INCIDENCE OF DRY SOCKET FOLLOWING EXTRACTION OF PERMANENT TEETH IN A DENTAL TEACHING INSTITUTE, KULASHEKHARAM

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BRANCH III

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CERTIFICATE

This is to certify that the dissertation entitled **"INCIDENCE OF DRY SOCKET FOLLOWING EXTRACTION OF PERMANENT TEETH IN A DENTAL TEACHING INSTITUTE, KULASHEKHARAM"** is a bonafide research work done by Dr. SHAMEEM JAMAL, Post graduate student during the period of 2014 - 2017 under my guidance and supervision. This dissertation is submitted to the Tamil Nadu Dr. M.G.R. Medical University, Chennai in partial fulfillment of the requirements for the award of Master of dental surgery, Branch III (Oral and Maxillofacial surgery). It has not been submitted (partially or fully) for the award of any other degree or diploma.

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LIST OF ABBREVIATION

DS	Dry Socket
AO	Alveolar Osteitis
OHI	Oral Hygiene Index
DM	Diabetes Mellitus
MC	Menstrual Cycle
OCP	Oral Contraceptive Pills
LA	Local Anesthesia
AIDS	Acquired Immune Deficiency Syndrome
SPSS	Statistical Package for Social Sciences

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ABSTRACT

Background:

One of the most common postoperative complication following the extraction of permanent teeth is dry socket. While a great deal has been published about third molar extractions, there are scarce data available related to the dry socket associated with routine erupted dental extraction in the recent literatures Pain that persists for more than two days can be a sign of postoperative complications that can result in clinical resources, operator time that increases costs and stress in a dental practice. Therefore, understanding the development of postoperative pain could be valuable to the clinician in terms of predicting and improving the treatment of these painful episodes.

Objectives:

The present study was undertaken to evaluate the Incidence of dry socket following extraction of permanent teeth in a dental teaching institute, Kulashekharam, Kanyakumari.

Methods:

Using two questionnaires, this prospective cross-sectional study evaluated a total of 168 patients who underwent surgical & non-surgical extraction of permanent teeth included in this study. One questionnaire was completed for every patient who had one or more permanent teeth extracted in the Oral Surgery department. The other questionnaire was completed for every patient who returned for a post-operative visit and was diagnosed with dry socket during the study period

Results:

There were 186 dental extractions carried out in 168 patients. The overall incidence of dry socket was 2.1%. There was no statistically significant association between the development of dry socket and age, medical history, medications taken by the patient, indications for the extraction, extraction site, operator experience, or the amount of local anesthesia and administration technique used. Incidence of dry socket in females was significantly higher during menstruation period (6.9%) in this study, and a direct linear trend was observed in poor oral hygiene status of patients. All cases with Dry socket treated and were followed until resolution of Dry socket

Conclusion:

The etiology of dry socket is multifactorial and ultimately it is the host's healing potential which determines the severity and duration of the condition. The incidence of dry socket was found as 2.1%. in this study. The incidence was higher in female patients during menstruation period (6.9%) and in poor oral hygiene status of patients (5.2%)

INTRODUCTION

One of the most common postoperative complications following the extraction of permanent teeth is a condition known as dry socket.[1] This term has been used in the literature since 1896, when it was first described by Crawford. It is characterized by severe pain starting usually on the second or third day postoperatively. Its prevalence has been reported to vary from 0% to more than 35% and is more common following mandibular third molar extraction[2].

While the pathophysiology of dry socket remains unclear, the most accepted theory is the disintegration of the blood clot in the alveolus by increased fibrinolytic activity.[3] While still a subject of controversy, the theoretical initiation of the fibrinolytic process has been reported to be related to multiple and probably interdependent factors such as the following:

- Age
- Gender
- Use of oral contraceptives
- Smoking
- Duration of surgery
- Condition of the extracted teeth
- Degree of surgical trauma
- Menstrual cycle
- Presence of a preexisting infection or pericoronitis

- Inadequate irrigation or curettage of the socket after extraction
- Low operator experience
- Extraction of mandibular teeth
- Use of excessive amounts of local anesthetic with vasoconstrictor[2]

This environment poses a risk for alveolar infection following single or multiple dental extractions, even in healthy subjects, and when they occur repeatedly those are Multi -microbial infections. Individuals at risk for a local or general infection, such as patients who are immune depressed, are malnourished, or have an uncontrolled associated systemic disease.[2]

Several methods have been advocated to reduce the incidence of dry socket including the use of antiseptic mouthwashes, gel, antifibrinolytic agents, antibiotics, steroids, clot supporting agents, and other intra-alveolar dressings and medicaments[27,68,58,29]. While this condition cannot be completely treated as long as the exact etiology is not firmly established, its management appears to be simple and effective. It usually involves reassurance of the patient, cleaning and irrigation of the affected socket, and insertion of a medicated pack.[17,24,15,62]

Although dry socket is a self limited complication, various methods have been proposed for treatment of this phenomenon[13]. However, prevention is more effective in dry socket.[14] Some studies reported that identification of predisposing factors and their elimination as much as possible while using pharmacological prophylaxis had resulted in significant decrease in the incidence of dry socket.

This study was performed to evaluate the incidence, predisposing factors (age, sex, medical history, oral hygiene status, menstruation cycle, cigarettes smoking, anatomic location, difficulty in extraction, local anesthetic technique) contributing to the development of dry socket.

AIMS AND OBJECTIVES

AIMS:

The aim of the study was to evaluate the Incidence of dry socket following extraction of permanent teeth in a dental teaching institute Kulasekharam.

OBJECTIVES:

Postoperatively,

- Evaluating the incidence of dry socket.
- To find out possible predisposing factors to develop dry socket

REVIEW OF LITERATURE

According to **Geoffrey et al**[11] an ideal tooth extraction may be defined as the painless removal of the whole tooth or tooth root with minimal trauma to the investing tissues, so that the wound heals uneventfully and no post-operative prosthetic problem is created. This procedure is frequently followed by complications includes Postoperative pain, Postoperative swelling, Trismus, Fracture of teeth, Excessive bleeding, Dry socket (alveolar ostitis), Postoperative infection like Pus, local swelling, lymphadenopathy, Damage to soft tissue, Damage to nerves, Opening of maxillary sinus(oroantral fistula), Loss of tooth, Fracture of maxillary tuberosity, Fracture of jaw, Dislocation of mandible ,Surgical emphysema (air in soft tissues producing crackling on palpation)

P V Gokul et al[18] studied about the Complications of exodontia. In his study, analyses the incidence of various complications following routine exodontia performed using fixed protocols. A total of 22,330 extractions carried out in 14,975 patients, aged between 14 and 82 years, The most common complications encountered were dry socket, tooth fracture, trismus, fracture of cortical plates. Wound dehiscence, postoperative pain and hemorrhage were encountered less frequently. Luxation of adjacent teeth, fracture of maxillary tuberosity, and displacement of tooth into adjacent tissue spaces were rare complications.

According to **I. R. Blum**[10] incidence of dry socket has been reported as 3–4% following routine dental extractions it ranges from 1% to 45% after the removal of mandibular third molars. This great variability in the reported

incidence of dry socket is largely due to differences in diagnostic criteria and in the methods of assessment, non-impacted, partially impacted and fully erupted mandibular third molars extractions, in intra operative and postoperative management of extraction sites; in patient populations with respect to age or to surgical techniques or surgical skill. Also, there is a large variation of pain thresholds within the population. Studies claiming 1% incidence lack clinical credibility, whereas those with unusually high incidence rates (>30%) suggest that other, unaddressed variables were introduced or the sample size was insufficient.

About the pathogenesis of dry socket according to **Birn et al**[9] claimed that partial or complete lysis and destruction of the blood clot was caused by tissue kinases liberated during inflammation by a direct or indirect activation of plasminogen in the blood. When direct tissue activators are released after trauma to the alveolar bone cells, plasminogen (which is laid down in the fibrin network as it is formed) is converted to plasmin, resulting in the breakup of the clot by disintegrating the fibrin. This conversion is accomplished in the presence of tissue or plasma pro-activators and activators. These activators have been recently classified as direct (physiologic) and indirect (nonphysiologic) and further subclassified according to their origin as intrinsic and extrinsic activators. Intrinsic activators originate from plasma components whereas extrinsic activators originate outside of the plasma/blood .Direct intrinsic activators include Factor XII (Hageman factor)-dependent activator and urokinase, which are mediated by leukocytes. Direct extrinsic activators include tissue plasminogen activators and endothelial plasminogen activators. Tissue plasminogen activators are found in most tissue types, including alveolar bone. Indirect activators include substances

such as streptokinase and staphylokinase, which are produced by bacteria and bind to plasminogen to form an activator complex that then cleaves other plasminogen molecules to plasmin. This strengthens the theory of the involvement of micro-organisms in the development of dry socket.

About the flap design in dry socket **Haraji et al**[19] reported that the modified triangular flap decreases the incidence of Alveolar Osteitis more than the buccal envelope flap. In this study he examined the patients who were candidates for extraction of a bilaterally impacted mandibular third molar with the same difficulty index; a modified triangular flap was placed on one side and a buccal envelope flap (control) was placed on the other side, Alveolar Osteitis and healing were assessed at three and seven days after surgery.

Eshghpour et al[20] studied about the Effect of menstrual cycle on frequency of alveolar osteitis in women undergoing surgical removal of mandibular third molar, in this study a total of 145 female patients, with a mean age of 24 years, underwent 290 third molar extractions. The overall frequency of dry socket was 23.45%. The frequency of dry socket was significantly greater in the middle of the cycle than during the menstrual period in both the Oral Contraceptive users and nonusers, other study variables includes smoking status, irrigation used during surgery, extraction difficulty, surgeon experience, number of local anesthetic cartridges used, and patient age . In Oral Contraceptive users revealed a significantly greater frequency of dry socket compared with nonusers.

Bortoluzzi et al [2] observed the effect of smoking in dry socket in his study the incidence of Dry Socket, Alveolar Infection, and Postoperative Pain Following

the Extraction of Erupted Teeth, Using a questionnaire study evaluated 357 consecutive surgeries in which 473 erupted teeth were extracted by dental students during a 22-month period. The subject sample consisted of 210 (58.8%) male patients ranging in age from 11 to 79 years (mean 41 ± 16.3). The most prevalent self-reported ethnicity was Caucasian (78.2%). The questionnaire consisted of 60 questions directed to the patient and to the dental student who performed the surgical procedure. The questionnaires were completed before and within seven days after the surgery to obtain outcomes data. Alveolar infection observed in 2 cases so the observed incidence was 0.6% Higher pain levels and pain persisting longer than two days were observed with more traumatic surgeries, or associated with postoperative complications. Smoking was found to be statistically associated with the development of postoperative complications. The incidence of alveolar infection, dry socket, and severe pain were very low for the routine extraction of erupted teeth. Severe pain that persists for more than two days can represent a sign of a postoperative complication such as dry socket.[2]

Smoking, surgical trauma and single extractions are considered to be predisposing factors in the occurrence of dry socket according **Younis et al**[7] study about Dry Socket: Frequency and Risk Factors in a Palestinian Dental Teaching Center. During the study period, 1305 dental extractions were carried out in 805 patients. There were 467 (58%) male patients and 338 (42%) female patients. Age of patients ranged from 10 to 73 years with a mean of 35.4 (±14.95) years. A total of 286 (35.5%) patients were smokers, of whom 33 (7% of the total sample) were heavy smokers (smoked more than 20 cigarettes per day). The proportion of smokers was noticeably higher in the male group than in the female group (58%

and 3.9% respectively). Despite most of patients 566 (70.3%) were fit and healthy at the time of extraction, 239 (29.7%) had varying underlying systemic conditions and 169 (21%) were taking different medications From the results from their study, the following conclusions they have made: 1. The incidence of dry sockets following single extractions was significantly higher than that following multiple extractions. There was a statistically significant difference in the incidence of dry socket between smokers and non-smokers. The incidence of dry socket was higher following surgical extractions than following non-surgical extractions. There was no statistically significant association between the development of dry socket and the patient's age, sex, medical history, medications (preoperative or postoperative), indication for extraction, extraction site, and operator's experience. [7]

Also **Eshghpour et al[6]** mentioned that smoking and oral contraceptive intake had significant association with incidence of dry socket in his study Dry Socket following Tooth Extraction in an Iranian Dental Center: Incidence and Risk Factors in their study. Total of 1073 teeth in 785 patients included in this study. 362 of patients were male (46.11%) and 423 (53.89%) were female. The age of participants was between 10 and 73 years old with the mean age of 32.68±17.63. Total of 31 patients (2.89%) were diagnosed with dry socket. smoking and oral contraceptive intake had significant association with incidence of dry socket . In contrast, age, gender, medical status, tooth location, number of anesthetic carpules, anesthetic technique, pre-extraction antibiotic consumption, and academic year of students had no significant association with the incidence of Dry socket[6]

Oginni et al[8] conducted a study about Dry Socket: A Prospective Study of Prevalent Risk Factors in a Nigerian Population. In their study Sixty-eight extraction sockets in 65 patients (46 females and 19 males) with a mean age of 33.48 years were studied. All extracted teeth were posterior (17 maxillary, and 51 mandibular). Preoperative diagnoses were mainly of acute apical periodontitis secondary to carious lesions (30/68), chronic apical periodontitis (18/68), and chronic pulpitis (15/68). The use of an oral contraceptive was elicited in 25% of the females, and extractions were performed between days 1 and 22 of their menstrual cycle. Extraction was traumatic in 66.2% of cases. A ranking of the elicited risk factors suggests that a previously infected posterior tooth involves an equal risk in both genders. Poor oral hygiene and traumatic extraction of a mandibular tooth were prominent in males, whereas extractions performed between days 1 and 22 of the menstrual cycle were significant in females. [8]

Nusair et al[1] studied Prevalence, and Risk Factors of Dry Socket in a Jordanian Dental Teaching Center and published in Journal of Contemporary Dental Practice. In his study there were 838 dental extractions carried out in 469 patients. The overall prevalence of dry socket was 4.8%. There was no statistically significant association between the development of dry socket and age, sex, medical history, medications taken by the patient, indications for the extraction, extraction site, operator experience, or the amount of local anesthesia and administration technique used. The prevalence of dry socket following non-surgical extractions was 3.2%, while the prevalence following surgical extractions was 20.1%($P < 0.002$). The prevalence of dry socket following surgical and non-surgical extractions were significantly higher in smokers (9.1%) than in non-

smokers (3%) , and a direct linear trend was observed between the amount of smoking and the prevalence of dry socket (P = 0.034). The prevalence of dry socket was significantly higher in the single extraction cases (7.3%) than in the multiple extraction cases (3.4%) (P = 0.018).

