Original Article

Prevalence of Tooth Agenesis in Orthodontic Patients in Nishtar Institute of Dentistry

Tooth Agenesis in Orthodontic Patients

Iqra Gaffar and Zubair Hassan Awaisi

ABSTRACT

Objective: To determine the prevalence and distribution of tooth agenesis (the congenital absence of one or more teeth) in a specific orthodontic patient population.

Study Design: Prospective study

Place and Duration of Study: This study was conducted at the Orthodontic Department of the Nishtar Institute of Dentistry, Multan from March 2020 to February 2021.

Methods: A total of one hundred and seventy patients enrolled in the study. The study ensured that all patients who agreed to participate provided informed written consent and approval was taken from ethical committee of hospital. Main variables of study were age, gender, type of missing tooth and place of missing tooth (maxilla or mandible) and side of missing tooth (right or left). SPSS version 27 was used for data analysis.

Results: The mean age 15.33±3.28 years. There were 67.4% males and 32.6% females. Out of 270 patients, hypodontia was observed in 12 (4.4%) patients. It was noted that there were 45 missing teeth among 12 patients. In which 26 (57.8%) teeth were maxilla and 19 (42.2%) were mandible. In maxilla, 10 (38.5%) were right and 16 (61.5%) were left. Whereas, in mandible there were 15 (78.9%) right and 4 (21.1%) left.

Conclusion: Study's findings regarding the occurrence of hypodontia are consistent with what has been reported in existing literature. The anterior segment of the dentition is particularly affected by hypodontia. Furthermore, early detection of hypodontia is important because identifying the condition at an early stage allows for more effective planning and treatment.

Key Words: Hypodontia, Agenesis, Orthodontic, Prevalence, Missing teeth.

Citation of article: Gaffar I, Awaisi ZH. Prevalence of Tooth Agenesis in Orthodontic Patients in Nishtar Institute of Dentistry. Med Forum 2023;34(11):21-24. doi:10.60110/medforum.341105.

INTRODUCTION

Congenital absence of teeth, also known as hypodontia or tooth agenesis, is indeed a relatively common developmental abnormality in humans[1]. It is characterized by the failure of one or more teeth to develop. The prevalence of hypodontia can vary significantly among different populations and races ranging from 2.63% to 11.2%[2]. Missing teeth can result from various factors, including genetics, dental development, and sometimes the need for extractions due to dental issues. It is common for people to have their wisdom teeth extracted in 25-35% of cases due to various reasons, including crowding or impaction[3].

Missing upper lateral incisors account for approximately 2% of cases, lower second premolars account for about 3% of cases, upper second premolars have a higher prevalence in females, with a 4:1 female-to-male ratio, primary teeth are relatively rare, with a low prevalence ranging from 0.1% to 0.9%[4]. The prevalence of missing permanent teeth, can indeed vary from 3.5% to 6.5% in different populations. The reasons for missing teeth can be diverse and may include genetic factors, developmental variations, early tooth loss due to trauma or disease, or a combination of these factors[5].

Dental anomaly has been found to be more prevalent in the Western population, with prevalence values ranging between 4.4% and 8%[6]. It is a multifactorial etiology that includes inheritance and environmental factors. It can be classified as hypodontia the lack of one to six teeth, oligodontia considered as complete lack of teeth, when absence of more than six teeth[7].

Missing teeth can affect a person's ability to chew food properly and may also impact speech articulation, lead to misalignment of adjacent teeth, which can result in issues such as overbites, underbites, or other malocclusions and gaps left by missing teeth can lead to bone loss and gum recession in the affected area[8]. Its treatment include orthodontic treatment that can used to move adjacent teeth into the space left by the missing tooth. This can close the gap and improve the aesthetics and functionality of the smile[9,10]. Adhesive bridges

Department of Orthodontic, Nishtar Institute of Dentistry, Multan.

Correspondence: Dr. Iqra Gaffar, Post Graduate Resident (PGR) of Orthodontic, Nishtar Institute of Dentistry, Multan.
Contact No: 0345 0356084
Email: iqraghaffar1@gmail.com

Received: April, 2023
Accepted: July, 2023
Printed: November, 2023

(Maryland bridges) or fixed partial dentures (commonly known as dental bridges) can be used to replace missing teeth. These restorations are anchored to the adjacent teeth, filling the gap[11].

The presence of tooth agenesis can influence the success and predictability of orthodontic treatment outcomes. By assessing the prevalence and distribution of tooth agenesis in orthodontic patients, the study can help orthodontists tailor treatment approaches and provide patients with more realistic expectations regarding abnormality and outcomes.

