

The Prevalence of Odontogenic Infections: An Analysis of Most Commonly Affected Teeth And Fascial Spaces

Syed Muhammad Ahmad Rahim, Muhammad Asif Shahzad, Shahzad Waheed Qureshi¹ Muhammad Zubair Ahmad, Shahzada Faiz Ahmad Khan, Iqra Rehman Alvi

Department of Oral & Maxillofacial Surgery, Azra Naheed Dental College, The Superior University, Lahore

Abstract

Background: The odontogenic infections of maxillofacial region are considered among the most common and alarming infections due to their incidence, origin, higher rate of morbidity and plausible mortality. In literature, variations and poor quality of evidence compelled us to ascertain the frequency of commonly involved teeth and fascial spaces in patients having odontogenic infections. The study will provide valuable insights into local patterns of these infections in study population emphasizing the importance of prompt diagnosis and treatment of odontogenic infections.

Objective: To ascertain the frequency of commonly involved teeth and fascial spaces in patients having odontogenic infections visiting Azra Naheed Dental college/Chaudhry Muhammad Akram Dental Hospital, Lahore.

Methodology: This descriptive cross sectional study was carried out at Department of Oral and Maxillofacial Surgery, Azra Naheed Dental College/Chaudhry Muhammad Akram Dental Hospital from June 2022 to February 2024. Non-probability consecutive sampling was used. Total 87 patients with odontogenic infection were enrolled in the study by using non-probability consecutive sampling method. A questionnaire was used to record demographic and clinical data which were purpose-built. An interview of duration 5-10 minutes was conducted to collect the demographic data. Detailed case history, intraoral examination and extraoral examination was performed for presence and identification of signs and symptoms such as pain, tooth mobility, tooth apice tenderness, intraoral swelling, extra oral swelling, fever, malaise, trismus, dysphagia, and dyspnea etc. The data was entered and analyzed using SPSS version 20. A p-value ≤ 0.05 was considered as statistically significant.

Result: In this study, symptoms of odontogenic infections of patients shows were 87(100%) pain, swelling 87(100%), fever in 46(52.87%), teeth involved shows 18(20.7%) upper teeth, 69(79.3%) lower, 18(20.7%) anterior, 69(79.3%) had posterior, 18(20.7%) had canine, 3rd molar had 36(41.4%), spaces involved were submandibular in 41(47.1%).

Conclusion: In this study pain, swelling, fever, and trismus were the commonest symptoms, dental caries as the commonest cause, teeth involved were lower, posterior and 3rd molar with submandibular as the frequent space involved.

Keywords: Odontogenic infections, teeth and spaces involved

Introduction

In oral and maxillofacial region, odontogenic infections are the most common diseases and quite difficult to treat conditions in dentistry.¹ Their symptoms include pain, swelling, fever, trismus, dysphagia, dyspnea and pus discharge.¹ The underlying etiologies include dental caries, pericoronitis, periodontitis and trauma. Odontogenic infections can spread to local alveolar processes and may involve deeper tissues of

maxillofacial area even after having odontogenic origin.² For the reason of complex anatomical characteristics of fascial spaces, there could be life-threatening complications due to spread of odontogenic infections such as respiratory obstruction, necrotizing fasciitis, mediastinitis, cerebral abscess, thoracic empyema, cavernous sinus thrombosis (CST), sepsis and osteomyelitis.³⁻⁵

Several studies evaluated the characteristics, etiologies and treatment modalities of odontogenic infections^{1-3,6} identifying that mandibular third molar was the most frequently involved tooth. The submandibular and buccal as the most commonly involved spaces followed by the infraorbital space while involvement of multiple spaces was also present in significant number of patients.⁷⁻¹⁰

Dental caries/necrotic pulp involving the lower third molar teeth have been identified as the most common and prevalent predisposing factor in numerous studies.⁹

Corresponding Author:

Dr. Syed Muhammad Ahmad Rahim
Department of Oral & Maxillofacial Surgery, Room No. 3 Azhra Naheed
The Superior University, Lahore, 17-km Raiwind Road, Lahore
Email: ahmadrahim808@gmail.com

