels of clinical experience that include undergraduate students, interns, dental surgeon, residents and faculty members. During follow-up, patients who presented with pain following dental extraction were examined clinically for the signs of dry socket. After reviewing the case, the following data were recorded: sex, oral hygiene status, type of extraction and experience of operators. All cases of dry socket were managed using a standard treatment protocol, which included irrigation with normal saline, placement of intra alveolar dressing containing zinc oxide eugenol paste, administration of systemic analgesics, and, in some cases, antibiotics.

The collected data were entered into Microsoft excel sheet and analyzed using SPSS (version 16.0) for windows. Descriptive statistics, such as percentages were calculated and the chi-square test was done for statistical analysis where appropriate.

RESULTS

The total number of patients who underwent dental extraction in the study period was 1636, and the total number of teeth extracted was 2151. Only 68 patients developed dry sockets, resulting an incidence of 4% of cases and 3.2% of extracted teeth. Among 562 males and 1074 females who underwent dental extraction, the incidence of dry socket among males and females was 25 (4.4%) and 43 (4.0%), respectively **(Table 1)**. The difference was not statistically significant ($\chi2 = 0.18$; $p = 0.669$).

Regarding oral hygiene, patients were classified into three groups based on the plaque index: poor, fair and good. Out of 68 patients who developed dry socket, 43 (4.2%) had fair, 10 (5.2%) had good and 15 (3.6%) had poor oral hygiene. The Chi-square test was used to analyze these data and the difference was not statistically significant ($\chi2 = 0.82$; $df = 2$; $p = 0.661$).

The incidence of dry socket was higher in cases of open extraction than in closed extraction. However, Fisher's exact test revealed that the difference between closed and open extractions was not statistically significant ($\chi2 = 2.83$; $p = 0.116$) **(Table 3)**.

The operators were classified into five groups; students, interns, dental surgeons, junior residents and faculties. There were 35 (4.2%) cases of dry socket out of 828 patients operated on by students, 14 (3.3%) out of 423 patients operated on by interns, 12 (4.6%) out of 259 operated on by dental surgeons, 4 (5%) out of 80 operated on by junior residents, 3 (6.5%) out of 46 operated on by faculty members. These findings were not statistically significant according to chi-square analysis ($\chi2 = 1.70$, $df = 4$; $p = 0.789$) **(Table 4)**.

From the sample of 68 patients with dry socket, the reason for extraction were apical periodontitis (16, 23.5%), severe chronic periodontitis (3, 4.4%), grossly decayed (23, 33.8%), impaction (5, 7.4%), orthodontic extraction (3,

4.4%), periapical abscess (7, 10.3%), pericoronitis (2, 2.9%), RCT failure (1, 1.5%,), root stump (8, 11.8%) **(Figure 1)**. A total of 68 patients with dry socket (54, 79.4%) patients did not have any significant medical disease whereas the remaining (14, 20.6%) patients have medical conditions like hypertension, multiple disease, anxiety, chronic liver disease, depression, diabetes, hypothyroidism and peptic disease respectively.

Table 1: Incidence of dry socket in relation to sex

Sex	Dry Socket	Without dry socket	Total	P value*
Female	43 (4.0 %)	1031 (96.0%)	1074	
Male	25 (4.4 %)	537 (95.6 %)	562	0.669
Total	68 (4.2 %)	1568 (95.8%)	1636	

*Chi-square test

Table 2: Incidence of dry socket in relation to oral hygiene

Oral hygiene	Dry socket	Without dry socket	Total	P value *
Fair	43 (4.2%)	984 (95.8%)	1027	
Good	10 (5.2%)	183 (94.8 %)	193	0.661
Poor	15 (3.6%)	401 (96.4%)	416	
Total	68 (4.2%)	1568 (95.8%)	1636	

*Chi-Square Test

Table 3: Incidence of dry socket in relation to type of extraction

Method	Dry Socket	Without dry socket	Total	P value
Close extraction	65 (4.0%)	1542 (96.0%)	1607	
Open extraction	3 (10.3%)	26 (89.7%)	29	0.116
Total	68 (4.2%)	1568 (95.8%)	1636	

Fisher's exact

Table 4: Incidence of dry socket in relation to operators

Operators	Dry socket	Without Dry Socket	Total	P value*
Dental Surgeons	12 (4.6%)	247 (95.4%)	259	
Faculties	3 (6.5%)	43 (93.5%)	46	
Interns	14 (3.3%)	409 (96.7%)	423	0.789
Junior Residents	4 (5.0%)	76 (95.0%)	80	
Student	35 (4.2%)	793 (95.8%)	828	
Total	68 (4.2%)	1568 (95.8%)	1636	

