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## Effect of oral contraceptives in the incidence of dry socket after mandibular 3<sup>rd</sup> molar extraction: A prospective clinical study

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**Abstract**

**Background:** One of the most frequently observed complications following extraction is dry socket. Incidence of which depends on several factors the one being oral contraceptives use. In the present study we compare the incidence of dry socket in women taking oral contraceptives with those who are not under oral contraceptives.

**Material and Methods:** This prospective clinical study was conducted in Department of Oral and Maxillofacial Surgery, Nanded Rural Dental College & Research Center. 987 mandibular third molar surgical extractions were done under local anesthesia after obtaining informed consent. The sockets were irrigated with copious saline and betadine. Post-operative analgesics and chlorhexidine mouth wash was given. The cases were followed up for the presence of dry socket.

**Results:** Out of 987 lower third molar surgical extraction cases which were performed, 61 cases reported to us with dry socket, out of which 43 cases were females (p value <.05). 31 females who developed dry socket were on Oral contraceptives and the rest 12 females who developed dry socket were not under any oral contraceptive medications. The ratio between the two being 4.09:1.

**Conclusion:** Oral contraceptives play a role in the incidence of dry socket due to the presence of estrogen and its fibrinolytic activity.

**Keywords:** 3<sup>rd</sup> molar, contraceptive pills, dry socket

**Introduction**

Blum (2002) described dry socket as “postoperative pain in and around the extraction site, which increases in severity at any time between one and three days after the extraction, accompanied by a partially or totally disintegrated blood clot within the alveolar socket, with or without halitosis” [1].

“Dry socket” term was first used by Crawford in 1896 [2]. Several other terms have also been used in literature to describe it, these include: Alveolitis sicca dolorosa, alveolar osteitis (AO), localized osteomyelitis, delayed extraction wound healing and fibrinolytic alveolitis. Tooth extraction procedure is followed by dry socket as a common complication or untoward incident [3] having peak incidence in the fourth decade of life [4, 5]. Incidence being is 1%-4% in all routine dental extractions it increases tremendously on extraction of impacted 3<sup>rd</sup> molars reported as 5%-30% according to most of the studies and literature reviews [6-10]. Mandible accounts for more cases of dry socket and the incidence can be up to 10 times more in mandibular molars when compared with their maxillary counterparts [11]. Gender variation also shows the prevalence to be more in females (4.1%) compared to males having incidence to as low as 0.5% with the ratio being 8.2:1 [12].

**Material and Methods**

This prospective clinical study was conducted in Department of Oral and Maxillofacial Surgery, Nanded Rural Dental College & Research Center. 987 mandibular third molar surgical extractions were done under local anesthesia (2% Lignocaine with 1:80,000 Adrenaline) following a standard protocol for extraction under aseptic conditions after obtaining informed consent. The sockets were irrigated with copious saline and betadine irrigation after the extraction. Post-operative analgesics and chlorhexidine mouth wash was given.

The cases were followed up. 61 cases reported to us with dry socket.

**Inclusion criteria:** After thorough history and based on the selection criteria, patients in the age group of 18-45 were included in our study.

**Exclusion criteria:** Patients aged more than 45 years were excluded from the study. Patients with acute pericoronitis, taking antibiotics for other infections, history of smoking, pregnancy, any other bone pathology or immunosuppression were also excluded.

The aim of this study was to analyse and compare incidence of dry socket in women on oral contraceptives and those women who weren't on oral contraceptives.

## Results

A total of 987 third molar surgical extraction cases which were performed. Results were statistically analysed using chi square test, fisher t test and p value was used to determine the significance. Out of these cases 486 cases were males and 501 cases were females (Graph 1). This shows no statistically significant differences between two groups ( $p > .05$ ).

61 cases reported to us with dry socket, out of which cases were 43 females with the ratio of 2.38:1 (graph 2). These results were statistically significant. The total number of dry socket cases in our study after mandibular 3<sup>rd</sup> molar extraction was 6.1%. 3.70% of males had dry socket where as 8.58% females presented with dry socket.

