



ORIGINAL ARTICLE

Frequency of congenitally missing third molars in orthodontic patients.

Amber Farooq¹, Verda Ahmad Khan², Samia Shad³, Maimoona Afsar⁴, Sardar Danial Hafeez⁵, Adil Shahnawaz⁶

Article Citation: Farooq A, Khan VA, Shad S, Afsar M, Hafeez SD, Shahnawaz A. Frequency of congenitally missing third molars in orthodontic patients. Professional Med J 2022; 29(7):1056-1060. <https://doi.org/10.29309/TPMJ/2022.29.07.6914>

ABSTRACT... Objective: To determine the frequency of congenitally missing third molars in Orthodontic patients. **Study Design:** Retrospective Study. **Setting:** Department of Orthodontics at Abbottabad International Dental College, Abbottabad. **Period:** February 2021 to November 2021. **Material & Methods:** Retrospective data was collected from the files in the departmental archives. Files from the past seven years were studied for data collection. Congenitally missing teeth were identified from the patient's history and the Orthopantomogram present within each file. The collected data was analyzed via SPSS software Version 21. **Results:** Chi-square test was applied to find the frequency of missing teeth. Congenital absence of third molars was highly significant among maxilla and mandible (p -value < 0.001). No significant difference was found among the genders. **Conclusion:** Congenitally missing third molars are more prevalent in the maxilla than the mandible.

Key words: Maxilla, Mandible, Orthodontics, Third Molar.

INTRODUCTION

CMT (Congenitally Missing Teeth) is a condition in which one or more teeth are missing from birth.¹ Agenesis is another term used to describe congenitally missing teeth.¹ In the primary dentition, the prevalence ranges between 0.1% and 0.2%.^{1,2} However, in the permanent dentition tooth agenesis is prevalent in 6.4% of the overall population, with similar occurrence in the two jaws.² This anomaly occurs in three categories: (1) Hypodontia (Agenesis of less than 6 teeth, occurred without syndrome) (2) Oligodontia (six or more teeth are missed) (3) Anodontia: (absence of all of the teeth, usually seen with ectodermal dysplasia).³ It is a multifaceted dental defect that's frequently linked to syndromes⁴ and other congenital facial dysplasia like cleft lip and palate.⁵ Non syndromic hypodontia can be caused by a variety of etiologic causes³, including abnormalities in dental lamina formation, tooth germ inability to develop at the correct moment, space constraints, systemic conditions, and genetic predispositions.⁶ There are three types of tooth agenesis described in the literature: (1)

missing third molars (2) missing teeth other than third molars (3) tooth agenesis taking all teeth into consideration.^{5,6}

Tooth agenesis prevalence rates differ by demographic, owing to changes in sampling and assessment methods, as well as differences in the age, sex, and race of the participants.⁷ Agenesis is the most common anomaly associated with third molars, the prevalence rate is 20%.⁸ When a third molar is missing, Bailit believes that agenesis of the remaining teeth is 13 times more likely, as well as reduced size and delayed development of some teeth and other dental defects is almost certain particularly when three or all four third molars are missing.^{5,6,8,9} Shani et al studied the frequency of missing third molars and its association with the pattern of other teeth missing. They reported that missing third molars were detected in 25.7% of children, with one or two missing third molars at 18.3%.¹ There was a considerable difference in the number of missing teeth between the maxilla and the mandible, and also between the right and left sides, with the maxilla and right

1. BDS, FCPS, HOD Orthodontics, Abbottabad International Dental College.
2. BDS, MDS Orthodontics (Resident), Registrar Orthodontics, Abbottabad International Dental College.
3. BDS, FCPS, HOD Oral and Maxillofacial Surgery, Abbottabad International Dental College.
4. BDS, Demonstrator Orthodontics, Abbottabad International Dental College.
5. BDS, Demonstrator Orthodontics, Abbottabad International Dental College.
6. BDS, FCPS, HOD Operative Department, Abbottabad International Dental College.