Received: 26th May, 2024

Revised: 15th June, 2024

Accepted: 26th June, 2024

DOI: <https://doi.org/10.52442/jrcd.v5i1.85>

Methods

After approval from the ethical review committee, this study was conducted at Oral & Maxillofacial Surgery Department, Azra Naheed Dental college/Chaudhry Muhammad Akram Dental Hospital, Lahore over a period from June 2022 to February 2024. A Verbal and written informed consent was taken from all the included patients. Total 87 patients with odontogenic infection (as per operational definitions) were enrolled by using non-probability consecutive sampling method. Patient with infected cyst, tumor, odontogenic infection secondary to facial bone fracture and pregnant females were not included in the study. A Questionnaire (purpose built) was used to record demographic details and clinical data of included patients. An interview of duration 5-10 minutes was conducted to collect the demographic data such as age, sex, duration of presenting complaint etc. Detailed case history, intraoral examination and extra oral examination was performed for the presence and identification of signs/symptoms such as pain, tooth mobility, tooth apex tenderness, intraoral swelling, extra oral swelling, fever, malaise, trismus, dysphagia, and dyspnea etc.

Teeth including incisor, canine, premolar and/or molar commonly involved as a source of odontogenic infection was determined by clinical assessment, periapical X-ray and OPG.

Fascial spaces including buccal, canine, masticator, sublingual, submandibular, lateral pharyngeal, peritonsillar, antero-visceral, retropharyngeal, danger space, and/or space of carotid sheath commonly involved in the spread of odontogenic infections were determined by clinical assessment and USG/CT. After proper diagnosis the patients were treated in department as outpatients surgically with incision & drainage/extraction of offending tooth and supported medically with empirical antibiotics, analgesics and antipyretics accordingly. Patients who required hospitalization based on severity of infection were admitted. Culture and sensitivity were advised for the all patients to rule out antibiotic resistance following empirical antibiotic therapy and improve the recovery rate, The combination of amoxicillin with clavulanic acid was the most preferable and empirical antibiotic prescribed to patients and clindamycin to penicillin allergic patients. Azithromycin and clarithromycin were also used in some patients following being suggested after culture and sensitivity test. All the patients responded well to the treatment therapies and showed uneventful recovery.

Results

A total of 87 patients satisfying the required inclusion or exclusion criteria were included in current study to determine the frequency of commonly involved teeth and facial spaces in patients with odontogenic infections visiting the Azra Naheed Dental college/Chaudhry Muhammad Akram Dental Hospital, Lahore.

Descriptive statistics of the patients showed mean age 43.37 ± 8.35 years (Table 1). Gender distribution shows that 58(66.67%) were male whereas 29(33.33%) were females with mean duration of complaint was 3.56 ± 1.45 days. Descriptive

statistics of symptoms of odontogenic infections of patients shows that 87(100%) had pain, swelling in 87(100%), fever in 46(52.87%), trismus in 57(65.51%), halitosis in 22(25.29%), malaise in 9(10.34%) and pus discharge was in 47(54.02%). (Table 2)

Descriptive statistics of teeth involved in odontogenic infections of patients shows 18(20.7%) upper teeth (canines) and 69(79.3%) lower, differentiating further as involvement of anterior teeth (all were upper canines) in 18(20.7%) and posterior teeth in 69 (79.3%) (showing all were lower involving 1st molar in 23(26.4%), 2nd molar in 10(11.5%) and 3rd molar in 36(41.4%).(Table 3)

Descriptive statistics of spaces involved in odontogenic infections of patients shows buccal in 19(21.8%), canine in 18(20.7%), sublingual in 9(10.3) and submandibular in 41(47.1%).(Table 4)

The combination of amoxicillin with clavulanic acid was the most preferable and empirical antibiotic prescribed to patients and clindamycin to penicillin allergic patients. Azithromycin and clarithromycin were also used in some patients following being suggested after culture and sensitivity test. All the patients responded well to the treatment therapies and showed uneventful recovery.

After stratification of the data regarding age and gender, Chi square test was applied. A p-value of ≤ 0.05 , post stratification, was considered as statistically significant.