Hasan et al[16] conducted a study, Evaluation of relative distribution and risk factors in patients with dry socket referring to Yazd dental clinics, in his 2 months study, only 28 people were diagnosed with dry socket out of 4,779 patients, the average age of people with dry socket was 36.61±13.59 years and without dry socket 42.86±15.49 years The results presented higher prevalence in female than male and lower jaw was more involved than upper jaw (2.5 times). The incidence of dry socket in teeth extractions without injury had been reported 0.04% while in damage cases were 1% Tooth infection also showed statistical significant difference Also some factors such as smoking, taking Oral contra captive pills and menstruation increased the chance of dry socket development, but these relations did not show any significant statistical difference, 0.584 and 0.302 respectively The more affected teeth in this study were third molar, first molar, second molar, premolars, canine and incisors, respectively. But the difference was not statistically significant The incidence of dry socket differed significantly with the level of oral hygiene and patients with systemic disease.

Females, preoperative infection, radiographically difficult impaction and habitual tobacco use are considered as predisposing factors and are related to higher incidence of dry socket formation in the study conducted by **Vijay et al**[4] about Post-surgical evaluation of dry socket formation after surgical removal of

impacted Mandibular third molar. A total of 63 patients undergoing surgical removal of impacted Mandibular third molar were enrolled in their study. The patients were placed in two groups according to status of development of dry socket. The majority of subjects 59 of 63 (93.7%) did not develop dry socket and were placed in a control group while only 4 of 63 (6.3%) subjects developed dry socket and comprised the study group There was no statistically significant difference between the control group and study group with respect to patient distribution according to the monitored risk factors of age, sex, infection, radiographies difficulty of the extraction, tobacco use of the impacted mandibular 3rd molar extraction. In their study, they found that incidence of dry socket was (6.3%) after surgical removal of impacted mandibular third molars. They also noticed the onset of symptoms mostly appears within 48 hours postoperatively, along with pain, bare bone and halitosis, on the 3rd postoperative day. Pain, empty socket and bare bone were most significant clinical features on the 7th postoperative day. Variables like patients mean age between 19 - 30 years; females, preoperative infection, radiographically difficult impaction and habitual tobacco use are considered as predisposing factors and are related to higher incidence of dry socket formation. In this study dry socket were treated with warm saline irrigation with Zinc oxide eugenol packing and it was observed that this procedure relieved acute pain episodes. The higher incidence of dry socket formation observed in his study was among young adults, especially females. Those were radiographically difficult impactions, with pre-existing infection and were habitual tobacco user.[4]

Abedalwahab et al[21] conducted a study, Alveolar ostetis incidence and risk factors following third molar surgery in Jordan, in their study a total number of 1087 patients were operated, 586 were females (53.9%) and 501 were males (46.1%). The overall incidence of alveolar ostetis was 12.7%. The patients who returned with dry socket comprised 50 males and 88 females corresponding to 4.6% and 8.1% of the whole sample respectively. By comparing the incidence of dry socket in each group separately it was found that 15% of the female group and 10% of the male group returned with dry socket. The difference was found to be statistically significant.

According to **Babatunde O et al**[12] there is significant relationship between fair/poor oral hygiene with dry socket in his study about the incidence and Predisposing Factors of dry socket in a Nigerian Tertiary Hospital. In his study he included the indication for extraction, number and type of teeth extracted, oral hygiene status, compliance to oral hygiene instructions, and development of dry socket. During his study 1182 patients with total of 1362 teeth extracted during a 4-year period of study were analyzed, out of which a total of 19 patients had dry socket (1.4%) More female patients had dry socket than males (36.8%) but no significant relationship with dry socket, $P > 0.05$, 0.393, and most of the patients (47.4%) were in the fourth decade. There was significant relationship between fair/poor oral hygiene with dry socket,. A total of 14 (73.7) patients had nonsurgical extractions and most of these also involved the lower molars, with significant relationship, $P < 0.05$, 0.013. The mean age (SD) was 35.2 (16.0) years. Mandibular teeth were affected more than maxillary teeth. Molars were more affected. Retained roots and third molars were conspicuous in the cases with dry socket.

Halabi D et al [22]reported that the previous surgical site infection, traumatic extraction, and tobacco smoking are associated with an increased risk of alveolar osteitis, a statistically significant association between traumatic extraction, tobacco smoking after extraction, previous surgical site infection and the development of alveolar osteitis.

Infiltration of excess local anesthetic into the tissues resulted in a higher incidence of dry socket according to **Turner et al**[35] conducted a clinical study of dry socket in 1982. In his study a total of 1274 extractions carried out by the author resulted in a dry socket incidence of 2.6%. and he state that there was no sex predilection in the occurrence of dry socket. Incidence of dry socket formation was highest in the first and second molar region. Forceful infiltration of an extra 2 ml of local anesthetic into the tissues resulted in a higher incidence of dry socket. Dry sockets occurred more frequently in difficult extraction cases as compared to routine extractions; this difference was statistically significant. 20 teeth in difficult extraction cases were removed by the open surgical method there were no cases of dry socket formation. Teeth removed principally due to a periodontal involvement did not give rise to a single case of dry socket. Treatment of dry socket with intra-alveolar dressings did reduce the pain; however, the healing time was invariably prolonged. The best results, in the form of reduction of pain and rapid healing, were obtained with the surgical method of reflection of a flap and debridement of the socket.

According to **Al-Sukhun J et al**[39] the effect of the use of analgesic in the incidence of dry socket. In his study he compare the efficiency of pain control in

the patients who use the selective cyclooxygenase-2 (COX-2) inhibitor celecoxib, pre-emptively, and the patients who use the ibuprufen, and he reported that the ibuprufen group had a significantly higher alveolar osteitis incidence than the celecoxib group and the placebo group.

Role of micro organism in dry socket reported in a non human study conducted by **Rodrigues MT et al**[75] in his study he studied by experimentally induced infection (the inoculation material contain Capnocytophaga ochracea, Fusobacterium nucleatum, Prevotella melaninogenica, Streptococcus anginosus, Treponema socranskii and Streptococcus sanguis) in the rat sockets, they reported that, it produced higher levels of serum C- reactive protein and showing the potential of disseminated infection and disturb in the alveolar repair process in an interesting experimental model for alveolitis studies.

Previously affected osteomyelitis site can cause dry socket according to **Krakowiak PA et al**[48] reported that, in certain patients, the normal process of healing can be delayed in some cases, because the sites was previously affected by osteomyelitis. This article outlines the pathogenesis, microbiology, and surgical and medical therapies of this condition and specifically addresses osteomyelitis cases related to patients with no documented history of radiation or bisphosphonate exposure and in whom the principal factor in the development of the condition is infection by pyogenic microorganisms.

The role of socket irrigation with a normal saline solution that routinely used at the end of extraction on the development of alveolar osteitis (dry socket) after removal of impacted mandibular third molars, **Tolstunov L et al**[62] studied

and he noticed that there is difference of dry socket incidence (77.8% on the irrigated versus 22.2% on non-irrigated side) which demonstrated between the traditional extraction protocol versus modified approach without the end-of-surgery irrigation. The study demonstrated that the post extraction socket bleeding is very important for the proper uncomplicated socket healing. If it's not washed away with irrigation solution at the end of extraction, the normal blood clot has a higher likelihood to form, and therefore, can potentially lead to an uncomplicated socket healing without development of alveolar osteitis.

Incidence of Dry Socket in Relation to Psychological Stress a study conducted by **Munir et al**[23] showing the incidence of dry sockets among a sample of patients attending different dental clinics after tooth extraction for three consecutive years in relation to their age, sex, tooth location and to patients perceived stress. Dry socket patients records were investigated for age, sex and tooth location. And a control group was chosen of exactly the same age and sex distribution as that of the patients but free from any symptoms. A questionnaire sheet with a list of possible life events for the last twelve months before the extractions were distributed among both, then the results was subjected to statistical analysis .Out of 956 patients, 58 (6%) developed dry sockets, (36%) of them were located on wisdom teeth with the lower ones comprising (25.86%). There were significant difference in mean perceived psychological stress between the patients and those in control group regarding different ages and sexes. There were higher incidence of dry sockets in his study than most other studies around the world. Female /male ratio was nearly equal. mostly occurred on lower and posterior more than upper and anterior teeth wisdom teeth, highly

affected, and In his study he state that their is a relationship between psychological stress and dry socket.

Upadhyaya et al[3] studied the Prevalence of dry socket following extraction of permanent teeth at Kathmandu University Teaching Hospital. Retrospective reviews of records of total 1860 no of patients were studied who underwent extraction of permanent teeth for various reasons since January 2007 to December 2008 period. There were 873(47%) male patients and 987(53%) female patients. In his study he included indications for extraction, extracted tooth status, onset of symptoms, relevant findings of the examined clinician, interval between presentation, management given, and its outcome were retrieved and analyzed. During the study total 2640 no. of permanent teeth were extracted of 1640 patients. Out of the 1640 no of total patients 987(53%) patients were female and 873 (47%) patients were male. A total of 103 (3.9%) extractions were complicated by dry socket in patients aged 11 to 80 years. 56 (54.4%) dry sockets were occurred in female patients and 47(45.6%) occurred in male patients. The highest frequency of dry socket was in the 21 to 30-year age group (40.77%) followed by more than 51year age group (13.59%) of patients. The indications for extraction of the total 103 number of dry socket cases. Advanced dental caries was the reason for extractions of most 46(44.6%) of cases of dry socket. This was followed by advanced periodontal disease in 42 (40.7%), pericoronitis in 11 (10.6%), orthodontic reasons 2 (1.9%) and prosthetic reasons 2 (1.9%) no of patients. most of the dry socket cases were occurred in mandibular teeth 71 (68.93%) than maxilla 32 (31.06%).The mandibular first molar 28 (27.81%) had highest incidence of dry socket occurrence followed by mandibular second molar 13 (12.62%) and premolars 13 (12.61%) and maxillary first molar11 (10.67%) followed by mandibular third molar 11 (10.67%). Pain

was the chief complaints of all cases with a dry socket. A combination clinical features of pain, empty socket, bare bone and halitosis present in 60(58.25%) no of cases. This was followed by the presence of pain, empty socket, and bare bone without halitosis in 20(19.41%) no of cases. pain , empty socket and halitosis were present in 8(7.76%) no. of cases and only pain with empty socket was present in 15(14.56%) no of cases. Thus pain and empty socket were present in 103(100%) cases, bare bone was present in 80 (78%) and halitosis was present in 68(66%) no. of cases . The onset of symptoms was found to range from immediately to more than 72 hours after the extraction. Symptoms started immediately after the extraction in 5(4.85%)cases, following 24 hours in 7 (6.79%)cases, following 48 hours in 23(22.33%) cases, following 72 hours in 49(47.57%) cases and following more than 72 hours in 19 (18.44%)no of patients.[3]

V Mudali et al[23] studied about the incidence and predisposing factors of dry socket following extraction of permanent teeth at a regional hospital in south Africa. A total of 2214 patients were reviewed of 2281 permanent teeth had been extracted. Collected data's are total number of patients their demographics, total number of permanent teeth extracted, number of dry sockets encountered and associated risk factors such as smoking, contraception and systemic illnesses .The overall incidence of dry socket reported was 42 (1.8%), resulting in an incidence of 1.84 dry sockets per 100 extractions with a 2:1 female predominance . Seventy percent (29/42) of the dry sockets occurred in patients between the ages of 21 and 40 years. being more prevalent in females, in the second and third decades of life, and in mandibular teeth, more specifically in molars. Nineteen of the twenty eight females (67%)who developed dry socket were on some sort of oral contraception, with this being the only predisposing factor for 14 (50%) of the group. Smoking was the most common

predisposing factor in males with 72% (10/14) of those who developed dry socket having a history of smoking. Traumatic extractions was the only factor in six (14%) of the cases, but when in combination with oral contraception and smoking was identified in 34% (14) of the cases. Six (14%) of the patients with dry socket were HIV positive, whilst one patient had diabetes mellitus.

Garcia AG et al[61] study about the use oral contraceptive affect the incidence of complications after extraction of a mandibular third molar. This study investigated whether oral contraceptive use affects the incidence of complications (pain, trismus, dry socket) in women undergoing removal of impacted mandibular third molars. Two hundred and sixty seven women, aged 17 - 45 years, underwent removal of an impacted mandibular third molar. Eighty seven of the women were regular users of oral contraceptives. All patients were evaluated for postoperative pain, trismus and dry socket. Trismus values (measured as maximum interincisal distance) were similar in the two groups of patients. Postoperative pain was significantly more frequent among women taking contraceptives, both on day 1 (30% of women taking contraceptives used analgesics, versus 11% of women not taking contraceptives, $p < 0.001$) and on day 5 (14% versus 5%, $p = 0.024$). Similarly, dry socket occurred more frequently among women taking contraceptives than among women not taking contraceptives. The results of this study support the view that oral contraceptive use favours the appearance of dry socket and postoperative pain after extraction, but has no effect on trismus.