31 females who developed dry socket were on Oral contraceptives and the rest 12 females who developed dry socket were not under any oral contraceptive medications (graph 3). These results were statistically highly significant ( $p$  value = .00). The ratio of prevalence of dry socket in females on oral contraceptive to females not on contraceptive during extraction of mandibular 3<sup>rd</sup> molar is 4.09:1.

A total of 194 female patients out of 501 female patients were on oral contraceptives rest 307 female patients not under contraceptive pills. 31 out of 194 patients on contraceptives (15.97%) presented with dry socket whereas 12 out of 307 female patients not under contraceptives (3.9%) had dry socket complaint (graph 4). On further investigations, we also found that the females who were on oral contraceptives, were between 1<sup>st</sup> to 21<sup>st</sup> days of their cycle during the time of surgery.

## Discussion

The period in which dry socket effects usually ranges from 5 to 10 days with onset by 24-72 hrs after tooth extraction [6]. It is marked by severe throbbing pain with onset being a day

following extraction. Other features include marked halitosis with foul taste. Exposed bone is present after clot is dislodged from socket. This exposed bone is then filled with food debris accumulated and there is edema of the adjacent gingiva, and regional lymphadenitis [13]. Systemically fever may be present but it is rare. Dry socket is self-limiting but can pose tremendous challenges in patient which are immunocompromised or previously had radiotherapy. Pain in dry socket cases affects the daily function and can be debilitating radiating to the temple, ear, and neck. Response to both drugs including narcotics and over-the-counter analgesics is poor [14]. Pus is not seen usually in dry socket cases. Remnants of the blood clot with inflammatory response is seen in histopathological slides. Neutrophils and lymphocytes are seen which can extend into the surrounding alveolus also [15].

There are several theories in literature that explain the aetiology of dry socket - bacterial infection, trauma, and biochemical agents [6]. The most accepted theory is birn hypothesis. According to Birn (1973) there is an increased fibrinolytic activity and plasmin gets activated from plasminogen by tissue activators [15]. This fibrinolytic activity affects the integrity of the blood clot in extraction site leading to dry socket [16] whereas normal post-extraction socket, heals by formation of fibrin clot by thrombin and fibrinogen. The normal cascade includes migration of epithelium and granulation tissue formation. Neoangiogenesis happens with new blood vessels growth in the clot. Degradation of the clot occurs at later stages by the activity of fibroblasts causing fibrinolysis through plasmin before the onset of osteoproliferation [17].

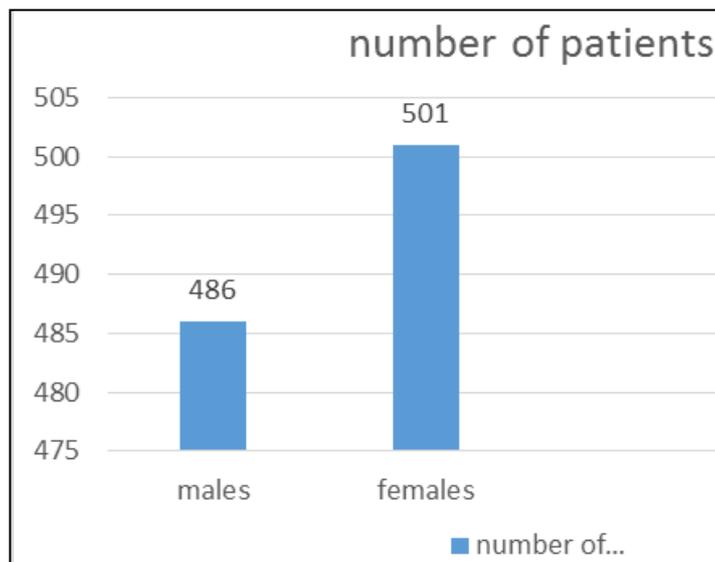
Sweet and Butler [18] found out that dry socket occurs in 4.1% of female patients, a higher value compared to males (0.5%). Lilly [18] found it to be 3 times more in females taking oral contraceptives. An elevated plasma fibrinolytic activity is seen in females on oral contraceptives which is due to the presence of estrogen in drug [19], this affects the clot stability after extraction. Catellani *et al.* [20]. Stated that increasing the dosage of estrogen in the oral contraceptive increases the chances of dry socket. During 23 to 28 days of the menstrual cycle, there is lowest fibrinolytic activity because the first 21 days are active estrogen days in contraceptive pill cycle. The next 7 days are free of estrogen.