Table 1: Descriptive statistics of age and gender of patients

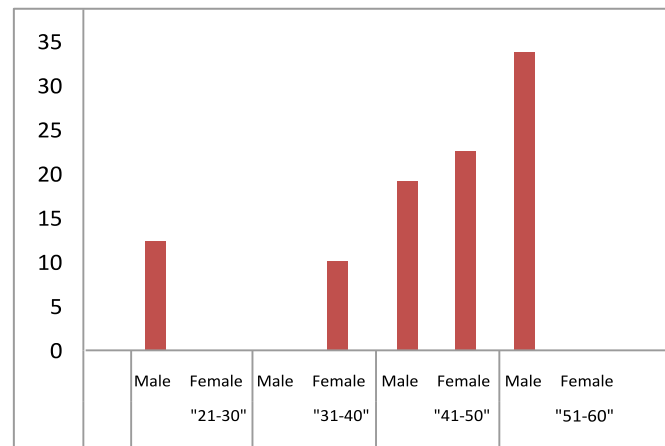


Table 2: Descriptive statistics of signs/symptoms of odontogenic infections of patients

Symptoms of infection	No. of patients	%
Pain	87	100
Swelling	87	100
Fever	46	52.87
Trismus	57	65.51
Dysphagia	14	16.09
Dyspnea	0	0
Halitosis	22	25.29
Malaise	9	10.34
Tooth Mobility	0	0
Pus Discharge	47	54.02

Table 3: Descriptive statistics of teeth involved in odontogenic infections

Teeth involved	No. of patients (n=87)	Percentage %
Upper	18	20.7
Lower	69	79.3
Anterior	18	20.7
Posterior	69	79.3
Incisor	00	00
Canine	18	20.7
Premolar	00	00
1 st molar	23	26.4
2 nd molar	10	11.5

Table 4: Descriptive statistics of spaces involved in odontogenic infections of patients

Spaces involved	No. of patients (n=87)	Percentage (%)
Buccal	19	21.8
Canine	18	20.7
Masticator	-	-
Sublingual	9	10.3
Submandibular	41	47.2
Lateral Pharyngeal	-	-
Peritonsillar	-	-
Anterovisceral	-	-
Retropharyngeal	-	-

Discussion

The odontogenic infections of maxillofacial region are considered among the most common and alarming infections due to their incidence, origin, higher rate of morbidity and plausible mortality.^{4,5,12} Despite the advents and innovations in antibiotic therapy along with improved life style and socioeconomic status of people, a large number of cases with odontogenic infections are still being referred and reported in tertiary hospitals. Considering the variations and poor quality of evidence, the current study aimed to identify and determine the frequency of commonly involved teeth and fascial spaces in patients with odontogenic infections visiting the Oral & Maxillofacial Surgery Department, Azra Naheed Dental college/Chaudhry Muhammad Akram Dental Hospital, Lahore.

In this study, mean age of patients was 43.37±8.35 years, 58(66.67%) were male whereas 29(33.33%) were females. Descriptive statistics of symptoms of odontogenic infections of patients shows that 87(100%) had pain, swelling in 87(100%), fever in 46(52.87%), Trismus in 57(65.51%), Halitosis in 22(25.29%), Malaise in 9(10.34%) and pus discharge was in 47(54.02%). Similar findings regarding the mean age and signs/symptoms were demonstrated in studies conducted by Yew et al. and others.^{13,14}

Several studies have evaluated the characteristics, etiologies and treatment modalities of odontogenic infections.¹⁻⁹ In our study, descriptive statistics of teeth involved in odontogenic infections of patients shows 18(20.7%) upper teeth (canines) and 69(79.3%) lower, differentiating further as involvement of anterior teeth (all were upper canines) in 18(20.7%) and posterior teeth in 69 (79.3%). These results are in agreement with retrospective study of Yanko G Yankov et al¹⁵ who reviewed the charts of 705 patients with maxillofacial space infections (MSI) from Maxillofacial Surgery Clinic, University Hospital St. Marina (Bulgaria), Regarding the causative teeth for the suppurative bacterial infection among their study patients - 208 out of 705 (29.5%) were the first molars of both jaws (16, 26, 36 and 46). The least frequent direct cause of odontogenic infection, accounting for only 17 cases out of 705 (2.41%) were central incisors (teeth 11, 21, 31 and 41).¹⁵ In another study, Pourdanesh et al.⁸ reviewed the eligible records of 310 patients with odontogenic abscess having age range of 2-84 years from Taleghani Hospital Iran. The mandibular 3rd molars were the most frequently involved teeth (34.5%). The findings of current study are in alignment with the studies of Pourdanesh et al⁸ and others^{16,17} showing descriptive statistics of spaces involved in odontogenic infections of patients with buccal in 19(21.8%), canine in 18(20.7%), sublingual in 9(10.3) and submandibular in 41(47.1%).