Correspondence Address:
Dr. Ambar Farooq
Department of Orthodontics,
Abbottabad International Dental College.
ambersaeedkhan@hotmail.com

Article received on: 29/11/2021
Accepted for publication: 17/02/2022

side having the most missing teeth. When there was another missing tooth, the chances of a 3rd molar missing increased by 3.3 times.¹ Mahnaz reported the prevalence of congenitally missing teeth was totally 45.7% and 34.8% for third molars between maxilla and mandible. Her study was carried out on Iranian population.³ Abida Aslam⁶, mansoor majeed¹⁰, Owais durrani¹¹, and Farhat Amin¹² conducted different studies on the Pakistani population and reported separately the frequency of missing teeth. Abida Aslam reported a rate of 4.2%⁶, owais durrani reported 9%¹¹, mansoor majeed reported 3.38%¹⁰, and farhat amin reported 6.08%¹² of hypodontia in their respective sample population. Mutations in the MSX1, PAX9, and AXIN2 genes cause severe forms of isolated tooth agenesis, known as oligodontia. Mild forms of hypodontia appear to be linked to mutations in other genes.¹³ When the quantity of a gene product required for dental development at early stages is reduced below a critical limit, it can lead to tooth agenesis.¹³ This belief, still, does not give an explanation for the detected characteristic oligodontia patterns, nor does it explain why some teeth are more vulnerable to agenesis than others.

The aim of this study was to find the frequency of congenitally missing teeth in a given population type and check whether the detected frequency conforms with the previous studies conducted on different populations.

MATERIAL & METHODS

This retrospective study was conducted at, Orthodontics department, Abbottabad International Dental hospital. After the ethical approval from the institutional review board (Ref # IRB/2021/05) was obtained, data collection was started. The data was collected and article completed between February 2021 and November 2021. Convenient sampling was carried out. Patient's records were obtained from the departmental archives and files of the past seven years were included in the study. Pre-treatment OPG radiographs were used for the study. The inclusion criteria were non-syndromic patients aged 13 years and above who had a history of missing teeth. Patients, who had failed

to report or files that did not mention whether the tooth/teeth were missing or extracted, were called on the phone numbers they provided. The patients who confirmed a history of extraction were excluded from the study. patients who had incomplete record files or who were confused about the status of extraction of the said tooth/teeth were also excluded from the study. A total of 1400 files were studied for data collection. 105 of the 1400 files had confirm congenitally missing tooth/teeth.

Data was analyzed using SPSS version 24. The power of test was kept at 80%. The quantitative data like age was presented in form of mean \pm S.D while f(%) was used for categorical data (such as gender, congenitally missing 3rd molar). Chi-square test was applied to see association between categorical variables e.g., congenitally missing 3rd molar with gender. P-value \leq 0.05 was considered as significant.

RESULTS

One hundred and five subjects had congenitally missing third molars. Forty-seven were male and fifty-eight females (Table-I). The descriptive statistics including the frequency of missing third molars were analyzed using the SPSS software. No significant association of missing pattern (right, left, and bilateral) was seen with gender, p-value $>$ 0.05 (Table-II). In addition, significant association was observed among congenitally missing third molars of maxilla and mandible, p-value $<$ 0.05. (Table-III).