In our study it was found that the women who were on oral contraceptives had a higher incidence of dry socket than those who were not. Further, we observed that the 73.19% women were between the day 1<sup>st</sup> to 21<sup>st</sup> of their cycle during the time of surgery, the rest 26.81% were in their last days of the cycle. All these cases were managed with Zinc oxide eugenol dressing after warm saline irrigation of the socket.

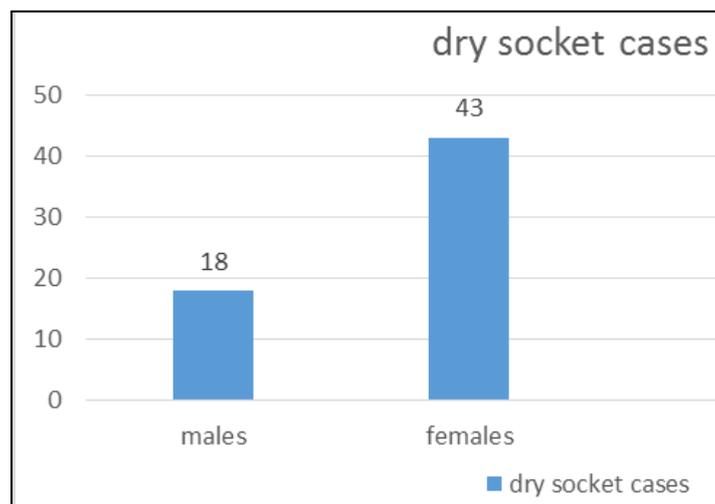
**Table 1:** Shows the comparison of data of various authors of incidence of dry socket after mandibular 3<sup>rd</sup> molar extraction and our study.

Authors	Total patients	Dry socket cases	Total number Of males	Females		
				Total	On contraceptives	Not under contraceptives
Almeida <i>et al.</i> [21]	363	13.8%	14.8%	13%	37.9%	8.9%
Garcia <i>et al.</i> [22]	267 females amoxicillin given postoperatively	6.4%	-	6.4%	11.5%	3.9%
Sweet <i>et al.</i> [23]	210 extraction females. Post-operative saline lavage	8.1%	-	8.1%	19.4%	5.7%
Larsen <i>et al.</i> [24]	134 extractions	21%	14%	23%	19%	25%
Al-Khateeb <i>et al.</i> [10]	642 total 363 mandibular	17.8% 21.2%	18.1%	16.9%	23.5%	-
Sweet <i>et al.</i> [12]	504 extractions mouthrinse chlor- amine-T (sodium-p-toluene sulfon chloramide) used.	2.8%	0.5%	4.1%	6%	3.4%
Nordenram <i>et al.</i> [25]	156 extractions females	18%	-	18%	23.1%	12.8%