*Chi-square test

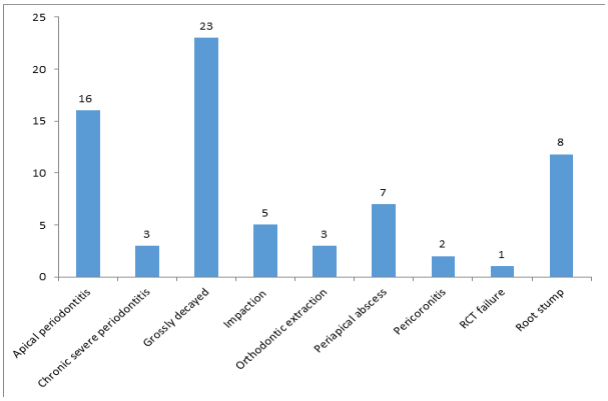

Figure 1: Reasons for extraction in patients with dry socket

DISCUSSION

This study aimed to evaluate the incidence of dry socket and the factors associated with it in patients who underwent routine dental extractions. Dry socket is a commonly encountered complication after tooth extraction. Several contributing factors have been reported to be associated with an increased risk of dry socket. Early studies reported that there was no significant difference in the sex distribution in relation to dry socket [8]. However, some studies have shown a higher tendency for dry socket to occur in females more than in males [9]. This may be attributed to the fact that, before 1960, oral contraceptives were not widely used. As their popularity and availability increased, more women began using them, and the incidence of dry socket noticeably increased. In the present study, the difference between males and females was found to be statistically insignificant in the current context.

Excessive trauma causes compression of the bone lining the socket, thereby impairing vascular penetration. Subsequently, such trauma can lead to thrombosis of the underlying vessel. Some authors have narrated that trauma leads to decrease in tissue resistance and wound infection [10]. As far as the type of extraction is concerned, the results in this survey revealed that the incidence of dry socket was higher after surgical (trans- alveolar) than closed extraction, but the difference was not statistically significant. These findings were in contrary to most previous studies, where most of the authors agreed that traumatic extraction is an important etiological factor in dry socket [11].

The role of general health in dry socket incidence remains controversial. Some authors suggest that

certain diseases (e.g. uncontrolled diabetes, anemia, liver disease) result in impairment of the immune system of the body and increase the incidence of dry socket following dental extraction [4]. Conversely, other authors found no significant correlation between the incidence of dry socket and the presence of systemic medical conditions [11]. In this study, 79.4% patients with dry sockets had no relevant medical history, whereas 20.6% associated with medical history such as hypertension, multiple disease, anxiety, chronic liver disease, depression, diabetes, hypothyroidism and peptic disease respectively, it was found to be more dry socket in normal patient than in patient with medical history. Several authors have emphasized that periapical or marginal infection in the alveolus and the blood clot may predispose to the development of dry socket [12]. Meyer has reported a high incidence (14%) of dry socket following pericoronitis [13]. In the present study, dry socket was most frequently observed in in grossly decayed teeth (33.8%) followed by teeth with apical periodontitis (23.5%).

Certain studies have indicated that irrigation can dislodge the newly formed blood clot [14]. However, more recent literature provides evidence that adequate irrigation is one of the key factors in preventing dry socket [15]. It facilitates the removal of enamel and dentin debris formed during tooth splitting and bone fragments from the extraction socket, that may otherwise impede the healing process. Earlier studies suggested that curettage might have a deleterious effect on the healing process, however, newer studies present surprisingly favorable outcome in prevention and healing of dry socket wound [14]. In this study, all extraction sites were irrigated with normal saline and betadine in a 1:1 dilution after extraction. Some investigations have suggested that the vasoconstrictors in intra-ligamentary injections may contribute to the development of dry socket [16]. There is well-documented evidence linking a higher incidence of alveolar osteitis with smoking . Sweets and Butler attributed this to the negative pressure built within the mouth during smoking, which may dislodge the clot [17]. However, this remains a subject of debate. Cigarette smoking is also believed to delay the healing of dry socket wounds [8].

Alveolar osteitis occurs more frequently within the age group of 20-40 years [11]. Local anesthesia has been mentioned as a risk factor in dry socket, however, extractions under general anesthesia have also been shown to result in dry socket when no local anesthesia is used [14]. Meechan et al. observed that two infiltrations resulted in a higher incidence of dry socket compared with a single injection [9]. There exists a possibility that epinephrine attenuates healing by reducing bleeding and oxygen tension, thereby increasing fibrinolysis [18]. It has been found that the molar area, particularly the first molar region in both jaws exhibits the highest incidence of dry socket, followed by the third molar region in the lower jaw and the second premolar in the upper jaw, which is in accordance with many studies [11,12].

An interesting finding of this study was that the incidence of dry socket in lower canine region ranked third after the first and third molar region. This finding contrasts with other studies, where most authors agreed that dry socket rarely occurs in the anterior region [12]. A number of studies have indicated that the incidence of dry socket is lower after multiple than after a single extraction [11,12]. Systemic antibacterials were also reported to have some benefit in the prevention of alveolar osteitis. Studies showing favorable results with penicillin, clindamycin, erythromycin and metronidazole have been published [19]. Some researchers however, have found no significant difference in the incidence of dry socket with the use of systemic antibiotics [19].

The use of chlorhexidine both as a mouth rinse and as a preoperative irrigant, has been shown to significantly reduce the oral microbial load and contribute to lowering the incidence of dry socket [20]. Eugenol based dressing (trade name Alvogyl) contain benzocaine as a local anesthetic, balsam of Peru vehicle and eugenol as an obtundant. Placement of the dressing provides immediate relief from pain and a course of 2-3 applications on alternate day is usually required [21].

This study was conducted in a single regional hospital; therefore, it covered a limited region and may not be generalised to the entire population. Patients may not return to the same centre if complications such as dry socket arise, suggesting that the actual incidence might be higher than what was reported in this study.

CONCLUSION

The incidence of dry socket was 4% of cases and 3.2% of teeth extracted. Its incidence was not associated with sex, type of extraction, oral hygiene, or operator experience.

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