According to **D C Bowe et al**[15] study about the management of dry socket/ alveolar osteitis. He explained about the clinical presentation of dry socket varies

according to individuals. In his study a total of 24 cases of dry socket were recorded. In the six-months of the 24 cases, six resulted from extractions carried out by the patient's general dental practitioner and the remaining 18 cases resulted from extractions carried out within the Accident and Emergency Department of the Dublin Dental School and Hospital. 517 (495 simple, 22 surgical) teeth were removed in the Accident and Emergency Department of Dublin Dental School and Hospital, giving a possible incidence of 3.5%. Of these 18 cases of dry socket, three resulted from surgical extractions and the remaining 15 resulted from simple extractions. The time between extraction and onset of symptoms ranged from one to three days post extraction. The time between the onset of symptoms and the presentation of the patient was on average four to six days. All patients presenting had severe pain, the severity of this ranging from seven to 10 as measured by the visual analogue scale, scored with 10 as a maximum. Eighteen (70%) had halitosis and 25 (94%) of the cases experienced an altered taste. All cases showed the presence of a slough and the presence of food impaction was recorded in 20 (74%) of the cases.

Ogenlewe MO et al[25] conducted a study in which he shows the incidence and pattern of presentation of dry socket in non surgical tooth extraction. In his 6 months study biodata of patients , reason for extraction, number and type of teeth extracted, time taken for the extraction, smoking habit, and use of oral contraceptives. Onset of symptoms and type of teeth involved for those with diagnosis of dry socket were also recorded. total of 554 teeth 31 extracted teeth sites developed dry socket. The mean age (SD) of the 27 patients who developed dry socket was 32.2 +/- 13.0 years, Most (44.5%) of the patients who presented

with dry socket were in the 3rd decade of life, with more than half (59%) of them presenting on the 3rd day after extraction. Mandibular and maxillary teeth were equally affected. Molars and premolars were exclusively affected. Difficulty of extraction was significantly associated with the development of dry socket . Female patients were significantly affected. Non-dressing treatment provided satisfactory relief of the symptoms and subsequent granulation of the socket.

Murph et al [17]conducted a retrospective study on the use of a dental dressing to reduce dry socket incidence in smokers. In his study data a total of 10 dry sockets developed in 9 of 472 patients with 707 extractions and all the patients were smokers, were used for retrospective analysis. In that Four female and five male patients experienced dry sockets post extraction. Overall, 1.7% of men (1.1% of extractions) and 2.2% of women (1.9% of extractions) developed dry sockets. percentage of patients .In each age bracket that developed dry sockets are 4 women, who developed a total of 5 dry sockets, were between 33 and 42 years of age; of these women, 2 each were between 33 and 40 (4.7%) and between 41 and 42 (4.4%) years of age. Five dry sockets occurred in 5 men who were between 27 and 54 years of age; of these men, 2 each were between the ages of 41 and 50 (3.0%) and between 51 and 60 (5.1%). One man between the ages of 21 and 30 (1.25%) also developed a dry socket. The prevalence of dry sockets versus the number of packs of cigarettes smoked by patients per day ranged from 1.4% for 1 pack per day smokers to 6.3% for 1.5 packs per day smokers. The prevalence of dry sockets were 1.6% and 1.5%, respectively, for men and women who had single extractions, and 2.2% and 3.8%, respectively, for men and women who underwent 2 or more extractions during the same visit.

Ashok Kumar et al[26] conducted a study about the incidence of dry socket following 3rd molar extraction. In his 3 months study 444 extractions carried out in 420 patients. Records of total number of patients underwent extraction of third molar for various reasons. Both male patients and female patients included. Information regarding indications for extraction, extracted tooth status, interval between presentation, management given, and its outcome were retrieved and analyzed. Out of the total number of extraction only one female patient was found with an incidence of dry socket in 48.

Madhumati Singh et al[71] study of incidence etiology and treatment of alveolar osteitis, comprised 60 patients of dry socket in the span of 5 years. The patients were randomly divided into three groups on the basis of treatments: Group A (zinc oxide eugenol group), Group B (alvogyl group), and Group C (platelet rich fibrin group). The clinical progress was noted at 1st and 7th day of treatment. In this present study of 60 cases of dry socket, included 40 (66.66 %) males and 20 (33.33%) females. Age range was 18-56 years and means (SD) was 36.31 (11.91) years. The incidence of dry socket was more prevalent in male (66.66%) and most of the patients were in third decade (36.31years). Pain remission - pain reduction is more rapid in ZOE group than alvogyl group and PRF group on day 1 but the change is non-significant at day 7 in all groups. Alveolar mucosal healing shows healing is faster and better in PRF group as compared to alvogyl and ZOE group at the end of 7th post treatment day. ZOE group lagged behind in complete healing at 7th day.

Vallverdu et al [43]conducted a data base research study in which Cochrane and pubmed-medline databases articles between October 2013 and February 2014

were included. The key words “dry socket”, “post-extraction complications”, “alvogyl”, “alveolar osteitis” and “fibrynolitic alveolitis” were used. case reports and non human studies excluded , total of 8 articles included out of 625 in which 3 prospective studies, 2 retrospective studies and 3 clinical trials. curettage and irrigation are applied to almost all groups studied in the articles included), as this seems to be imperative to remove debris, sequestra, and bacteria from the denuded bone as a unic or as a control treatment or before applying some local therapy. to assess pain intensity, some of the studies used the visual analogue scale, asking the patients to measure their pain ranging from 0 (“no pain at all”) to 10 (“the most pain imaginable”), although some studies considered 8 or 9 the maximum level of pain. other methods used to assess pain remission were the number of analgesic tablets needed ,the mg of acetaminophen or the percentage of patients who referred a pain decrease. only three of the studies including quantitative references of the alveolar mucosa healing evolution in those alveoli that had developed dry socket. socket healing was measured with different scales, after his article’s analysis and according to their scientific quality, a recommendation is given to all of the therapeutic interventions proposed for dry socket’s treatment.

Inamdar MN et al [27] conducted a clinical study for the prevention of dry socket using chlorhexidine gel and ornidazole gel only in impacted mandibular third molar a comparative randomized prospective study on 30 patients in his study he state that there is improvement in mouth opening and swelling after placement of chlorhexidine gel or ornidazole gel. this improvement in mouth opening and swelling has effect on pain also and there is decrease in post-extraction pain. out of 10 patients 1 developed dry socket after placement of

chlorhexidine gel and 2 from 10 patients developed dry socket in which nothing was placed, shows that incidence of dry socket is significantly less on placement of either chlorhexidine gel or ornidazole gel. there is no significant difference between chlorhexidine gel and ornidazole gel and both gels are effective in reducing the incidence of dry socket in patients with difficulty score between 7 and 10. Both chlorhexidine gel and ornidazole gel are effective in reducing post-operative complications which are pain, swelling, and reduction in mouth opening. this improvement signifies and highlights the use of chlorhexidine gel and ornidazole gel in the prevention of dry socket after extraction of mandibular third molar.

Silvana et al[68] conducted a study in which studied about the effectiveness of intra-alveolar chlorhexidine gel in reducing dry socket following surgical extraction of lower third molars. In this study sample of 40 patients treated who required extraction of third molars impacted, which were randomly assigned to research groups experimental group (chlorhexidine gel 0.12%) and control group (placebo gel). Performed the extraction was administered 1 ml of chlorhexidine gel or 1 ml of placebo gel within the socket. The removal of suture was on the fifth postoperative day in which the presence or absence of dry socket was evaluated. And results showed as no relationship between the appearance of dry socket after application of chlorhexidine gel or placebo gel. significant differences in the pain presented on the fifth postoperative day were evident, the administration of intra-alveolar chlorhexidine gel 0.12% could generate a better response to postoperative pain after the removal of third molars.

Umar khitab et al[68] conducted a clinical study explaining about the characteristics and treatment of dry socket undertaken on 90 patients having the clinical features of dry socket, in a private clinic of the author. In his 3 year study data regarding the age, gender, site of dry socket, time lapsed from extraction until diagnosis and treatment outcome was evaluated and reviewed. the age ranged from 17- 69 years with a mean value 34.3 years, with high frequency occurring in 4th decade. the male to female ratio was 1.12: 1. sixty six patients presented dry socket in mandible, while 24 in maxilla. dry socket was more common at 3rd molar in mandible and 1st molar in maxilla. 26 patients presented with dry sockets after three days of surgical intervention, while three patients (3.33%) after 7 days of their extraction, All patients were treated with surgically by administering anesthesia, curettage and irrigation of the socket to cleanse it of necrotic bone, tooth fragments, induce bleeding and primary closure by advancement flap, to protect the clot and enhance healing by primary intention. This procedure provided immediate pain relief and promoted healing. surgical intervention without any complication

D Reekie et al[76] conducted a clinical research which explained about the prevention of dry socket with topical metronidazole in general dental practice. Study which he conducted was a placebo-controlled clinical trial. A total of 302 patients ,23 returned with alveolar osteitis. Out of these, 8 patients had received the metronidazole gel and 15 patients with the placebo of KY Jelly. Difference in the incidence of alveolar osteitis between the placebo and the active gel groups was not significant and his study concluded that 25% topical metronidazole gel was not effective in reducing the incidence of alveolar osteitis Topical

metronidazole gel was ineffective in preventing either alveolar osteitis or the patient returning with pain. Complications following tooth extraction are significantly less in those aged 50 years and over compared with those less than 50 years of age.

Vikrant et al[45] reported that there was significant effectiveness of azithromycin in comparison with other antimicrobials as prophylactic use in impacted mandibular third-molar surgery in which penicillins and cephalosporins were mainly used in his study fifty (23 males & 27 females) patients. Pre-surgical evaluation of pain, swelling, lymphadenopathy, fever and purulent discharge from the surgical site were made. All patients were administered oral Azithromycin 500mg, 1 hour prior to the procedure. The patients were followed up clinically for a minimum period of 10 days post operatively. Evaluation for pyrexia, purulent discharge from surgical site, persistent pain &/or swelling & lymphadenopathy was done on 1st, 3rd, 7th and 10th postoperative day to determine SSI (surgical site infection). All patients received same set of post-operative medications (Tab. Diclofenac sodium (50mg) TID, Tab. Ranitidine 150 mg BID for 5 days) and set of instructions. Results showd as Surgical site infection was seen in only one patient (2%) out of the total fifty patients included in the study when oral Azithromycin was administered one hour prior to surgical removal of mandibular third molar.

Winiewska I et al[56] studied the effect of application of lincomycin on Beta-tricalcium phosphate (TCP) to the alveolus and they reported that Lincomycin on TCP can be used to prevent alveolar ostitis and reduces

complications in the form of pain and trismus, Beta-tricalcium phosphate also prevents atrophy of the alveolar process. Out of 80 patients 20 patients reported no pain 24 hours after extraction. On the third day after surgery, alveolar periostitis was present in 15% of patients in the study group and 75% of patients in the control group. On the last day of follow-up, periostitis was present in only 2.5% of patients in the study group as opposed to 45% of patients in the control group. The differences were statistically significant

Intra-alveolar application of chlorhexidine gel can reduce the incidence of alveolar osteitis in **Torres lagares D et al[58]** study, in his study 38 patients with bleeding disorders was studied. The experimental group treated with bioadhesive 0.2% CHX gel applied intraoperatively once after surgical removal of the third molar. The control group was treated in an identical fashion with placebo gel. 57.15% reduction in the incidence of AO in the experimental group. The control group had a 17% incidence of AO and the experimental group had a 7% incidence of AO. Bleeding complications occurred in 21% of the experimental group compared with 29% of the control group

In a study by **Hita-Iglesias P et al[29]** also reporting topical application of bioadhesive chlorhexidine gel to the surgical wound during the postoperative week may decrease the incidence of alveolar osteitis after extraction of the mandibular third molars. The bioadhesive 0.2% chlorhexidine gel to the wound during the first postoperative week and a 0.12% chlorhexidine rinse during the first week postextraction observed a 70% decrease in postoperative alveolar osteitis. The

0.12% chlorhexidine rinse group had 25% incidence postoperative alveolar osteitis, while the gel group had 7.5%.

Gelatamp a colloidal silver gelatin sponge can prevent the occurrence of dry socket after teeth extraction according to **Wang YZ et al[65]** in his study 350 teeth extracted from 976 patients, the patients divided into group A, group B and group C randomly. "Gelatamp" colloidal silver gelatin sponge was implanted into alveolar socket after teeth extraction in group A, with absorbable gelatin sponge was implanted into alveolar socket in group B and nothing was implanted into alveolar socket in group C. The incidence of dry socket was 0.44% in group A, 2% in group B and 4.44% in group C. There was significant difference in the incidence of dry socket between group A and group C. There was also significant difference between group B and group C and between group A and group B.

Tetracycline compound placement to prevent dry socket, a postoperative study of 200 impacted mandibular third molars.study conducted by **Sanchis et al[33]**. In this study his results showing Dry socket was diagnosed in 4 cases (2%), with no relation to intra-alveolar tetracycline placement being observed. The patients who were administered intra-alveolar tetracycline had less pain and trismus and consumed fewer analgesics than the patients who received no such treatment, although statistical significance was not reached. He concluded his study as the intra-alveolar placement of tetracycline compound after the surgical removal of impacted mandibular third molars did not affect the incidence of dry socket.

