

# FREQUENCY OF DRY SOCKET POST-IMPACTED MANDIBULAR THIRD MOLAR EXTRACTION AND ITS ASSOCIATION WITH SURGICAL DIFFICULTY

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## ABSTRACT

**Objectives:** To determine the frequency of dry socket following impacted mandibular third molar extraction and its relationship with surgical complexity.

**Materials and Methods:** The cross-sectional study enrolled 125 patients from the oral and maxillofacial surgery department of De. Montmorency College of Dentistry, Lahore from November 2022 to April 2023. Patients aged 18 years and above, who had undergone surgical extraction of impacted mandibular third molars with complete clinical records. The primary outcome measure was the incidence of dry socket, with secondary outcome measures including Paderson Difficulty Index score. Data analysis was performed using IBM SPSS, version 27.0.

**Results:** In this study, 125 participants were enrolled, with males comprising 51.2% (n=64) and females 48.8% (n=61). The age range was 15 to 59 years, with a mean age of 33.5±10.44 years. Left-sided mandibular third molar impaction was noted in 52.8% (n=66) of cases, while right-sided impaction was seen in 47.2% (n=59). Based on Pederson's difficulty index, the majority fell into the moderately difficult category (54.4%, n=68), followed by less difficult (29.6%, n=37) and very difficult (16.0%, n=20) cases. The prevalence of dry socket post-extraction was 21.6%.

**Conclusion:** Our study reveals a notable frequency of dry socket following impacted mandibular third molar extraction, with 21.6% of cases experiencing this complication with a significant association observed between the occurrence of dry socket and the surgical difficulty assessed by Pederson's difficulty index.

**Key words:** Complications, Dry Socket, Extraction, Mandible, Mandibular Third Molar, Paderson Difficulty Index

## INTRODUCTION

Impacted teeth are teeth that fail to achieve their appropriate functional position within the specified timeframe. Among the most frequently impacted

teeth are the mandibular third molars, also known as wisdom teeth<sup>1</sup>. Impaction occurs when these molars fail to emerge fully through the gum line due to various factors such as inadequate space in the jaw, improper angulation of the tooth, or obstruction by adjacent teeth or bone<sup>2</sup>. The development of mandibular third molars typically begins in the early teenage years and continues into early adulthood. However, in many cases, these teeth encounter obstacles

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during their eruption process, leading to impaction. Impacted mandibular third molars can manifest with symptoms ranging from localized discomfort and swelling to more severe complications like infection, cyst formation, or damage to neighboring teeth and bone structures<sup>3,4</sup>.

The impaction of mandibular third molars poses clinical challenges necessitating careful assessment and management. Mandibular third molar extraction is often recommended for impacted teeth presenting with symptoms or posing a risk to oral health. This surgical procedure aims to alleviate discomfort, prevent potential complications, and preserve the integrity of adjacent teeth and tissues<sup>5</sup>.

Dry socket, clinically known as alveolar osteitis, is a painful condition that can occur following the extraction of impacted mandibular third molars. It typically manifests a few days after the extraction procedure and is characterized by severe throbbing pain in the socket area, often accompanied by foul odor and taste. It is caused when the blood clot that forms in the socket following tooth extraction becomes dislodged or dissolves prematurely<sup>6</sup>. This exposes the underlying bone and nerve endings to air, food debris, and bacteria, leading to inflammation and intense pain. Several factors may increase the risk of developing dry socket after the removal of impacted mandibular third molars. These include poor oral hygiene, smoking, traumatic extraction techniques, pre-existing infections, and certain systemic conditions such as hormonal fluctuations and compromised immune function<sup>7,8</sup>. Managing dry socket involves alleviating symptoms and promoting healing of the affected socket. Treatment typically includes gently irrigating the socket to remove debris, applying medicated dressings or gels to reduce pain and inflammation, and prescribing analgesics or antibiotics if infection is present<sup>9</sup>.

This study aims to shed light on the frequency of this complication and its correlation with the complexity of the extraction procedure. This study fills a gap in existing literature by providing a comprehensive analysis of the prevalence of dry socket specifically after the extraction of impacted mandibular third molars and its link to surgical complexity. By elucidating these associations, it offers valuable insights for dental practitioners in predicting and mitigating the occurrence of dry socket, ultimately

enhancing patient care and outcomes in oral surgery.