Our study demonstrated that the dental caries/necrotic pulp as the leading causative and predisposing factor for odontogenic infections which are in accordance with studies carried out by Kityamuwesi et al.⁹ They enrolled 130 patients with pyogenic odontogenic infection having age range of 1.5-89 years from Mulago Hospital Uganda. Dental caries particularly of lower third molar teeth was the most prevalent predisposing factor. The most involved spaces were submandibular (85.3%).⁹ In another study, Kumar et al¹⁰ investigated and highlighted the same findings regarding the etiology and anatomical distribution of Odontogenic Maxillofacial Infections (OMI). The most common cause of OMI was found to be carious tooth/necrotic pulp (70%), buccal (40%) and submandibular (30%) spaces were the most frequently involved anatomic spaces, followed by the infraorbital space (20%). The study also highlights the importance of early diagnosis and appropriate management of OMI to prevent complications and reduce morbidity. Other studies also corroborated our finding that the common presenting signs and symptoms were pain, swelling, lymphadenopathy and trismus.¹⁸⁻²⁰

Patel et al¹⁶. in their study on 100 patients with severe odontogenic infections stated that the mandibular third molars have been the most common cause of odontogenic infections and the submandibular space has been the most common location of infection. Liu X, Zhang et al¹⁷. in their study on 205 patients with head and neck space infections of odontogenic origin stated that the third molars were the most common source of odontogenic infections (44.4%), followed by second molars (24.4%), and first molars (15.6%) Rajput et al¹⁸. reported that the submandibular space is the most frequently involved space in the odontogenic infections. Combination of various spaces has been observed by Gupta R et al¹⁹ and others^{21,22}; in their study on odontogenic infections stating that the submandibular space was the most frequently

frequently involved in patients with multi space infections. The results of above-mentioned studies are in line with the findings of our study identifying the submandibular and buccal spaces as the most commonly involved ones followed by canine and sublingual spaces.

Conclusion

In this study pain, swelling, fever, and trismus were the commonest symptoms of infection, the commonest cause was dental caries, the commonest involved teeth were lower,

posterior teeth and 3rd molar with submandibular as the frequent space involved in our population. Amoxicillin plus clavulanic acid and clindamycin were the most prescribed and effective antibiotics followed by azithromycin and clarithromycin. Odontogenic infections in maxillofacial region are quite common and persistent problem requiring rapid, proper diagnosis and treatment to minimize any risk of life-threatening complications.

Conflict of Interest

None.