Poor MR et al[55] conducted a study in which the Reduction in the incidence of alveolar osteitis in patients treated with the SaliCept patch, containing Acemannan hydrogel. The SaliCept Patch is a freeze-dried pledget that contains Acemannan Hydrogel obtained from the clear inner gel of Aloe vera L. patients treated with either clindamycin-soaked Gelfoam or SaliCept Patches . 1,031 sockets had been treated with clindamycin-soaked Gelfoam. 1,064 sockets had 2 SaliCept Patches placed immediately after extraction. analysis of all extraction sites revealed that the incidence of AO in the Gelfoam group was 7.6% compared with 1.1% in the SaliCept-treated group (P <.0001). his study results suggest that the SaliCept Patch significantly reduces the incidence of AO compared with clindamycin-soaked Gelfoam.

Betts NJ et al[69] study , evaluated the efficacy of topical viscous 2% lidocaine jelly for the alleviation of pain experienced during the instrumentation of mandibular third molar extraction sites diagnosed with alveolar osteitis and for pain relief during the postinstrumentation period. thirty adult patients with a diagnosis of alveolar osteitis in a mandibular third molar extraction site were included in study. Each patient had their sutures removed, the socket irrigated, and 2% lidocaine jelly placed on the tip and side of the tongue to blind the patient against the test substances. The subjects were then randomly distributed into two groups. Group 1 had a nonactive jelly base placed into the socket 2 minutes prior to the placement of a standard obtundant dressing. Group 2 had viscous 2% lidocaine jelly placed into the socket in the same manner. Patients subjectively quantified their pain intensity pretreatment, during instrumentation, immediately post manipulation, at 5-minute intervals to 30 minutes, and at 45 and 60 minutes. They also subjectively quantified

their pain relief at each of the time intervals following instrumentation. he use of 2% lidocaine jelly elicited a statistically significant (P < .05) decrease in pain perception, and a statistically significant increase in pain relief when compared with the inactive jelly. Topical viscous 2% lidocaine jelly is a useful adjunct during the treatment of alveolar osteitis, especially in the early (< or = 60 minutes) post instrumentation period.

MATERIALS AND METHODS

Study design:

This is a Cross sectional study for evaluating the incidence of dry socket following extraction of permanent teeth in a dental teaching institute Kulasekharam**.**

Study setting:

Patients who reported to the Department of Oral and Maxillofacial surgery, Sree Mookambika Institute of Dental science, Kulasekharam, K.K district, Tamilnadu were included in the study. One sixty eight patients who fulfilled the inclusion criteria formed the study sample.

Number of group:

Two groups.

Description of group:

Out of One sixty eight patients one eighty six extraction of tooth carried out during the study period. It was divided into two groups:

Group I : Age of up to 45 years old patients

Group II : Age of 46 year and above old patients

Sample size of each group:

- 93 extractions sockets out of 87 patients in group I
- 93 extractions sockets out of 80 patients in group II

Total sample size of the study

186(168 patients)

Scientific basis of sample size used in study

Scientific basis of sample size used in the study:

Sample size formula used here $= 4pq/d^2$

P = incidence of dry socket = 35%[1]

q = 100- P = 65

d = 20% of P = 7, So total sample size = 186

Sampling technique

Convenient sampling technique is used.

SELECTION CRITERIA:

Inclusion criteria:

- Patients who underwent extraction from the Department of Oral Surgery, Sree Mookambika Institute of Dental Sciences, Kulasekharam
- Patients in the age group as follows: Up to 45 years and 46 years and above.
- Patients who agreed to follow the study protocol.
- Patients who undergo extraction of permanent teeth

Exclusion criteria:

1. Patient with immunodeficiency pathology.
2. Patient with uncontrolled systemic diseases.
3. Patient with anti-coagulant therapy.
4. Any patient allergic to any drug.
5. Uncooperative patients
6. Patient with psychological problems

7. Patients not willing for post procedure follow-up
8. Patients who undergo extraction of deciduous teeth

This study protocol was reviewed then approved by our departmental review board, research committee, ethical committee and all the patients in this study were informed of the benefits and possible risks.

Parameters to be studied:

(1). Sex

(2). Medical history

(3). Smoking habit

(4). Menstrual cycle

(5). Oral hygiene status

(6).Anatomical location of teeth,

(7). Extraction techniques

(8). Local anesthetic techniques.

Armamentarium:

1. Data recorded questioner sheet 1
2. Data recorded questioner sheet 2
3. Pen

Procedure in detail:

Data collected over a period of one month using two questionnaires. The first questionnaire completed for each patient who has an extraction of one or more permanent teeth. Patients who have only deciduous tooth extraction are not

included in this study. The questionnaire completed by the person who performed the extraction. It included items such as patient demographic data, medical history and medications ,personal history, smoking habits, teeth extracted, indication for the extraction for each tooth, extraction technique, technique of local anesthesia, and postoperative medications. The second questionnaire was completed for each patient who came back to the clinic during the study period and as diagnosed with a dry socket. Patients diagnosed as dry socket if they had at least two of the following signs and symptoms:

a. Empty socket with or without food debris
b. Pain in or around the socket occurring any time within one week of the extraction

This questionnaire completed by the researcher and includes items such as the patient demographic data, socket affecting, signs and symptoms and onset of symptoms.

Study Groups

Patients divided into two age groups as follows: up to 45 years and 46 years and above. These two groups can organized as follows: 1. The extracting teeth were classify according to their anatomical location into upper anterior teeth, upper posterior teeth, lower anterior teeth, and lower posterior teeth. 2. Extraction techniques classified into: Non-surgical extractions (extractions which need simple elevation or root separation without reflecting a mucoperiosteal flap).Surgical extractions (extractions which involved the reflection of a mucoperiosteal flap with or without bone removal). 3. Local anesthetic techniques classified into: Infiltration anesthesia & Regional block anesthesia 4. Patients divided according to their sex 5.medical history into two groups: medically fit patients and patients with systemic

diseases. 6. Patients can be divided according to their smoking habit into: Non-smokers: patients who are not smoking and ex-smokers. Smokers: patients who smoke up to 20 cigarettes per day. Heavy smokers: patients who smoke more than 20 cigarettes per day 7. patients can be divided according to oral hygiene status into fair and poor 8.Female patients divided according menstrual cycle during surgery.

RESULTS

Statistical analysis:

The data was expressed in number and percentage. Statistical Package for Social Sciences (SPSS 16.0) version used for analysis. Chi square test and Wilcoxon signed rank sum test applied to find the statistical significant between the groups. P value less than 0.05 ($p<0.05$) considered statistically significant at 95% confidence interval.

Table-1: Comparison of number and percentage of patient's gender between the groups

Groups	Male		Female	
	Number	Percentage (%)	Number	Percentage (%)
Group-I	42	47.72	46*	52.28
Group-II	38	47.50	42*	52.50

Table-2: Comparison of number and percentage of patient's oral hygiene status between the groups

Oral hygiene status	Group-I		Group-II	
	Number	Percentage (%)	Number	Percentage (%)
Fair	60	68.18	51*	63.75
Poor	28	31.82	29	36.25

Table-3: Comparison of number and percentage of patient's medical history between the groups

Medical history	Group-I		Group-II	
	Number	Percentage (%)	Number	Percentage (%)
Medically fit	65	73.86	46*	57.50
Systemic illness	23	26.14	34*	42.50

Table-4: Comparison of number and percentage of patient's smoking habit between the groups

Smoking habit	Group-I		Group-II	
	Number	Percentage (%)	Number	Percentage (%)
Smoker	22	25.00	33*	41.25
Heavy smoker	3	03.41	2	02.50
Non smoker	63	71.59	45*	56.25

Table-5: Comparison of number and percentage of patient's menstrual period between the groups

Menstrual periods	Group-I		Group-II	
	Number	Percentage (%)	Number	Percentage (%)
Menstrual cycle not during surgery period	59	67.05	0	00.00
Menstrual cycle during surgery period	29	32.95	0	00.00

Table-6: Comparison of number and percentage of extracted teeth according anatomical location between the groups

Anatomical location	Group-I		Group-II	
	Number	Percentage (%)	Number	Percentage (%)
Upper anterior teeth	7	07.53	19*	20.43
Upper posterior teeth	37	39.78	26*	27.96
Lower anterior teeth	9	09.68	22*	23.66
Lower posterior teeth	40	43.01	26*	27.96

Table-7: Comparison of number and percentage of patient's extraction technique between the groups

Extraction technique	Group-I		Group-II	
	Number	Percentage (%)	Number	Percentage (%)
Surgical	51	54.84	44*	47.31
Non surgical	42	45.16	49*	52.69

Table-8: Comparison of number and percentage of patient's local anesthetic technique between the groups

Local anesthetic technique	Group-I		Group-II	
	Number	Percentage (%)	Number	Percentage (%)
Infiltration	37	39.78	40	43.01*
Regional	56	60.42	53	56.99*

Tabl-9: Comparison of number of males and females between the groups with dry sockets

Sender	Group-I & Group-II	Dry sockets	P value
Male	80	1*	**0.001**
Female	88	3*	

(*p<0.05 significant compared Group-I & II with dry sockets)

Tabl-10: Comparison of number of patients of oral hygiene status between the groups with dry sockets

Oral hygiene status	Group-I & Group-II	Dry sockets	P value
Fair	111	1*	**0.001**
Poor	57	3*	

(*p<0.05 significant compared Group-I & II with dry sockets)

Table-11: Comparison of number of patient's medical history between the groups with dry sockets

Medical history	Group-I & Group-II	Dry sockets	P value
Medically fit	111	3*	**0.001**
Systemic illness	57	1*	

(*p<0.05 significant compared Group-I & II with dry sockets)

Table-12: Comparison of number of patients smoking habit between the groups with dry sockets

Smoking habit	Group-I & Group-II	Dry sockets	P value
Smoker	55	1*	**0.001**
Heavy smoker	5	0	
Non smoker	108	3*	

(*p<0.05 significant compared Group-I & II with dry sockets)

Table-13: Comparison of number of patients menstrual periods between the groups with dry sockets

Patients observation	Group-I & Group-II	Dry sockets	P value
Menstrual cycle during surgery period	29	2*	**0.001**
Menstrual cycle not during surgery period	59	1	

(*p<0.05 significant compared Group-I & II with dry sockets)

Table-14: Comparison of number of patients anatomical location between the groups with dry sockets

Anatomical location	Group-I & Group-II	Dry sockets	P value
Upper anterior teeth	26	0*	**0.001**
Upper posterior teeth	63	1*	
Lower anterior teeth	31	0*	
Lower posterior teeth	66	3*	

(*p<0.05 significant compared Group-I & II with dry sockets)

Table-15: Comparison of number of patient extraction techniques between the groups with dry sockets

Extraction techniques	Group-I & Group-II	Dry sockets	P value
Surgical extractions	95	3*	**0.001**
Non surgical extractions	91	1*	

(*p<0.05 significant compared Group-I & II with dry sockets)

Table-16: Comparison of number of patient local anesthetic techniques between the groups with dry sockets

Anesthetic techniques	Group-I & Group-II	Dry sockets	P value
Infiltration anesthesia	77	1*	**0.001**
Regional anesthesia	109	3*	

(*p<0.05 significant compared Group-I & II with dry sockets)

Table-17: Comparing dry socket patients according to sex

Dry sockets patients	Male		Female		P value
	Number	Percentage (%)	Number	Percentage (%)	
Group 1	1	100.00	2*	66.67	**0.03**
Group 2	0	00.00	1*	33.33	

(*p<0.05 significant compared between males and females)

Graph-1: Comparing dry socket patients according to sex

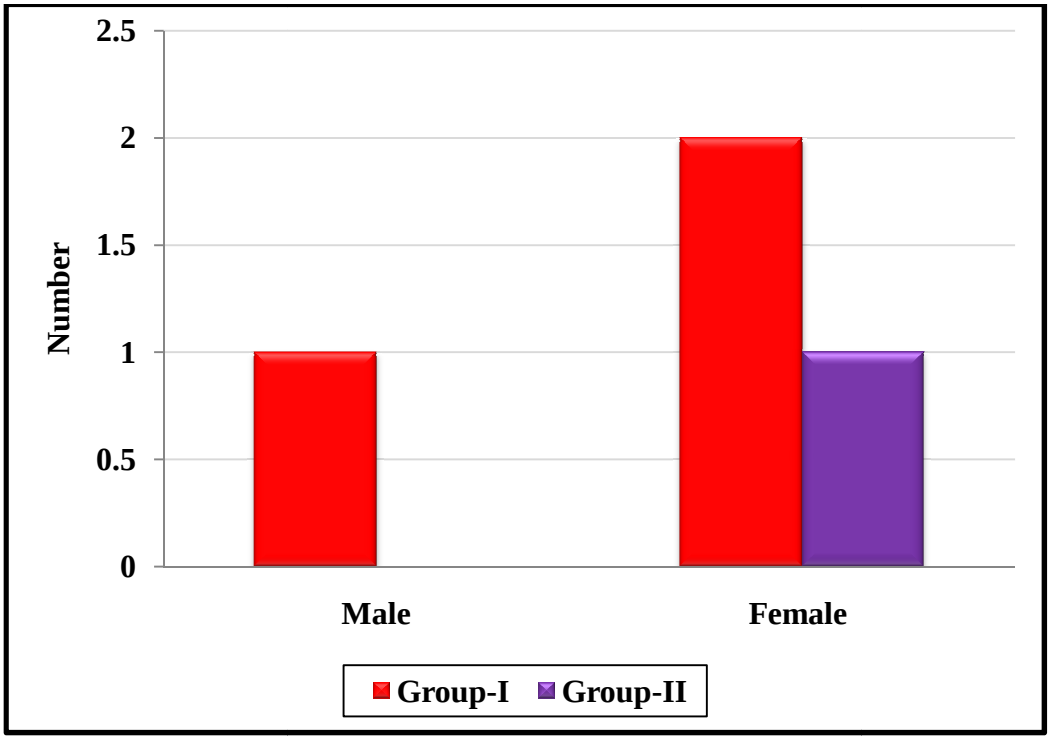


Table-18: Comparing dry socket patients according to oral hygiene status

Oral hygiene status	Fair		Poor		P value
	Number	Percentage (%)	Number	Percentage (%)	
Group 1	0	00.00	1*	33.33	0.03
Group 2	1	100.00	2*	66.67	