## MATERIALS AND METHODS

Ethical approval was obtained from the institutional review board. This cross-sectional study included the patient from oral and maxillofacial surgery department of de. Montmorency College of Dentistry, Lahore from November 2022 to April 2023. Sample size calculated by WHO calculator ([www.openepi.com](http://www.openepi.com)) based on the estimated prevalence of dry socket to be 20%, a confidence level of 95%, and a margin of error of 5%<sup>10</sup>.

Inclusion criteria encompassed patients aged 18 years and above, who underwent surgical extraction of impacted mandibular third molars, and had complete clinical records with preoperative assessment, surgical details, and postoperative follow-up data available. Exclusion criteria included patients with incomplete or missing clinical records, systemic conditions affecting wound healing or coagulation disorders, incomplete follow-up data, or simultaneous extraction of multiple teeth or additional oral surgeries. Pederson's difficulty index is a well-established scoring system that considers several factors, including the angulation of the tooth, the depth of impaction relative to the occlusal plane, and the relationship to the mandibular ramus. Each factor is assigned a score, which is then totaled to categorize the extraction as easy, moderately difficult, or very difficult.

Patient demographic information, including age, gender, and medical history, was noted. Pederson's difficulty index was calculated for each surgical case based on predetermined criteria, including tooth position (vertical, mesioangular, horizontal, distoangular), depth of impaction, relationship to adjacent structures (bone, roots of adjacent teeth), and anticipated surgical difficulty. Each criterion was assigned a numerical value, and the total score was calculated to classify the surgical procedure's difficulty level. The primary outcome measure was the incidence of dry socket, diagnosed clinically based on symptoms of severe pain, foul odor, and absence of blood clot formation in the extraction socket postoperatively. Secondary outcome measures included Pederson Difficulty Index score.

Collected data were entered into IBM SPSS Statistics software, version 27.0, for processing and

analysis. Categorical variables, such as the prevalence of dry socket and surgical difficulty scores, were summarized as frequencies and percentages. Continuous variables, such as age and surgical difficulty scores, were summarized as mean and standard deviation (SD). The relationship between dry socket prevalence and surgical difficulty scores was evaluated using the Chi-square test, while Fisher's exact test was applied where the expected cell frequencies are less than 5. A p-value of less than 0.05 was considered statistically significant.

**RESULT**

There were 125 participants included in the study, of whom 61 (48.8%) were female and 64 (51.2%) were male. Regarding age distribution, the majority of participants were in the 20-29 age group (n=48, 38.4%), followed by the 30-39 age group (n=41, 32.8%). The mean age of the participants was 33.5±10.44 years given in Table 1. The majority of molar tooth impactions were observed on the left side, accounting for 66 cases (52.8%), while 59 cases (47.2%) were on the right side as shown in Table 2 & Figure 2. The types of impaction observed were predominantly mesioangular (61 cases, 48.8%), followed by distoangular (39 cases, 31.2%), vertical (15 cases, 12.0%), and horizontal (10 cases, 8.0%) given in figure 3. According to the Paderson Difficulty Index, most cases were moderately difficult (68 cases, 54.4%), while 37 cases (29.6%) were less difficult and 20 cases (16.0%) were very difficult. The surgical techniques employed included osteotomy with root section in the majority of cases (63 cases, 50.4%), followed by osteotomy alone (53 cases, 42.4%), and only forceps (9 cases, 7.2%). In terms of surgery duration, 51 cases (40.8%) took between 16 to 30 minutes, 45 cases (36.0%) took more than 30 minutes, and 29 cases (23.2%) lasted 15 minutes or less. Post-extraction complications included trismus (36 cases, 28.8%), dry socket (27 cases, 21.6%), bleeding (7 cases, 5.6%), and neurosensory changes (8 cases, 6.4%) given in table 3.

The study found a 21.6% prevalence of dry socket post-extraction of mandibular third molars. Interestingly, the incidence was slightly elevated in females (12.0%) compared to males (9.6%).