References

1. Neal TW, Schlieve T. Complications of severe odontogenic infections: a review. *Biology*. 2022 Sep; 11(9):1784. doi: 10.3390/biology11121784.
2. Singh AK, et al. Odontogenic Infections: A Review of the Literature. *J Oral Sci*. 2022;64(2):123-135. doi: 10.2334/josnusd.64.123.
3. Kumar S, et al. Maxillofacial Odontogenic Infections: A Retrospective Study. *J Maxillofac Oral Surg*. 2022;21(2):287-294. doi: 10.1007/s12663-021-01631-6.
4. Burgos-Larraín LF et al. Brain complications from odontogenic infections: a systematic review. *Journal of stomatology, oral and maxillofacial surgery* 2022; 123(6):794-800.
5. Gemelli N, Boccalatte L, N. Ciarrocchi. Multiple brain abscesses due to odontogenic infection. *Neurocrit Care* 2020;33:604-606.
6. Xue H, X.H. Wang, L. Shi, Q. Wei, Y.M. Zhang, H.F. Yang. Dental focal infection-induced ventricular and spinal canal empyema: a case report. *World J Clin Cases* 2020; 14(8):3114-3121
7. Blankson PK, Parkins G, Boamah MO, Abdulai AE, Ahmed AM, Bondorin S, Nuamah I. Severe odontogenic infections: a 5-year review of a major referral hospital in Ghana. *Pan Afr Med J*. 2019 Feb 12;32:71. DOI
8. Pourdanesh F, Dehghani N, Azarsina M, Malekhosein Z. Pattern of odontogenic infections at a tertiary hospital in Tehran, Iran: a 10-year retrospective study of 310 patients. *J Dent (Tehran)*. 2013;10:319-28
9. Kityamuwesi R, Muwaz L, Kasangaki A, Kajumbula H, Rwenyonyi CM. Characteristics of pyogenic odontogenic infection in patients attending Mulago Hospital, Uganda: a cross-sectional study. *BMC Microbiol*. 2015;15:46.
10. Kumar P, Singh A, Gupta R, Kumar V, Singh S, Sharma G. Odontogenic Maxillofacial Infections (OMI): A Retrospective Study of 120 Cases. *J Maxillofac Surg Res*. 2022;4(2):123-128. DOI: 10.1055/s-0042-1742381
11. Ahmed M, Khan A, Saeed M, et al. Odontogenic Infections: A Retrospective Analysis of 150 Cases. *J Oral Maxillofac Surg*. 2022;80(7):1424-1429. DOI: 10.1016/j.joms.2022.02.00
12. Rautaporras N et al. Deep odontogenic infections—identifying risk factors for nosocomial pneumonia *Clinical Oral Investigations* 2021;25:1925-1932.
13. Yew CC, Sivamuni SS, Su Ee Khoo, Yuen KM, Tew MM. Clinical Management of Orofacial Odontogenic Infection: A Four Year Retrospective Study. *Archives of Orofacial Science* 2021; 16(1):21-22.
14. Ömer Ekici. Epidemiological analysis and management of patients with facial space infections of odontogenic origin: A retrospective evaluation of two years. *Clinical and Experimental Health Sciences* 2023; 13(1):58-66.
15. Yankov YG, Dimanov S, Nikolaev NI, Stoev L, Yotsova RV, Stoeva M. Etiology and demographic distribution of odontogenic abscesses in the maxillofacial area in patients over 18 years of age: a five-year retrospective study. *Cureus*. 2024;16(4):e59334. DOI: 10.7759/cureus.59334. PMID:38817524; PMCID: PMC11137639
16. Patel S, Shah S, Patel A, Prajapati A, Patel N, Mehta H. Odontogenic Infections: A Retrospective Analysis of 120 Cases. *J Oral Maxillofac Surg*. 2021;79(9):1864-1869. DOI: 10.1016/j.joms.2021.04.021
17. Liu X, Zhang Y, Wang X, Liu L, Li J, Zhu S. Odontogenic infections: a retrospective study of 193 cases. *J Craniomaxillofac Surg*. 2023;51(2):143-148. DOI: 10.1016/j.jcms.2022.12.005
18. Rajput A, Sharma A, Kumar P, Singh S, Rajput N, Verma M. Odontogenic Infections: A Retrospective Analysis of 250 Cases. *J Oral Maxillofac Surg*. 2024;82(3):532-538. DOI: 10.1016/j.joms.2023.11.021
19. Gupta R, Gupta M, Singh R, Singh S, Kumar A, Verma M. Odontogenic Infections: A Retrospective Study of 150 Cases. *J Maxillofac Surg Res*. 2019;3(2):53-58. DOI: 10.1055/s-0039-1693171
20. Zhang C, Tang Y, Zheng M, Yang J, Zhu G, Zhou H, Zhang Z, Liang X. Maxillofacial space infection experience in West China: a retrospective study of 212 cases. *Int J Infect Dis* 2010; 14:414-417.
21. Storoe W, Haug R, Lillich T. The changing face of odontogenic infections. *J Oral Maxillofac Surg*. 2001;59:748-9.
22. Antonia V, Katarina G, Ante M, Mikić M. Frequency of patients with odontogenic infection at the department for maxillofacial surgery of university hospital of split in the period from 2015 to 2021. *Acta Stomatologica Croatica*, 2022;56(4):444-48.

How to cite this article?

Rahim SAM, Shahzad MA, Qureshi SW, Ahmad MZ, Khan SFA, Alvi IR, The Prevalence of Odontogenic Infections: An Analysis of Most Commonly Affected Teeth and Fascial Spaces. *J Rehman Coll Dent* 2024; 5(1) 8-11

Author Contributions

1. Syed Muhammad Ahmad Rahim - Conceptualization and Methodology of study
2. Muhammad Asif Shahzad - Literature review
3. Shahzad Waheed Qureshi - Manuscript review
4. Muhammad Zubair Ahmad - Data Analysis
5. Shahzad Faiz Ahmad Khan - Manuscript writing
6. Iqra Rehman Alvi - Data Interpretation