(*p<0.05 significant compared between fair and poor)

Graph-2: Comparing dry socket patients according to oral hygiene status

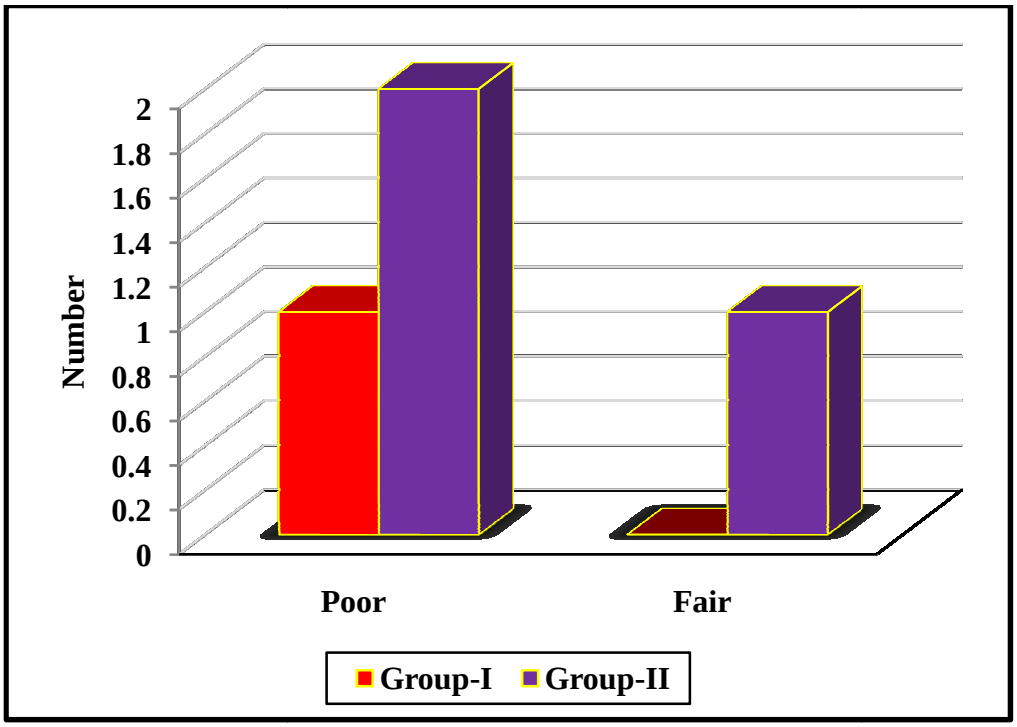


Table-19: Comparing the patients according to menstrual cycle during surgery period and not during surgery period

Groups	Menstrual cycle during surgery period - dry socket		Menstrual cycle not during surgery period-dry socket		P value
	Number	Percentage (%)	Number	Percentage (%)	
Group 1	2*	100.00	0	00.00	0.03
Group 2	0	00.00	1	100.00	

(*p<0.05 significant compared between Menstrual cycle during surgery period-dry socket and Menstrual cycle not during surgery period-dry socket)

Graph-3: Comparing the patients according to menstrual cycle during surgery period and not during surgery period

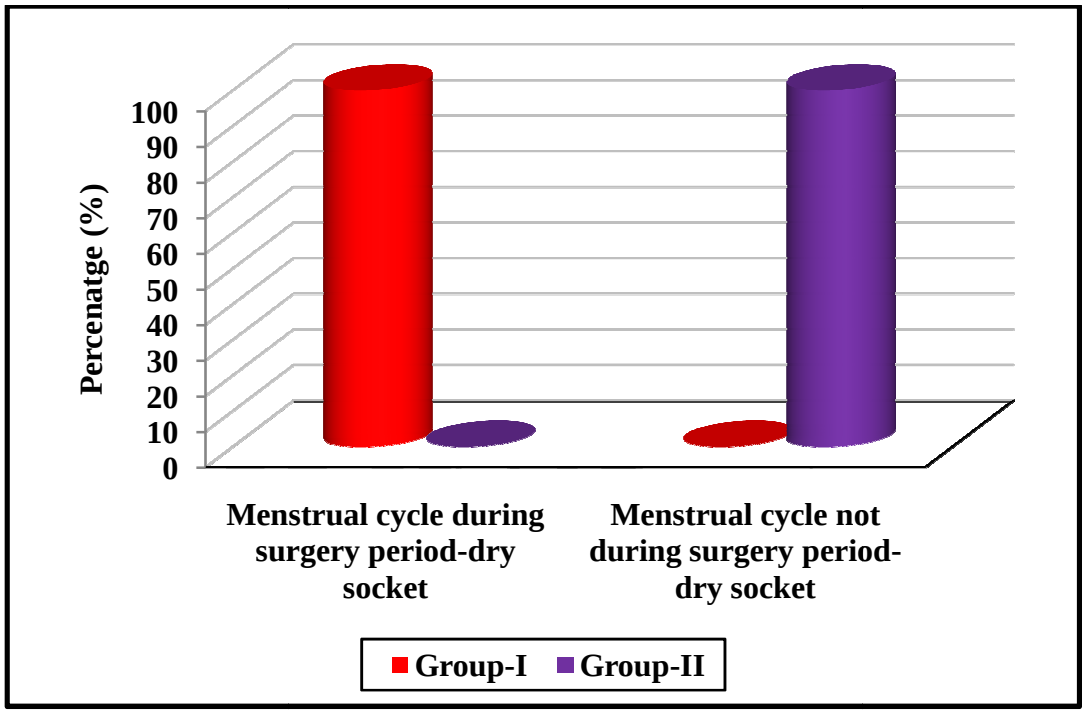


Table-20: Comparing the dry sockets according to anatomical areas

Anatomical areas	Upper anterior		Upper posterior		Lower anterior		Lower posterior		P value
	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	
Group 1	0	00.00	1*	100.00	0	00.00	2*, #	66.67	0.03
Group 2	0	00.00	0	00.00	0	00.00	1*,#,$	33.33	

(*p<0.05 significant compared upper anterior with others, #p<0.05 significant compared upper posterior with others, $p<0.05 significant compared lower anterior with others)

Graph-4: Comparing the dry sockets according to anatomical areas

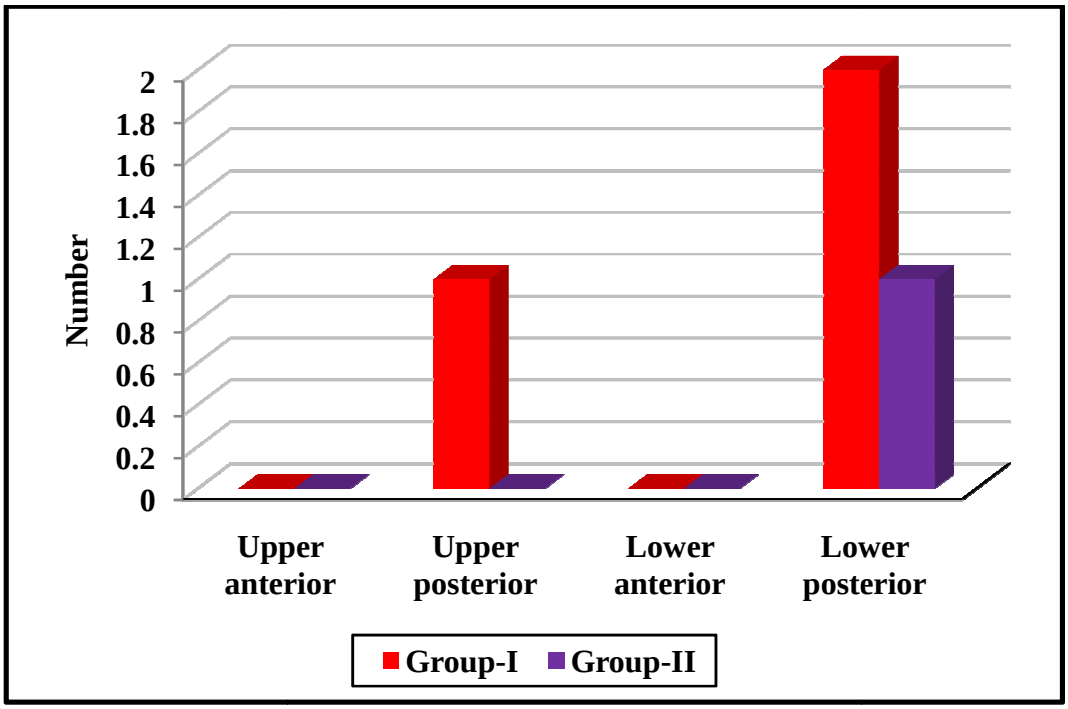
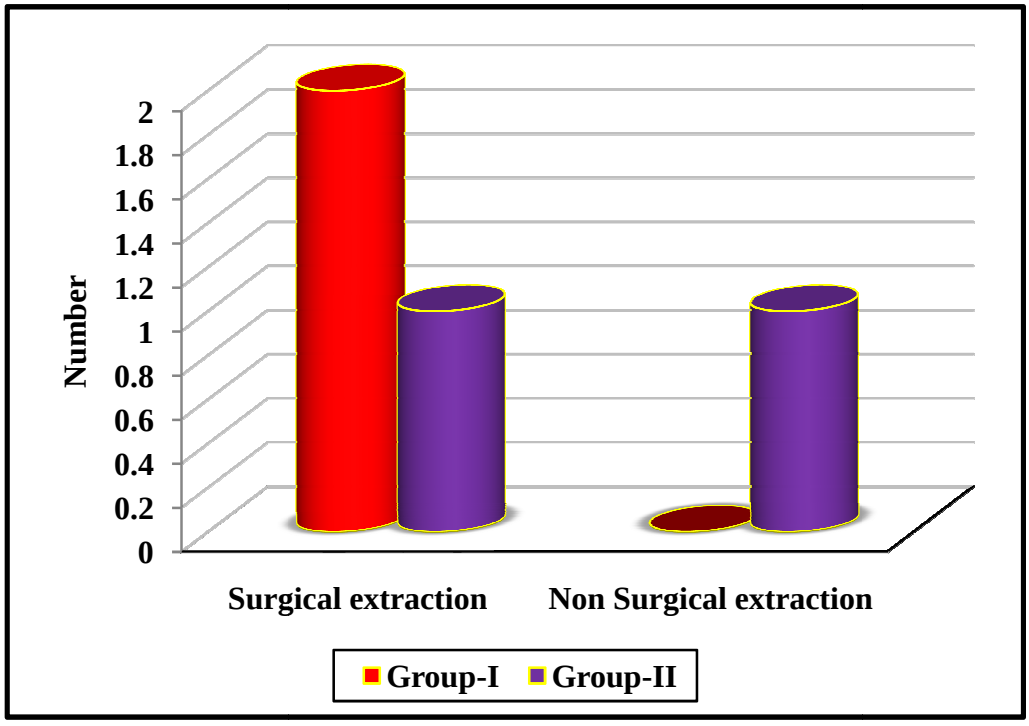


Table-21: Comparison of dry sockets according to extraction technique

Groups	Surgical extraction		Non Surgical extraction		P value
	Number	Percentage (%)	Number	Percentage (%)	
Group 1	2*	66.67	0	00.00	**0.03**
Group 2	1	33.33	1	100.00	

(*p<0.05 significant compared surgical extraction with non surgical extraction)

Graph-5: Comparison of dry sockets according to extraction technique



Interpretation of results

Table 1: Comparison of number and percentage of patient's gender between the groups. In group I total number of male patients is 42(47.72%) and female patients is 46(52.28%) and in group II 38(47.50%) male patients and 42(52.50%) female patients.

Table 2: Comparison of number and percentage of patient's oral hygiene status between the groups. It was categorized into two as fair and poor in each groups. In group I patients which are fair oral hygiene status was 60(68.18%) and poor was 28(31.82%) and in group II fair oral hygiene status was 51(63.75%) and poor was 29(36.25%)

Table 3: Comparison of number and percentage of patient's medical history between the groups. According to medical history patients was categorized into medically fit patients and patients with systemic illness. In group I medically fit patients was 65(73.86%) and patients with systemic illness was 23(26.14%) and group II medically fit patients was 46(57.50%) and systemic illness was 34 (42.50%)

Table 4: Comparison of number and percentage of patient's smoking habit between the groups. In this smoking patients categorized into smoker, heavy smoker and non smoker in group I smoker was 22(25%) and heavy smoker was 3(3.41%) and non smoker was 63(71.59) and in group II smoker was 33(41.25%) and heavy smoker was 2(2.50%) and non smoker was 45(56.25)

Table 5: Comparison of number and percentage of patient's menstrual period between the groups. In this only female patients categorized according to menstrual cycle as menstrual cycle during surgery period and menstrual cycle not during surgery period. In which menstrual cycle during surgery period patients was 29(32.95%) and menstrual cycle not during surgery period patients was 59(32.95%)

Table 6: Comparison of number and percentage of extracted teeth according to anatomical location between the groups as in upper anterior teeth region 7(07.53%) extraction of teeth carried out in group I and 19(20.43%) extraction of teeth in group II, In upper posterior teeth region 37 (39.78%) extraction of teeth in group I and 26(27.96%) in group II, in lower anterior teeth region 9(09.68%) in group I and 22(23.66%) group II, and in lower posterior teeth region 40(43.01%) extracted teeth in group I and 26(27.97%) in group II.