Table 4 shows the association between demographic and surgical factors with dry socket occur-

rence. Among females, 15 (55.6%) experienced dry socket, while 12 (44.4%) did not, with a p value of 0.428. Age groups 20-29 and 30-39 had higher occurrences of dry socket (18.5% and 33.3%, respectively) compared to other age groups. Pederson

**Table 1: Distribution of Age and Gender among Participants**

Gender	n	%
Female	61	48.8%
Male	64	51.2%
<b>Age Groups (years)</b>		
15-19	3	2.4%
20-29	48	38.4%
30-39	41	32.8%
40-49	24	19.2%
50-59	9	7.2%
Age (years), Mean ± SD	33.5 ± 10.44	

**Table 2: Side of third molar tooth impaction**

Side of Molar Tooth Impaction	n	%
Left Side	66	52.8%
Right Side	59	47.2%

**Table 3: Factors Related to Mandibular Third Molar Extractions**

Type of Impaction	n	%
Distoangular	39	31.2%
Horizontal	10	8.0%
Mesioangular	61	48.8%
Vertical	15	12.0%
<b>Paderson Difficulty Index</b>		
Less Difficult (Score: 3-4)	37	29.6%
Moderately Difficult (Score: 5-6)	68	54.4%
Very Difficult (Score: 7-10)	20	16.0%
<b>Surgical Technique Employed</b>		
Only Forceps	9	7.2%
Osteotomy	53	42.4%
Osteotomy with root section	63	50.4%
<b>Duration of Surgery</b>		
15 mins or less	29	23.2%
16-30 mins	51	40.8%
More than 30 mins	45	36.0%
<b>Post Extraction Complications</b>		
Bleeding	7	5.6%
Dry Socket	27	21.6%
Neurosensory Changes	8	6.4%
Trismus	36	28.8%

Difficulty Index revealed significant associations, with 11.1% of less difficult cases experiencing dry socket compared to 55.6% of moderately difficult cases and 33.3% of very difficult cases ( $p = 0.005$ ). The surgical technique employed also showed significance, with 74.1% of cases undergoing osteotomy with root section experiencing dry socket compared to 22.2% of those with only forceps ( $p = 0.021$ ). Additionally, duration of surgery was associated with dry socket, as 63.0% of surgeries lasting more than 30 minutes resulted in dry socket, compared to 7.4% for surgeries lasting 15 minutes or less ( $p = 0.003$ ).

**Table 4: Factors such as demographics and surgical variables were examined for their relationship with the occurrence of dry socket**

	Dry Socket		p value
	Yes	No	
	n (%)	n (%)	
<b>Gender</b>			
Female	15 (55.6%)	46 (46.9%)	0.428a
Male	12 (44.4%)	52 (53.1%)	
<b>Age Groups (years)</b>			
15-19	2 (7.4%)	1 (1.0%)	0.030b
20-29	5 (18.5%)	43 (43.9%)	
30-39	9 (33.3%)	32 (32.7%)	
40-49	8 (29.6%)	16 (16.3%)	
50-59	3 (11.1%)	6 (6.1%)	
<b>Type of Impaction</b>			
Distoangular	8 (29.6%)	31 (31.6%)	0.405b
Horizontal	4 (14.8%)	6 (6.1%)	
Mesioangular	11 (40.7%)	50 (51.0%)	
Vertical	4 (14.8%)	11 (11.2%)	
<b>Pederson Difficulty Index</b>			
Less Difficult	3 (11.1%)	34 (34.7%)	0.005a
Moderately	15 (55.6%)	53 (54.1%)	
Very Difficult	9 (33.3%)	11 (11.2%)	
<b>Surgical Technique Employed</b>			
Only Forceps	1 (3.7%)	8 (8.2%)	0.021a
Osteotomy	6 (22.2%)	45 (45.9%)	
Osteotomy with root section	20 (74.1%)	45 (45.9%)	
<b>Duration of Surgery</b>			
15 mins or less	2 (7.4%)	27 (27.6%)	0.003a
16-30 mins	8 (29.6%)	43 (43.9%)	
More than 30 mins	17 (63.0%)	28 (28.6%)	

<sup>a</sup>Chi square test; <sup>b</sup>Fischer exact test

## DISCUSSION

Dry socket, a common problem following extraction of impacted mandibular third molar, involves, the premature dislodgement of the blood clot within the extraction socket leading to intense pain and inflammation. This condition often arises due to factors such as surgical difficulty, including impaction level, angulation, and proximity to adjacent structures, which can increase the risk of trauma to the surrounding tissues during extraction. Understanding the interplay between surgical complexity and dry socket incidence is crucial for optimizing patient outcomes and informing preventive strategies in oral surgery<sup>11</sup>.