AGE (Years)	
Mean	17.36
S.D	4.405
Range	17
Minimum	13
Maximum	30

Table-I. Descriptive statistics of age (years)

		Unilateral Right	Unilateral Left	Bilateral	Chi-square	P-Value
Congenitally Missing Third Molars of Maxilla						
Gender	Female	6(10.3%)	5(8.6%)	31(53.4%)	2.844	0.416
	Male	7(14.9%)	6(12.8%)	27(57.4%)		
Congenitally Missing Third Molars of Mandible						
Gender	Female	9(15.5%)	7(12.1%)	18(31%)	1.672	0.643
	Male	4(8.5%)	6(12.8%)	13(27.7%)		

Table-II. Comparison of congenitally missing third molars maxilla and mandibular with respect to gender

	Unilateral Right	Unilateral Left	Bilateral	Total	Chi-square	P-Value
Maxilla	13(12.4%)	11(10.5%)	58(55.2%)	82(78.05%)	40.966	<0.001
Mandible	13(12.4%)	13(12.4%)	31(29.5%)	57(54.28%)		

Table-III. Comparison of congenitally missing third molars (maxilla) in congenitally missing third molars (mandible)

DISCUSSION

The prevalence rate of third molars agenesis has increased significantly within the past decade. Approximately 75% of the hypodontia is related to third molars.⁸ Studies conducted on various populations have shown a variety of ranges, but the fact remains the same that third molars are the most frequently missing teeth in the oral cavity.⁸ Nowadays, approximately 50% of the third molars present some form of anomaly¹⁴, either they remain un-erupted or partially erupted or they are absent from the oral cavity. Their time of formation, and crown and root morphology are highly variable.¹⁴

Studies suggest that the third molars are the most frequently missing teeth, followed by mandibular second premolars and maxillary lateral incisors.⁸ The results of our study were highly significant among maxillary and mandibular missing third molars, with a p value of <0.001 (Table-III). It was confirmed from our results that congenitally missing third molars are more prevalent in the maxilla (78.05%) than the mandible (55.2%) (Table-III). Studies conducted previously by authors have reported similar results.^{1,3,10} Shani reported missing third molars to be more prevalent in the maxilla with an incidence rate of 25%.¹ Mahnaz et al also reported similar results with 45% missing maxillary third molars and 34% missing mandibular third molars.³ Majeed et al also studied the prevalence of missing impacted and supernumerary teeth and reported that missing third molars were more prevalent in maxilla than in the mandible.¹⁰ Some studies show that females have a higher incidence of hypodontia^{16,21},

while our study showed no significant co-relation between the genders as similar to other studies (Table-II).^{15,18,20}

Our results showed 7.5% prevalence rate of congenitally missing third molars. The occurrence of a congenitally absent third molar is substantially higher than that of other teeth around the world varies between 17 and 28%.^{8,15} The majority of studies on hypodontia prevalence have been conducted on Caucasians, with prevalence rates ranging from 4 to 7%.¹⁶ In the African American population hypodontia was recorded in 7.7% of the population.¹⁷ Hypodontia studies in the Asian populations reported prevalence rate of 6.9% in Chinese population¹⁹, 11.2% in Korean population²⁰ and 9.4% in Japanese¹⁸ population. Another study carried on the Malay population reported a prevalence rate of 3.2%.¹

The prevalence rate of our study is similar to the studies conducted on other populations, but the results can vary as our study only included missing third molars while other studies included congenitally missing teeth including third molars.^{1,16,17,18,19,20} In order to confirm this difference wider range of the population should be included in the study. Our results can differ from other studies as we collected our data retrospectively rather than prospectively including a wider range of the population.

CONCLUSION

Prevalence of congenitally missing third molars were higher in maxilla than in the mandible. There was no significant relationship between the






gender.

Copyright© 17 Feb, 2022.