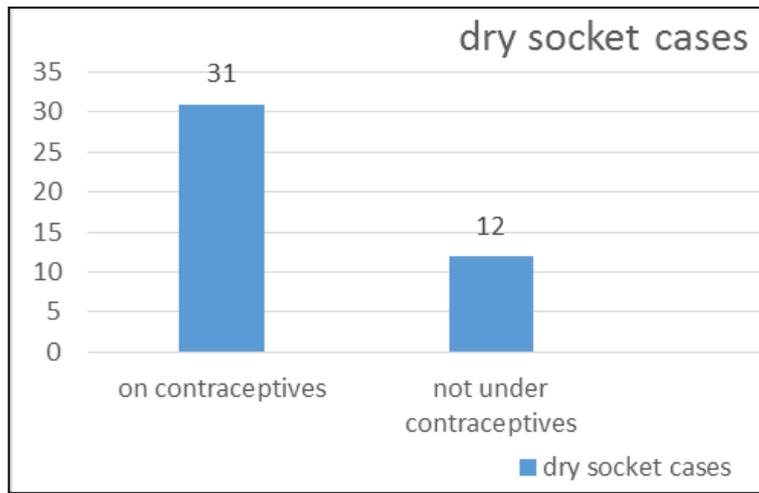
Schow <i>et al.</i> [26]	1080 extractions	21.9%	15.38%	-	44.64%	24.48%
Lilly <i>et al.</i> [18]	2195 surgical and non-surgical extractions	9.1%	2% nonsurgical 9.7% surgical	13.1% nonsurgical 11% surgical	21.4% nonsurgical 21.3% surgical	10.6% nonsurgical 6.8% surgical
Blondeau <i>et al.</i> [27]	550 extractions tetracycline used in socket	3.6%	1.8%	4.9%	9% females	8% females
Eshghpour <i>et al.</i> [28]	290 extractions females Amoxicillin given postoperatively	23.45%	-	23.45%	29.54%	18.35%
Eshghpour <i>et al.</i> [29]	256 extractions amoxicillin given postoperatively	19.14%	20.25%	17.79%	24.24%	11.53%
Sivolella <i>et al.</i> [30]	118 female extractions Antibiotics and mouth rinse given postoperatively	1.69%	-	1.69%	2.64%	1.25%
Muhonen <i>et al.</i> [31]	550 patients antibiotics given postoperatively	2.9%	1.3%	4.5%	-	-
Babar <i>et al.</i> [32]	100 extractions Chlorhexidine gel Control	18% 8% 28%	11% 4% 18%	7% 4% 10%	- - -	- - -
Our study	987 surgical extractions post-operative chlorhexidine mouth wash	6.1%.	3.70%	8.58%	15.97%	3.9%



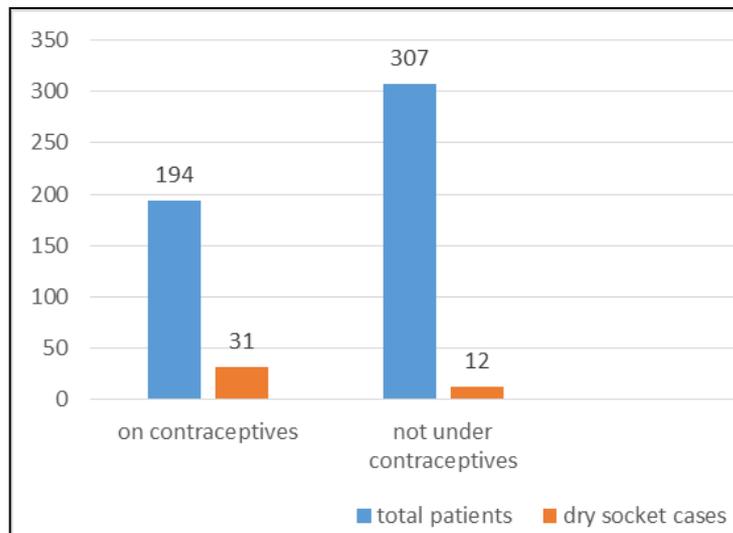
Graph 1: Ratio of male to female in impaction cases.



Graph 2: Ratio of male to female in dry socket cases.



**Graph 3:** Ratio of females on oral contraceptives to females not under contraceptives in dry socket cases.



**Graph 4:** Comparison of dry socket in females on oral contraceptives to females not under contraceptives in dry socket cases.

**Conclusion**

Dry socket being a common complication post extraction makes it necessary for the clinician to understand about all the probable risk factors associated with its incidence. The relationship between estrogen and clot stability, makes it an important factor and necessary precaution must be taken before extraction to prevent the incidence of painful dry socket. Oral contraceptives use being very common among women in the child bearing age group put them at greater risk of developing alveolar osteitis. Hence a thorough history of medications consumed by the patient should be taken. The incidence of dry socket can be lowered in oral contraceptives patients also by giving appointments for extraction between 23-28<sup>th</sup> days of the cycle which are free of estrogen. All other necessary preoperative precautions like preoperative mouth rinse, standard operating procedures, aseptic operating field, copious saline irrigation and adequate post-operative care aid in limiting dry socket incidence. However, following all standard surgical technique in a young, healthy and non-smoking male patient still 1%-4% chances of incidence of dry socket are there. Therefore it is important to recognize the additional risk factors which can be associated with certain medical conditions for the prevention of dry socket and this information should be included in written informed consent.

**Conflict of interest:** None

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