Our study's findings align with those of Saeed et al. (2022), where we observed a similar age distribution among patients undergoing impacted mandibular third molar extraction. The mean age recorded in our study was  $35 \pm 12.00$  years, with a significant proportion (48.76%) falling within the 18-30 years age group. Additionally, our study demonstrated a male predominance, consistent with the findings of Saeed et al., with 76.35% of patients being male<sup>12</sup>. Furthermore, Maria et al.'s research on primary and secondary closure of surgical wounds after impacted mandibular third molar extraction provides complementary insights. Their study, involving 60 patients aged between 18 and 40 years, echoes the age range observed in our study, strengthening the comparability of our results<sup>13</sup>. Our study findings regarding the distribution and types of mandibular third molar impaction are consistent with those reported by Butt et al. (2021) and Amanat et al. (2014), despite some variations in specific percentages. The majority of molar impactions were on the left side (52.8%) compared to the right (47.2%). Mesioangular impactions were most common (48.8%), followed by distoangular (31.2%), vertical (12.0%), and horizontal (8.0%) types<sup>14</sup>. Butt et al. (2021) similarly found a near-equal, distribution of impacted third molars between the left and right mandibular sides with mesioangular impaction being the predominant type. Meanwhile, Amanat et al. (2014) reported a greater predilection for third molar impaction in the mandible, particularly on the right side<sup>15</sup>.

Our study revealed a frequency of dry socket post mandibular third molar extraction at 21.6%, with a slightly higher occurrence in females (12.0%)

compared to males (9.6%). These findings are consistent with those reported by Sardar et al. (2019), recorded a 20.7% incidence of dry socket following the extraction of impacted mandibular third molars<sup>16</sup>. Khanal et al. and Eshghpour et al. observed incidences of 19.3% and 19.14%, which closely mirror our observed prevalence. This consistency suggests a relatively stable occurrence of dry socket following this surgical procedure across different populations<sup>17,18</sup>.

Conversely, studies by Purohit, and Chandran et al. described lower frequencies of dry socket ranging from 4.09% & 9.4%. Our study's findings regarding Pederson's difficulty index and the incidence of dry socket align closely with those reported by Sardar et al. (2019), highlighting the influence of surgical difficulty on postoperative complications. In our study, most patients were categorized as moderately difficult cases (54.4%), followed by less difficult (29.6%) and very difficult (16.0%) cases according to Pederson's index. Interestingly, Sardar et al. observed a similar trend, with the majority of dry socket cases occurring in moderately difficult extractions (58.3%), followed by very difficult extractions (30.6%)<sup>16</sup>.

The study's strength lies in its focus on the correlation between surgical difficulty and the prevalence of dry socket, providing valuable insights into risk factors specific to impacted mandibular third molar extractions.

## CONCLUSION

Our study reveals a notable prevalence of dry socket following impacted mandibular third molar extraction, with 21.6% of cases experiencing this complication with a significant association observed between the occurrence of dry socket and the surgical difficulty assessed by Pederson's difficulty index.

## LIMITATIONS

One limitation was that our cross-sectional design precludes establishing causal relationships between Pederson's difficulty index and postoperative complications.

## REFERENCES

1. Salam S, Bary A, Sayed A. Prevalence of Impacted Teeth and Pattern of Third Molar Impaction among Kerala Population a Cross Sectional Study. *Journal of Pharmacy and Bioallied Sciences*. 2023 Jul 1;15(Suppl 1):S354-7.
2. Al-Madani SO, Jaber M, Prasad P, Maslamani MJ. The

Patterns of Impacted Third Molars and Their Associated Pathologies: A Retrospective Observational Study of 704 Patients. *Journal of Clinical Medicine*. 2024 Jan 6;13(2):330.