Table 7: Comparison of number and percentage of patient's extraction technique between the groups as surgical extraction and non surgical extraction techniques in group I surgical extraction of 51(54.84%) teeth carried out and in group II 44(47.31%) and in non surgical extraction group I 42 (45.16%)extraction carried out and in group II 49(52.69%) extractions.

Table 8: Comparison of number and percentage of patient's local anesthetic technique between the groups. local anesthetic techniques recorded as infiltration anesthesia and regional anesthesia. In infiltration anesthesia extracted teeth in group I was 37(39.78%) and group II it was 40 (43.01%) and regional anesthesia it was 56(60.42%) and in group II 53(56.99%) extracted sockets

Table 9: Comparison of number of males and females between the groups with dry sockets . out of 80 male patients in both groups one dry socket reported and 3 (P 0.001) dry socket reported out of 88 female patients in both groups. Total of 4 patients came with dry socket out of 167 patients . Dry sockets in Female patients are significant when compared with male patients

Table 10: Comparison of number of patients of oral hygiene status between the groups with dry sockets . oral hygiene status divided as fair oral hygiene status and poor oral hygiene status. out of 168 patients 111 fair oral hygiene status patients came in that only one dry socket reported and out 57 poor oral hygiene status patients 3 dry sockets reported. Dry socket is significant in poor oral hygiene status than fair patients.

Table 11: Comparison of number of patient's medical history between the groups with dry sockets. The reported dry sockets in medically fit patients was 3 out of 111 and out 57 patients with systemic illness shows only one dry socket patient. Patient with systemic illness is not statistically significant when comparing with medically fit patients

Table-12: Comparison of number of patients smoking habit between the groups with dry sockets in this out of 55 smoker patients the reported dry socket was only one and in heavy smoker there were no cases reported in our study and out of 108 non smoker patients there were 3 dry socket cases reported. Dry sockets in non smoking patients are more significant than smoker patients in this study.

Table-13: Comparison of number of patients menstrual periods between the groups with dry sockets. In this both the groups out of 88 female patients

patients with menstrual cycle during surgery period reported was 29 . out of this 29 patients 3 patients came back with complains of dry socket. Dry sockets in patients which are in menstrual cycle during surgery period is significant.

Table-14: Comparison of number of extraction sockets according to anatomical location between the groups with dry sockets. It is categorized into four, in upper anterior teeth region, out of 26 patients zero dry sockets reported in this study, in upper posterior teeth region out 63 extraction sockets 3 came as dry sockets, in lower anterior teeth region also showing zero dry sockets out of 31 extraction sockets and in posterior teeth region showing 3 dry sockets out of 66 extracted teeth in both groups. Dry sockets in posterior mandibular region is significant when comparing with upper anterior, upper posterior, lower anterior regions.

Table-15: Comparison of number of patient extraction techniques between the groups with dry sockets. Extraction techniques divided into surgical and non surgical extraction. Patients with surgically extracted teeth sockets came back with 3 dry sockets out of 95 extracted teeth. And in non surgical extraction only one case came back with dry sockets out of 91 extractions. Dry sockets in surgical extractions was significant than non surgical extraction.

Table-16: Comparison of number of patients local anesthetic techniques between the groups with dry sockets. Local anesthetic techniques divided into infiltration anesthesia and regional anesthesia. In infiltration anesthesia 1 patients came with dry socket out of 77 infiltrations and in regional anesthesia 3 cases reported as dry sockets out of 109 extraction of teeth. Here comparing with regional anesthesia, dry sockets in infiltration anesthesia is not significant in this study.

Table-17: Comparing dry socket patients according to sex. Out of 168 patients 4 patient reported as dry sockets in that one male patient and three female patients. In this study the incidence of dry socket in female patients is significantly higher than male patients(P 0.02).

Table-18: Comparing dry socket patients according to oral hygiene status. In both groups the reported dry socket cases is 3 in poor oral hygiene status and in fair oral hygiene cases reported case is one. Incidence of dry socket in poor oral hygiene status is significantly high than fair oral hygiene status(P 0.02)

Table-19: Comparing the patients according to menstrual cycle during surgery period and not during surgery period. In this incidence of dry sockets in menstrual cycle during surgery period was 2 and incidence of dry sockets in menstrual cycle not during surgery period was 1. Showing (P 0.03)significant compared between Menstrual cycle during surgery period than menstrual cycle not during surgery period-dry socket.

Table-20: Comparing the dry sockets according to anatomical areas. In this incidence of dry socket in lower posterior region(p 0.02) is significant than and upper posterior region, upper anterior and lower anterior region

Table-21: Comparison of dry sockets according to extraction technique. In this incidence of dry sockets in surgical extracted teeth region (P 0.03) showing significance than non surgical extracted regions .

Graph 1: In comparison of distribution of patient according to gender both male and female in both groups. Total of 4 patients diagnosed as dry sockets, in

that one male patient and 2 female patient in group I. And 1 female patient in group II.

Graph 2: Comparing dry socket patients according to oral hygiene status. In both groups the reported dry socket cases is 4. In poor oral hygiene status and in fair oral hygiene cases reported case is one in group I and 3 cases in group II. Incidence of dry socket in poor oral hygiene status is significantly high than fair oral hygiene status.

Graph 3: Comparing the patients according to menstrual cycle during surgery period and not during surgery period.. In group I, incidence of dry sockets in menstrual cycle during surgery period was 2 and incidence of dry sockets in menstrual cycle not during surgery period was 1. And in group II there is no significant results.

Graph 4: Comparing the dry sockets according to anatomical areas. In this incidence of dry socket in group I, 1 in upper posterior region and 2 in lower posterior region. In group II 1 case in lower posterior region.

Graph 5: Comparison of dry sockets according to extraction technique. In group I incidence of dry sockets in surgical extracted teeth region was 1 and zero in non surgical extraction.and in group II one case in surgical extraction and one case in non surgical cases. showing significant in surgical extracted regions.

DISCUSSION

Dry socket is a most common clinical complication of extraction of teeth.[13] It is characterized by following removal of the tooth, patients report an initial improvement or reduction in pain experienced over the first 24 hours and then subsequently go on to develop a severe, debilitating, constant pain that continues through the night, becoming most intense at 72 hours post extraction.[30] It can be associated with foul taste and halitosis.[72] The pain responds poorly to over-the-counter analgesic medication.[73] Clinically, an empty socket (lacking a blood clot) with exposed bone is seen. The socket may be filled with a mixture of saliva and food debris. A slough is also sometimes present. The adjacent gingiva tend to be red, inflamed, tender and edematous. There is generally no evidence of suppuration, swelling or systemic infection such as a fever or systemic upset.[38]

The pathogenesis of this pain after extraction is not completely known, but several factors have been suggested as predisposing factors including poor oral hygiene status, smoking, anatomical site of extracted socket, difficulty in extraction, excess local anesthesia, menstrual cycle, oral contraceptive pills.[44] The generally accepted etiology of dry socket is an increased local fibrinolysis leading to disintegration of the clot. Some antifibrinolytic agents when placed topically in the extraction site have been shown to decrease the incidence of dry socket. Surgical trauma, which leads to liberation of different tissue activators, and bacterial infections remain the two most acceptable initiating factors of this localized fibrinolytic activity.[9,43] The results of this study show the incidence of dry socket and its clinical features are generally similar to those reported in the

literature. The overall incidence of dry socket was 2.1% in our study. which is similar to the overall incidence rate of reported in the literature.

Another possible Pathophysiology was given by Nit-zan in 1983. They reported that T. denticola is the only one saprophyte found in the sockets of established cases of alveolar osteitis. However, in clinical trials after application of an antianerobic antibiotic (Metronidazole) there has been less incidence of alveolar osteitis. On basis of this finding Nitzan concluded that formation of dry socket was multifactorial and main predisposing factors were sex, age, extraction sites, trauma/difficulty of ex-traction and smoking.[76] In this study pain and an empty socket with or without food debris were considered as dry socket. Reported incidence of dry socket in literature could possibly be attributed to variations in the diagnostic criteria by different researchers.

Comparison of number and percentage of patients gender between the groups. Out of 168 patients 42 (47.72%)male patients in group I and 38(47.75%) male patients in group II, female patients were 46 (52.28%)patient in group I and 42(52.50%) in group II. The relationship between gender and the development of alveolar osteitis is significant(P-0.001), with high incidence in the female population similar to previous studies.[3,11,28,38] In this present study incidence of dry socket in female patients was 3 (75%) whereas 1 (25%) in male patients. This indicates female predominance of dry socket, which was a common finding, similar results in accordance to Larsen P. E. et al.[38], Bortoluzzi M. C. et al[2] and Ahmed A. et al.[28] This high incidence of dry socket in female patient was due to use of oral contraceptives and menstrual cycle which causes increased fibrinolytic activity associated with higher estrogen level.[3,9]

Comparing the number and percentage of patient's oral hygiene status between the groups. In group I, a total of 60(68.18%) patients categorized as fair oral hygiene status and 28(31.82%) patient as poor oral hygiene status. In group II 52(63.75%) patient as fair and 29(36.25%) patient as poor. There is significant relationship between poor oral hygiene with dry socket than fair oral hygiene status. In this study out of 57 patients in both groups, the incidence of dry socket in poor oral hygiene is 3(P-0.001). And in fair oral hygiene status incidence in both groups, dry socket was one. This was in accordance with Babatunde O et al,[12] study shows significance of oral hygiene status. Dry socket was more frequently found in patients with poor oral hygiene, and this is not surprising since food impaction in the empty socket and its fermentation by bacteria is believed to be the cause of such a problem.

According to medical history groups categorized as medically fit patients and patients with systemic illness. In group I medically fit patients in group I is 65(73.86%) and with systemic illness 23(26.14%) patients. And in group II it as 46(57.50%) and 34(42.50%) respectively. We couldn't find a significance in dry socket's patients with systemic illness. As most of the patients were medically fit. Although some studies have reported relationship between some medical diseases and incidence of DS, the results of the current study did not support this association; which was in accordance to Nusair et al,[1] Younes et al,[7] Eshghpour et al.[6]

Patients divided according to their smoking habit into: Non-smokers: patients who are not smoking and ex-smokers. Smokers: patients who smoke up to 20 cigarettes per day. Heavy smokers: patients who smokes more than 20

cigarettes per day. In group I patient categorized smoker was 22(25%) heavy smoker was 3(3.41%) and non smoker as 63(71.59%). And in group II smoker was 33(41.25%), heavy smoker was 2(2.5%) and non smoker was 45(56.25%). The incidence of dry socket in group I was one in smoker patients and zero in heavy smokers and 3 in non smokers, results from this study dry socket was not significant in smokers when compared with non smokers. In this study out of 168 patients 60 (35.7%)male patients were having the habit of smoking. Majority of the patients were non smokers 108(64.3%). In smokers majority of patients were non heavy smokers causing the results to be insignificant in accordance with Hermesch et al.[78] reported that smoking has no influence on the incidence of DS.

Total of 88 female patients, underwent teeth extractions in which 3 patients diagnosed as dry socket .Out of 3 patients 2 patients was in menstrual phase during the surgery and one was not in menstrual cycle during surgery. The overall incidence of dry socket in females in menstrual phase during surgery was (6.9 %). The dry socket was in the middle of the cycle than during the menstrual period in both the patients. statistically significant differences were found between the 2 groups during the menstrual period ($P < .05$). literature also showing the significance of menstrual cycle during the surgery can cause dry socket.[3,4] According to Eshghpour et al[20] the frequency of dry socket was significantly greater in the middle of the cycle than during the menstrual period in both the Oral Contraceptive users and nonusers. Delayed procedures will be performed during the menstrual period in both OC users and nonusers to eliminate the effect of cycle-related hormonal changes on the development of AO. The incidence of dry socket was reported to be similar between males and females prior to 1960.

However, after this time there was a reported increase in females taking oral contraceptive medication. Oestrogen in oral contraceptives has been shown to increase plasma fibrinolytic activity (due to increased plasminogen levels) and it is hypothesised that this may contribute to instability of the blood clot in the socket. It has been suggested that extractions should be carried out on days 23-28 of the oral contraceptive tablet cycle, when oestrogen levels are at their lowest, so as to reduce this effect. Similarly, in a recent prospective study looking at risk factors for the development of dry socket in a Nigerian population it was found that avoidance of surgery on days one to 22 of the menstrual cycle may reduce the incidence of dry socket.[31]

When anatomical site was considered, out of 186 extractions, extraction in upper anterior teeth region in group I there were 7(7.53%) extraction and in group II 19(20.43%) extraction carried out, in upper posterior teeth region 37(39.78%) extraction in group I and 26(27.97%) extraction in group II. in lower anterior teeth region 9(9.68%) extraction in group I and 22(23.66%) extraction in group II and in lower posterior teeth region 40(43.01%) extraction in group I and 26 (27.96%)extraction in group II. In this the incidence of dry socket were only one(25%) case of dry socket in the upper jaw compared to 3 (75%) cases in the lower jaw. The incidence of dry socket was 4.5% following mandibular extractions. This difference was statistically significant (P=0.03). Similar to Khorasani et al[77] Ogini et al[8] study, incidence of dry socket in mandible was higher than maxilla. Some researchers believe that the etiology of more incidence of dry socket in lower jaw is related to more bone density, lower blood supply and reduced capacity of granulation tissue production.[8] The more affected teeth in this

study were molars, premolars. Approximately same as Khorasani,[77] Upadhyaya[3] studies. The more involvement of third molar can be attributed to more bone thickness in this area, wideness of roots, lack of easy access for cleansing surgical site by the patients.[8,77]

In surgical extractions higher incidence of dry socket(3.15%). was seen when compared with non surgical extraction in this study. It is widely accepted that incidence of dry socket increases with the increase in difficult extraction.[1,46,79] This could be due to more liberation of direct tissue activators secondary to bone marrow inflammation following the more difficult and, hence, more traumatic extractions in accordance with the study of Nusair et al,[1] Lilly et al[46] and Alexander et al.[79]

In relation to local anesthesia, anesthetic techniques divided into infiltration anesthesia and regional anesthesia. In this study in group I patients which had infiltration anesthesia was about 37(39.78%) and in group II it was 40(43.01%). Total of 56(60.42%) patients for regional anesthesia in group I and in group II it was 53(56.99%). incidence of dry socket in infiltration anesthesia was one(1.29%)and regional anesthesia was 3(2.75%). It has been thought, but not conclusively proven that there is a possibility of an increased incidence of dry socket following the use of local anaesthesia with vasoconstrictors before the extraction[9]. Although Krogh[82] emphasized the incidence of dry socket was highest in the mandibular molar area, A higher incidence of dry socket when infiltration anaesthesia was used and concluded infiltration anaesthesia gave rise to a temporary ischemia leading to poor blood supply to the socket. However,

subsequent studies indicate ischemia lasts only for one to two hours and is followed by a reactive hyperaemia which makes it of no importance to the subsequent disintegration of the blood clot.[9,80] This concept is currently widely accepted.[3] In this study there was no significant difference in dry socket incidence following the extraction of teeth requiring infiltration anaesthesia.