REFERENCES

1. Mani S, Wan, John J. **Prevalence and patterns of tooth agenesis among Malay children.** Southeast Asian J Trop Med Public Health. 2014; 45(2):490-98.
2. Khalaf K, Miskelly J, Voge E, Tatiana V. **Prevalence of hypodontia and associated factors: A systematic review and meta-analysis.** J Orthod. 2014; 41(4):299-316.
3. Sheikhi M, Sadeghi M, Ghorbanizadeh S. **Prevalence of congenitally missing permanent teeth in Iran.** Dent Res J. 2012; 9(1): 105-11.
4. Dhanrajani P. **Hypodontia: Etiology, clinical features, and management.** Quintessence Int. 2002; 33(1):294-302.
5. Baek H, Kim Y. **Congenital missing permanent teeth in Korean unilateral cleft lip and alveolus and unilateral cleft lip and palate patients.** Angle Orthod. 2007; 77(1):88-93.
6. Aslam, Amjad, Arbab, Sher Shah. **Prevalence and distribution of hypodontia in Pakistani orthodontic population.** Pak Oral Dent J. 2010; 30(2):134-9.
7. Lagana G, Lombardi C, Franchi L, Cozza P. **Tooth agenesis: Dento-skeletal characteristics in subjects with orthodontic treatment need.** Eur J Paediatr Dent. 2011; 12(1):17-20.
8. Afzal F, Raza H, Basir S, Afzal S, Rasool G. **Patterns of third-molar agenesis in an orthodontic patient population with different skeletal malocclusions.** P Oral Dent J. 2015; 35(4):623-27.
9. Bailit HL. **Dental variation among populations: An anthropologic view.** Dent Clin North Am. 1975; 19(1):125-39.
10. Majeed M, Ahmed I, Uzair M, Atif M. **Prevalence of missing, impacted and supernumerary teeth in patients under orthodontic treatment in a teaching hospital of Karachi, Pakistan.** Int J Dent Health Sci. 2014; 1(1):39-46.
11. Durrani O, Zulfiqar K, Bashir U, Shamsheer M. **Prevalence of tooth agenesis in orthodontic patients at Islamic International Dental Hospital.** Pak Orthod J. 2010; 2(2):48-51.
12. Amin F. **Prevalence of hypodontia in orthodontic patients in a Pakistani sample – a study.** Pak Oral Dent J. 2010; 30(1):142-5.
13. Ulrich H, Luder, Mitsiadis, Thimios A. **Tooth agenesis.** In: eLS. John Wiley & Sons, Ltd: Chichester. DOI: 10.1002/9780470015902.a0005990.pub2.
14. Varela M, Arrieta P, Ventureira C. **Non-syndromic concomitant hypodontia and supernumerary teeth in an orthodontic population.** Eur J Orthod. 2009; 31(6):632-37.
15. Celikoglu M, Kamak H. **Patterns of third-molar agenesis in an orthodontic patient population with different skeletal malocclusions.** Angle Orthod. 2012; 82(1):165-9.
16. Harris EF, Clark LL. **Hypodontia: An epidemiologic study of American black and white people.** Am J Orthod Dentofacial Orthop. 2008; 134(1):761-7.
17. Vastardis H. **The genetics of human tooth agenesis: New discoveries for understanding dental anomalies.** Am J Orthod Dentofacial Orthop. 2000; 117(1):650-6.
18. Goya HA, Tanaka S, Maeda T, Akimoto Y. **An orthopantomographic study of hypodontia in permanent teeth of Japanese pediatric patients.** J Oral Sci. 2008; 50(1):143-50.
19. Davis PJ. **Hypodontia and hyperdontia of permanent teeth in Hong Kong schoolchildren.** Community Dent Oral Epidemiol. 1987; 15(1):218-20.
20. Chung CJ, Han JH, Kim KH. **The pattern and prevalence of hypodontia in Koreans.** Oral Dis. 2008; 14(1):620-5.
21. Polder BJ, Van't Hof MA, Van der Linden FP. **A meta-analysis of the prevalence of dental agenesis of permanent teeth.** Community Dent Oral Epidemiol. 2004; 32(1):217-26.

AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Amber Farooq	Critical revision of the study.	
2	Verda Ahmad Khan	Design, Collected data, material and wrote the article.	
3	Samia Shad	Revision of article.	
4	Maimoona Afsar	Helped with data collection.	
5	Sardar Danial Hafeez	Helped with data collection.	
6	Adil Shahnawaz	Revision of article.	