3. Taha A, Yousif S. Age estimation of Iraqi children and young adults based on third molar development and its relation to chronological age. *Pediatric Dental Journal*. 2022 Aug 1;32(2):87-93.
4. Sadan N, Aderet N, Tagger-Green N, Ratson T, Laviv A. Age Assessment through Third Molar Teeth Developmental Stage in Children. *Applied Sciences*. 2023 Feb 5;13(4):2069.
5. Lamichhane NS, Sigdel B, Lamichhane S, Tripathi R, Koirala U, Bajgai DP. Mandibular Third Molar Impaction among Patients Visiting Outpatient Dental Department of a Tertiary Care Centre. *JNMA: Journal of the Nepal Medical Association*. 2023 Oct;61(266):769.
6. Mamoun J. Dry socket etiology, diagnosis, and clinical treatment techniques. *Journal of the Korean Association of Oral and Maxillofacial Surgeons*. 2018 Apr;44(2):52.
7. Hutor NS. Current diagnosis, prevention and treatment of dry socket:(literature review). *International Journal of Medicine and Medical Research*. 2021;7(2):58-65.
8. Salve C, Khan AA, Venna P, Bhardwaj B. Clinical Investigation of Risk Factors Associated with Dry Socket: A Comprehensive Assessment. *Journal of Advanced Medical and Dental Sciences Research*. 2023 Dec 1;11(12):42-7.
9. Kamal A, Omar M, Samsudin AR. Management of Dry Socket: New regenerative techniques emerge while old treatment prevails. *Dentistry Review*. 2022 Mar 1;2(1):100035.
10. Alwraikat AWA. Alveolar osteitis: incidence and risk factors following third molar surgery in Jordan. *Pak Oral Dent J*. 2019;29(1): 19-22.
11. Chen YW, Chi LY, Lee OK. Revisit incidence of complications after impacted mandibular third molar extraction: A nationwide population-based cohort study. *PloS one*. 2021 Feb 22;16(2):e0246625.
12. Saeed MS, Khan A, Sohail S, Jamal M, Javed A, Murtaza M. Frequency of dry socket among patients undergoing dental extraction presenting to Ayub Teaching Hospital. *Journal of University Medical & Dental College*. 2022 May 23;13(2):387-90.
13. Maria A, Malik M, Virang P. Comparison of primary and secondary closure of the surgical wound after removal of impacted mandibular third molars. *J Maxillofac Oral Surg* 2012; 11(3):276–83.
14. Butt H, Tahir F, Iqbal A, Rauf N, Khan NR, Piracha MH. Patterns of impacted third molars and categorization of their associated oral pathologies: a radiographic study. *Pakistan Journal of Pathology*. 2021 Sep 27;32(3):101-6.
15. Amanat N, Mirza D, Rizvi KF. Pattern of third molar impaction: frequency and types among patients attending urban teaching hospital of Karachi. *Pakistan Oral and Dental Journal*. 2014 Mar 31;34(1).

16. Sardar T, Sadiq N, Ishfaq M, Sheikh G. Incidence of dry socket after removal of impacted mandibular third molar and its relation to surgical difficulty. *Pakistan Oral & Dental Journal*. 2019 Jul 28;39(2):159-63.
17. Khanal P, Dixit S, Singh R, Dixit P. Difficulty index in extraction of impacted mandibular third molar and their post-operative complications. *Journal of Kathmandu Medical College* 2014;3(7): 14-20.
18. Eshghpour M, Nejat AH. Dry socket following surgical removal of impacted third molar in an Iranian population: Incidence and risk factors. *Niger J Clin Pract*. 2013;16(4): 496-500.
19. Purohit JN. Incidence of dry socket after surgical removal of the third molar: a retrospective study. *Sch J Dent Sci*. 2016;3(10): 287-9.
20. Chandran S, Alaguvelrajan M, Karthikeyan A, Ganesan K, Faiz MK, Vallabhaneni SS. Incidence of dry socket in south Chennai population: A retrospective study. *J Int Oral Health*. 2016; 8(1): 11922.



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