SUMMARY

The occurrence of dry socket in an everyday oral surgery or dental practice is unavoidable. The risk factors for this temporary and debilitating condition are clearly identified. However, adherence to superb surgical technique in a young, healthy, and nonsmoking male patient still carries a 1%-4% incidence of dry socket. Surgeons must recognize additional risk factors in patients with particular medical conditions and include this information as a part of the informed consent. Treatment options for this condition are generally limited and directed toward palliative care. The surgical site should be irrigated, curetting the extraction socket. Packing with a zinc oxide– eugenol paste on iodoform gauze can be considered to relieve acute pain episodes. Ultimately it is the host's healing potential which determines the severity and duration of the condition.

CONCLUSION

1. The overall incidence of dry socket was comparable to previous findings reported in the literature.
2. The incidence of dry socket following single extractions was significantly higher than following multiple extractions.
3. The incidence of dry socket was higher following surgical extractions than following non-surgical extractions.
4. Incidence of dry sockets during menstrual cycle was higher than non-menstrual phase in females.
5. There was no statistically significant association between the development of dry socket and patient's age, medical history, medications (preoperative or postoperative), smoking habits, indication for extraction, operators experience, and amount or technique of local anesthesia

BIBLIOGRAPHY

1. Nusair YM, Younis MH. Prevalence, clinical picture, and risk factors of dry socket in a Jordanian dental teaching center. J Contemp Dent Pract 2007;8:53-63.
2. Bortoluzzi, Manfro, De Dea, Dutra. Incidence of dry socket, alveolar infection, and postoperative pain following the extraction of erupted teeth. J Contemp Dent Pract 2010;11:33-40.
3. Upadhyaya C, Humagain M. Prevalence of dry socket following extraction of permanent teeth at Kathmandu University Teaching Hospital (KUTH). Kathmandu Univ Med J 2010;8(1):18-24.
4. Kumar V, Chaudhary M, Singh S, Gokkulakrishnan. Post-surgical evaluation of dry socket formation after surgical removal of impacted mandibular third molar A prospective study. Open J Stomatol 2012;2:292-8.
5. Alwraikat AA. Alveolar osteitis: Incidence and risk factors following third molar surgery in Jordan. Pakistan Oral & Dent J 2009;29(1):19-22.
6. Eshghpour M, Moradi A, Nejat AH. Dry Socket following Tooth Extraction in an Iranian Dental Center: Incidence and Risk Factors. J Dent Mater Tech 2013; 2(3): 86-91.
7. AbuYounis MH, AbuHantash RO. Dry socket: Frequency, clinical picture, and risk factors in a Palestinian dental teaching center. Open Dent J 2011;5:7-12
8. Oginni FO. Dry socket: a prospective study of prevalent risk factors in a Nigerian population. J Oral Maxillofac Surg 2008; 66(11):2290-5.

9. Birn H. Etiology and pathogenesis of fibrinolytic alveolitis (dry socket.). Int J Oral Surg 1973;2:215-263.

10. Blum IR. Contemporary views on dry socket (alveolar osteitis): a clinical appraisal of standardization, aetiopathogenesis and management: a critical review. Int J Oral Maxillofac Surg 2002;31(3):309-17.

11. Howe GL. Some Complications of Tooth Extraction: Lectures delivered at the Royal College of Surgeons of England on 27th April 1961. Annals of the Royal College of Surgeons of England 1962;30(5):309-23.

12. Babatunde O, Godspower T, Akinbami Dry Socket: Incidence, Clinical Features, and Predisposing Factors. International Journal of Dentistry 2014;2014:1-7

13. Venkateshwar GP, Padhye MN, Khosla AR, Kakkar ST. Complications of exodontia: A retrospective study. Indian J Dent Res 2011;22:633-638

14. Lloyd R. Prevention of dry socket with metronidazole. British Dental Journal. 2006;200(4):206-206.

15. Bowe DC. The management of dry socket/alveolar osteitis. Journal of the Irish Dental Association 2011;57(6):305-10.

16. Momeni H, Shahnaseri S, Hamzeheil Z. Evaluation of relative distribution and risk factors in patients with dry socket referring to Yazd dental clinics. Dent Res J 2011(8):84-7.

17. Murph JT. A retrospective study on the use of a dental dressing to reduce dry socket incidence in smokers. Journal of academy of general dentistry 2015;(3):1-3

18. Khosla A, Venkateshwar G, Padhye M, Kakkar S. Complications of exodontia: A retrospective study. Indian J Dent Res 2011;22(5):633.

19. Haraji A, Motamedi MH, Rezvani F. Can flap design influence the incidence *of* alveolar osteitis following removal of impacted mandibular third molars*?*.Gen Dent 2010;58(1):87-89.

20. Eshghpour M, Rezaei NM, Nejat A. Effect of menstrual cycle on frequency of alveolar osteitis in women undergoing surgical removal of mandibular third molar: a single-blind randomized clinical trial. J Oral Maxillofac Surg 2013;71(14):84-89.

21. Abedalwahab, Alwraikat. Alveolar osteitis: incidence and risk factors following third molar surgery in Jordan. Pakistan Oral & Dental Journal 2009;29(1):19-22.

22. Halabi D, Escobar J, Munoz C, Uribe S. Logistic regression analysis of risk factors for the development of alveolar osteitis. J Oral Maxillofac Surg 2012;70:1040-44.

23. Munir Y, Al-Kotany. Incidence of Dry Socket in Relation to Psychological Stress: A Retrospective Study. Tikrit Journal for Dental Sciences 2012;2:161-8.

24. Mudali V, Mahomed O. Incidence and predisposing factors for dry socket following extraction of permanent teeth at a regional hospital in kwa-zulu natal. SADJ 2016;71(4):166-9.

25. Ogunlewe MO. Incidence and pattern of presentation of dry socket following non-surgical tooth extraction. Nig Q J Hosp Med 2007;17(4):126-30.

26. M.D.Ashok Kumar et al. Incidence of Dry Socket after Third Molar Extraction. J Pharm Sci & Res 2015; 7(7):451-452.

27. Mohammed Nasir K Inamdar. Prevention of Dry Socket using Chlorhexidine Gel and Ornidazole Gel in Impacted Mandibular Third Molar: A Comparative Randomized Prospective Study on 30 Patients. Journal of International Oral Health 2015;7(11):41-6.

28. Khitab U, Khan A, Shah SM. Clinical characteristics and treatment of dry socket. Pakistan oral & dental journal 2012;32(2):206-9.

29. Hita-Iglesias P, Torres-Lagares D, Flores-Ruiz R, Magallanes-Abad N, Basallote-Gonzalez M, Gutierrez-Perez JL. Effectiveness of chlorhexidine gel versus chlorhexidine rinse in reducing alveolar osteitis in mandibular third molar surgery. J Oral Maxillofac Surg 2008;66:441-45.

30. Ritzau M, Therkildsen P. Antitibrinolytic prevention of alveolitis sicca dolorosa. Int J Oral Surg 1978;7:534-40.

31. MacGregor AJ. Aetiology of dry socket: A clinical investigation. Br J Oral Surg 1968:6:49-58.

32. Noroozi AR, Philbert RF. Modern concepts in understanding and management of the “dry socket” syndrome: comprehensive review of the literature. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;107:30-35.

33. Sanchis JM, Saez U, Penarrocha M, Gay C. Tetracycline compound placement to prevent dry socket: a postoperative study of 200 impacted mandibular third molars. J Oral Maxillofac Surg 2004;62:587-91.

34. Sisk AL, Hammer WB, Shelton DW, Joy ED. Complications following removal of impacted third molars: the role of the experience of the surgeon. J Oral Maxillofac Surg 1986;44(11):855-9.

35. Turner PS. A clinical study of dry socket. Int J Oral Surg 1982;11(4):226-31.

36. Bruce RA, Frederickson GC, Small GS. Age of patients and morbidity associated with mandibular third molar surgery. J Am Dent Assoc 1980;101(2):240-5.

37. Awang MN. The etiology of dry socket: a review. Int Dent J, 1989;39:236-40.

38. Larsen PE. Alveolar osteitis after surgical removal of mandibular third molars. Oral Surg Oral Med Oral Pathol 1992;73:393-7.

39. Al-Sukhun J, Penttila H. The cyclooxygenase-2 inhibitor celecoxib and alveolar osteitis. J Ir Dent Assoc. 2011;57:50-53.

40. Belinfante LS, Marlow CD, Myers W, Rosenberg C. Incidence of dry socket complication in third molar removal. J Oral Surg.1973; 31(2):106-8.

41. Al-Khateeb TL, El-Marsafi AI, Butler NP. The relationship between the indications for the surgical removal of impacted third molars and the incidence of alveolar osteitis. J Oral Maxillofac Surg. 1991; 49(2):141-5.

42. Yoshii T, Hamamoto Y, Muraoka S, Furudoi S, Komori T. Differences in postoperative morbidity rates, including infection and dry socket, and differences in the healing process after mandibular third molar surgery in patients receiving 1-day or 3-day prophylaxis with lenampicillin. J Infect Chemother 2002;8(1):87-93.

43. Taberner-Vallverdu M, Nazir M, Sanchez-Garces MA, Gay-Escoda C. Efficacy of different methods used for dry socket management: A systematic review. Med Oral Patol Oral Cir Bucal 2015;20(5):633-9

44. Erickson Ri, Waite De, Wilkison Rh. A study of dry sockets. Oral Surg Oral Med Oral Pathol 1960;13:1046-50.

45. Vikrant Dilip Sane et al. Efficacy of Single Dose Azithromycin as Prophylactic Antibiotic in Surgical Removal of Mandibular Third Molars A Clinical Study. J Maxillofac Oral Surg 2013;12(4):382–386

46. Lilly GE, Osbon DB, Rael EM, Samuels HS, Jones JC. Alveolar osteitis associated with mandibular third molar extractions. J Am Dent Assoc. 1974; 88(4):802-6.

47. Osborn TP, Frederickson G, Small IA, Torgerson TS. A prospective study of complications related to mandibular third molar surgery. J Oral Maxillofac Surg. 1985; 43(10): 767-9.

48. Krakowiak PA. Alveolar osteitis and osteomyelitis of the jaws. Oral Maxillofac Surg Clin North Am. 2011;23(3):401-13.

49. Chiapasco M, De Cicco L, Marrone G. Side effects and complications associated with third molar surgery. Oral Surg Oral Med Oral Pathol 1993;76(4):412-20.

50. Krekmanov L. Alveolitis after operative removal of third molars in the mandible. Int J Oral Surg 1981;10(3):173-9.

51. Benediktsdottir IS, Wenzel A, Petersen JK, Hintze H. Mandibular third molar removal: risk indicators for extended operation time, postoperative pain, and complications. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2004;97(4):438-46.

52. Alexander RE. Dental extraction wound management: a case against medicating postextraction sockets. J Oral Maxillofac Surg. 2000; 58(5):538-51.

53. Al-Belasy FA. The relationship of “shisha” (water pipe) smoking to postextraction dry socket. J Oral Maxillofac Surg 2004;62(1):10-4.

54. Swanson AE. Reducing the incidence of dry socket: a clinical appraisal. J Dent Assoc S Afr 1966;21(5):155-62.

55. Poor MR, Hall JE, Poor AS. Reduction in the incidence of alveolar osteitis in patients treated with Salicept patch, Containing Acemannan Hydrogel. J Oral Maxillofac Surg 2002; 60:373-9.

56. Winiewska I, Slosarczyk A, Myliwiec L, Sporniak-Tutak K. Lincomycin applied to the alveolus on TCP carrier and its effect on wound healing after surgical extraction of a third molar. Ann Acad Med Stetin 2009;55(2):59-64.

57. Field EA, Nind D, Varga E, Martin MV. The effect of chlorhexidine irrigation on the incidence of dry socket: a pilot study. Br J Oral Maxillofac Surg 1988; 26(5):395-401.

58. Torres-Lagares D, Gutierrez-Perez JL, Hita-Iglesias P, Magallanes-Abad N, Flores-Ruiz R, Basallote-Garcia M, et al. Randomized, double-blind study of effectiveness of intra-alveolar application of chlorhexidine gel in reducing incidence of alveolar osteitis and bleeding complications in mandibular third molar surgery in patients with bleeding disorders. J Oral Maxillofac Surg. 2010;68:1322-26

59. De Boer MP, Raghoebar GM, Stegegna B, Schoen PJ, Boering G. Complications after mandibular third molar extraction. Quintessence Int 1995; 26(11):779-84.

60. Bloomer CR. Alveolar osteitis prevention by immediate placement of medicated packing. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2000; 90(3):282-4.

61. Garcia AG, Grana PM, Sampedro FG. Does oral contraceptive use affect the incidence of complications after extraction of a mandibular third molar? Br Dent J 2003;194(8):453-5.

62. Tolstunov L. Influence of immediate post-extraction socket irrigation on development of alveolar osteitis after mandibular third molar removal: a prospective split-mouth study, preliminary report. Br Dent J 2012;213(12):597-601.

63. Ritzau M, Hillerup S, Branebjerg PE. Does metronidazole prevent alveolitis sicca dolorosa? Int J Oral Maxillofac Surg 1992; 21:299.

64. Sorensen DC, Preisch J. The effect of tetracycline on the incidence of postextraction alveolar osteitis. J Oral Maxillofac Surg 1987;45:1029.

65. Wang YZ, Guan QL, Li YX, Guo JL, Jiang L, Jia MY, et al. Use of gelatamp colloidal silver gelatin sponge to prevent dry socket after extracting mandibular impacted teeth. Shanghai Kou Qiang Yi Xue 2013;22:108-10.

66. Trieger N, Schlagel GD. Preventing dry socket. A simple procedure. J Am Dent Assoc 1991;122:67.

67. Fotos P, Koorbusch GF, Sarasin D, et al. Evaluation of intraalveolar chlorhexidine dressing after removal of impacted mandibular third molars. Oral Surg Oral Med Oral Pathol 1992;73:383.

68. Requena-Calla S, Funes-Rumiche I. Effectiveness of intra-alveolar chlorhexidine gel in reducing dry socket following surgical extraction of lower third molars. A pilot study. J Clin Exp Dent 2016;8(2):160-3.

69. Betts NJ, Makowski G, Shen Y, et al. Evaluation of topical viscous 2% lidocaine jelly as an adjunct during the management of alveolar osteitis. J Oral Maxillofac Surg 1995;53:1140.

70. Cohen ME, Simecek JW. Effects of gender-related factors on the incidence of localized alveolar osteitis. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1995;79:416.

71. Singh M, Ranganatha N. Incidence etiology and treatment of alveolar osteitis. IJRAMR 2016;3(1):1167-70

72. Brown LR, Merrill SS, Allen RE. Microbiologic study of intraoral wounds. J Oral Surg 1970; 28:89.

73. Nitzan DW. On the genesis of "dry socket." J Oral Maxillofac Surg 1983; 41:706.

74. Schow SR. Evaluation of postoperative localized osteitis in mandibular third molar surgery. Oral Surg Oral Med Oral Pathol 1974;38:352.

75. Rodrigues MT, Cardoso CL, Carvalho PS, Cestari TM, Feres M, Garlet GP, Ferreira O Jr. Experimental alveolitis in rats: microbiological, acute phase response and histometric characterization of delayed alveolar healing. J Appl Oral Sci. 2011;19(3):260-68.

76. D Reekie, P Downes, C V Devlin, G M Nixon, H Devlin .The prevention of dry socket with topical metronidazole in general dental practice.Br Dent J 2005;200:210-13

77. Khorasani M, Razavi F. The prevalence and risk factors of dry socket in dental surgery clients following tooth extraction at Qazvin Faculty of Dentistry JQUMS. 2006;10:29-5

78. Hermesch CB, Hilton TJ, Biesbrock AR, et al. Perioperative use of 0.12% chlorhexidine gluconate for the prevention of alveolar osteitis: efficacy and risk factor analysis. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1998;85:381-7

79. Bloomer CR. Alveolar osteitis prevention by immediate placement of medicated packing. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2000;90:282-284

80. Tsirlis AT, Iakovidis DP, Parissis NA. Dry socket:Frequency of occurrence after intraligamentary anaesthesia. Quintessence Int 1992;23:575.

81. Krogh HW: Incidence of dry socket. J Am Dent Assoc 1937;24:1829.

CONSENT FORM

PARTICIPANTS CONSENT FORM

The details of the study have been explained to me in writing and the details have been fully explained to me. I am aware that the results of the study may not be directly beneficial to me but will help in the advancement or medical sciences. I confirm that I have understood the study and had the opportunity to ask questions. I understand that my participation in the study is voluntary and that I am free **to** withdraw at any time, without giving any reason, without the medical care that will **normally** be provided by the hospital being affected. I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s). I have been given an information sheet giving details of the study. I fully consent to participate in the study titled

"INCIDENCE OF DRY SOCKET FOLLOWING EXTRACTION OF PERMANENT TEETH IN A DENTAL TEACHING INSTITUTE, KULASHEKHARAM"

Serial no / Reference no :

Name of the participant :

Address of the participant :

Contact number of the participant :

Signature / thumb impression of the participant / Legal guardian

Witnesses:

1.

2.

Date:

Place:

ஒப்புதல் படிவம்

இந்த ஆராய்ச்சியின் தகவல்கள் அனைத்தும் என்னிடம் தெளிவாக எழுத்துமூலம் விளக்கப்பட்டுள்ளது. இந்த ஆராய்ச்சியின் முடிவுகள் எனக்கு நேரடியாக பயன்பராவிட்டாலும் மருத்துவத்துறையின் முன்னேற்றத்திற்கு பயன்படும் என்பதை அறிவேன். இவ்வாராய்சியைப் பற்றி நான் தெளிவாக புரிந்துக் கொண்டுள்ளேன். நான் தானாக முன்வந்து இதில் பங்குப் பெறுகிறேன். என்பதை அறிவேன். இதிலிருந்து எந்த நேரமும் எக்காரணமும் கூறாமல் வந்தாலும் இந்த மருத்துவமனையில் எனக்கு கிடைக்கும் மருத்துவ உதவி எவ்விதத்திலும் பாதிக்கப்படாது என்பதையும் அறிவேன். இவ்வாராய்ச்சியின் மூலம் வரும் முடிவுகள் மற்றும் தகவல்களை அறிவியல்துறையின் பயன்பாடுகளுக்கு (மட்டுமே) உபயோகப்படுத்திக்கொள்ள சம்மதிக்கிறேன். எனக்கு இவ்வாராய்ச்சியைப் பற்றிய விரிவான தகவல்கள் அடங்கிய படிவம் தரப்பட்டுள்ளது.

நான் **"குலசேகரம் பல் மருத்துவக் கல்லூரியில் நிரந்தர பற்களை எடுத்தபின் ஏற்படும் டிரை சாக்கெட்டின் பரவுதலை காண்தல்."** என்கிற ஆராய்ச்சியில் பங்கேற்க முழுமனதுடன் சம்மதிக்கிறேன்.

பங்கு கொள்பவரின் தொடர். மருத்துவ எண் :

பங்கு கொள்பவரின் பெயர் :

18 வயதிற்கு கீழ் உள்ளவர்களுக்கு பாதுகாவலரின் கையொப்பம்:

முகவரி

தொலை தொடர்பு எண் :

பங்கு கொள்பவர் பராமரிப்பவர் கையொப்பம்/பெருவிரல் கவடு :

சாட்சி 1

சாட்சி 2

தேதி:

இடம்: குலசேகரம்

സമ്മതപത്രം

ഈ പഠനത്തെ പറ്റിയുള്ള എല്ലാ കാര്യങ്ങളും എനിക്ക് പറഞ്ഞ് മനസ്സിലാക്കി തരികയും അതിന്റെ ഒരു പകർപ്പ് എനിക്കു നൽകുകയും ചെയ്തിട്ടുണ്ട്. ഈ പഠനം ഗവേഷണത്തിനായി ഉള്ളതാണെന്നും എനിക്ക് ഇതിൽ നിന്ന് നേരിട്ട് ഒരു ഫലവും ഉണ്ടാകില്ലെന്നും ഞാൻ മനസ്സിലാക്കുന്നു. ഈ പഠനത്തിന്റെ രീതിയും ഉദ്ദേശവും എനിക്ക് മനസ്സിലാക്കി തന്നിട്ടുണ്ട്. അതു പോലെ എനിക്ക് സംശയങ്ങൾ ചോദിക്കാൻ അവസരങ്ങൾ ലഭിച്ചിട്ടുമുണ്ട്. ഇതിൽ പങ്കെടുക്കാനും പങ്കെടുക്കാതിരിക്കാനും ഉള്ള അവകാശം എനിക്കുണ്ടെന്നും അതുപോലെ പഠനത്തിന്റെ ഏതു ഘട്ടത്തിലും ഇതിൽ നിന്ന് പിൻവങ്ങാനുള്ള സ്വാതന്ത്ര്യവും എനിക്കുണ്ടെന്ന് ഞാൻ മനസ്സിലാക്കുന്നു. ഈ പഠനത്തിൽ പങ്കെടുക്കുന്നതുകൊണ്ടോ, പങ്കെടുക്കാത്തതുകൊണ്ടോ എന്റെ മറ്റു ചികിത്സകളെ ബാധിക്കുന്നതല്ലെന്ന് ഞാൻ അറിയുന്നു.

"കുലശേഖരം ദന്ത ആശുപത്രിയിൽ പല്ലെടുത്തതിനുശേഷം വരുന്ന ഡ്രൈസോക്കറ്റിന്റെ വ്യാപ്തിയെക്കുറിച്ചുള്ള പഠനം." എന്ന ഗവേഷണത്തിൽ പങ്കെടുക്കുന്നതിനും ഇതിന്റെ ഫലങ്ങൾ ശാസ്ത്രലേഖനത്തിൽ പ്രസിദ്ധീകരിക്കുന്നതിനും എനിക്ക് സമ്മതമാണെന്ന് ഞാൻ ഇതിനാൽ അറിയിച്ചുകൊള്ളുന്നു.

സീരിയൽ നമ്പർ / റഫറൻസ് നമ്പർ :

പങ്കെടുക്കുന്ന ആളിന്റെ പേര് :

മേൽവിലാസം :

ഫോൺ നമ്പർ :

ഒപ്പ് / വിരലടയാളം

(18 വയസ്സിനു താഴെയുള്ള രോഗിയാണെങ്കിൽ, രക്ഷകർത്താവ് ഒപ്പിടേണ്ടതാണ്)

സാക്ഷി :

സ്ഥലം :

തീയതി

QUESTIONNAIRE NO 1

Dry Socket in a Dental Teaching Institute, Kulashekharam

EXTRACTION SHEET

Patient's name:

OP number: Date:

Gender: Age: years

Smoking:No/Yes cigarettes: /day

Medical History:

Medications:

Personal history:

Oral hygiene status

- Fair
- Poor

Teeth Extracted:

Reason for extraction:

- Advanced caries
- Advanced periodontal disease
- Orthodontic treatment
- Pericoronitis
- Others, specify

Extraction technique:

- Surgical extraction
- Normal forceps extraction

Technique of local anaesthesia :

- Infiltration anesthesia
- Regional anesthesia

Postoperative instructions given? Yes/No

Postoperative medications prescribed:

QUESTIONNAIRE NO 2

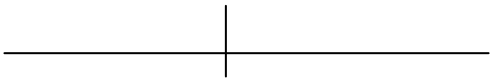
Dry Socket in a Dental Teaching Institute, kulashekharam

DRY SOCKET SHEET

Patient's name:

OP number: Date:

Gender: Age: years

Socket affected: 

Signs and symptoms:

- Pain
- Empty socket
- Bare bone
- Halitosis
- Others:

Onset of symptoms:

- Immediately after extraction
- 24 hours after extraction
- 48 hours after extraction
- 72 hours after extraction
- Other, specify

SREE MOOKAMBIKA INSTITUTE OF DENTAL SCIENCES

KULASEKHARAM, KANYAKUMARI DIST., TAMIL NADU, INDIA.

INSTITUTIONAL RESEARCH COMMITTEE

Certificate

This is to certify that the research project protocol, ***Ref no. 15/06/2015*** titled, ***"Incidence of dry socket following extraction of permanent teeth in a Dental Teaching Institute, Kulashekharam"*** submitted by ***Dr. Shameem Jamal, II Year MDS, Department of Oral and Maxillofacial Surgery*** has been approved by the Institutional Research Committee at its meeting held on 15th ***June 2015.***

Convener
Dr. T. Sreelal

Secretary
Dr. Pradeesh Sathyan

SREE MOOKAMBIKA INSTITUTE OF MEDICAL SCIENCES

(Kulasekharam (K.K District, TN)-629161, Phone No: 04651-280866, Fax No: 280740)

Institutional Human Ethics Committee (IHEC)

{CDSCO Reg No: ECR/446/Inst/TN/2013}

Ref. No: SMIMS/IHEC/2015/A/23 **Date: 17th February 2016**

CERTIFICATE

This is to certify that the Research Protocol Ref. No. **SMIMS/IHEC/2015/A/23** entitled "Incidence of Dry Socket Following Extraction of Permanent Teeth in a Dental Teaching Institute, Kulashekharam" submitted by Dr. Shameem Jamal, Postgraduate of Department of Oral and Maxillofacial Surgery, SMIMS has been approved by the Institutional Human Ethics Committee at its meeting held on 22nd December 2015.

IHEC Date 17/2/16

17/2/16

Dr. Rema Menon. N
Member Secretary
Institutional Human Ethics Committee
Professor and HOD of Pharmacology
SMIMS, Kulasekharam (K.K District)
Tamil Nadu-629161

[This Institutional Human Ethics Committee is organized and is operating according to the requirements of ICH-GCP/GLP guidelines and requirements of the Amended Schedule-Y of Drugs and Cosmetics Act, 1940 and Rules 1945 of Government of India.]