METHODS

Study conducted in the Orthodontic Department of the Nishtar Institute of dentistry, Multan from March 2020 to February 2021. The study selected 170 consecutive patients who met the inclusion criteria. The sample size was determined using a confidence level of 95%, power of study 80% and proportion of 22.8% in maxillary lateral incisors. The patients included in the study ranged between 8 to 16 years of age. The study ensured that all patients who agreed to participate provided informed written consent and approval was taken from ethical committee of hospital (Ref. No. 113468/71). Patients included in the study or procedure should have at least one clear, high-quality radiographic image. This image may consist of an Orthopantomogram (OPG) and, if necessary, a periapical radiograph. Patients with systemic anomalies, individuals with ectodermal dysplasia, (group of genetic disorders that affect the development of the skin, hair, nails, and teeth), cleft lip and/or palate, down's syndrome, previously undergone orthodontic treatment and who have had a tooth extracted due to trauma or for pathological reasons are excluded. OPGs are used to assess the presence or absence of teeth, particularly looking for congenitally missing teeth under 60 Lux illuminator and 5X magnifying glass. A tooth is considered congenitally missing if it is absent from the oral cavity and cannot be identified on the X-ray images (radiographically), and there is no history of extraction.

A standardized document or form used to collect and record data from the study that includes fields for documenting the presence or absence of teeth, relevant patient information, and any other pertinent details related to the study's objectives. A tooth was considered as missing if it was absent on OPG, no signs of mineralization, cast and tooth crypt on place of tooth suspected absent. This condition can affect any permanent tooth, including third molars (wisdom teeth) or any other tooth in the mouth. The absence of a tooth may or may not have functional or aesthetic implications, and treatment options may include orthodontic treatment to close gaps, dental implants, or other prosthetic solutions to replace the missing tooth.

SPSS software was used to perform statistical analysis, which included the calculation of descriptive statistics and the chi-square test for comparing groups. P value ≤0.05 was taken as significant.

RESULTS

Overall, 270 patients were included in this study. The mean age 15.33±3.28 years. There were 182 (67.4%) males and 88 (32.6%) females. (Table. 1).

Out of 270 patients, hypodontia was observed in 12 (4.4%) patients. (Figure. I). It was noted that there were 45 missing teeth among 12 patients. In which 26 (57.8%) teeth were maxilla and 19 (42.2%) were mandible. In maxilla, 10 (38.5%) were right and 16 (61.5%) were left.

Table No. 1: Demographic and clinical variables of the study patients

Variable	Mean±S.D	Frequency	Percentage
Age (years)	15.33±3.28		
Gender			
Male		182	67.4
Female		88	32.6

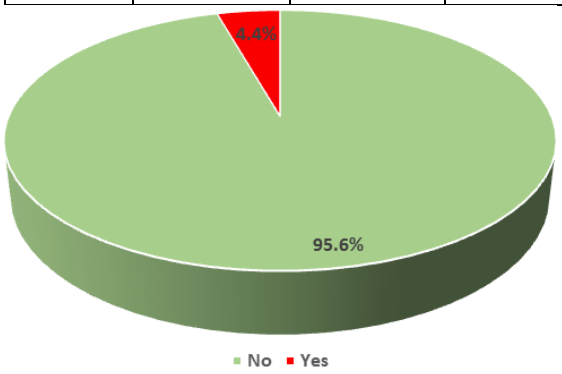

Figure No. 1: Hypodontia

Table No.2: The distribution of tooth type according to maxilla and mandible (right & left)

Type of tooth	Maxilla Right	Maxilla Left	Maxilla Total	Mandible Right	Mandible Left	Mandible Total
Central Incisor	1	1	2	2	2	4
Lateral Incisor	5	8	13	4	2	6
Canine	1	1	2	0	0	0
First Premolar	1	2	3	3	0	3
Second Premolar	2	3	5	6	0	6
First Molar	0	1	1	0	0	0
Second Molar	0	0	0	0	0	0

Whereas, in mandible there were 15 (78.9%) right and 4 (21.1%) left.

The distribution of tooth type according to maxilla (right & left) and mandible (right & left) were shown in table. 2.

DISCUSSION

Hypodontia is characterized by the congenital absence of one or more teeth, and its prevalence can vary across different populations and studies. In this study the 4.4% prevalence is in line with the range reported in the existing literature, which suggests that the findings are consistent with previous research on the topic. The mean age 15.33±3.28 years. A study was conducted in 1980 and reported the estimated prevalence of hypodontia in various populations between 0.1% and 0.9%.

In this study there were 182 (67.4%) males and 88 (32.6%) females and 57.8% teeth were missing in maxilla and 42.2% were in mandible. A study conducted by Ajami et al[12] that investigated the prevalence of hypodontia in a group of Iranian children aged 9 to 14 years old at Mashhad School of Dentistry and reported a total of 54 children (9%) were affected by hypodontia. Among the children with hypodontia, 31 of them (9.2%) were girls, while 23 (8.8%) were boys.

A study conducted by Chung et al[13] on the prevalence of hypodontia and its association with congenital absence of 3rd molar. In his study involved 1622 Korean subjects, comprising 611 males and 1011 females, prevalence of hypodontia was 11.2%. Hypodontia was found to be more common in the mandible than in the maxilla. Among the missing teeth, the lateral incisors were the most commonly affected, with 40% of cases. The second premolars in the mandible followed, with 20.4% of cases.

Study by Albashaireh et al[14] reported a hypodontia prevalence of 5.5% in the permanent teeth, with a specific mention of crown size and shape deformity affecting upper lateral incisors. This study was conducted on 1045 dental patients aged 16-45 years. Another study found a hypodontia prevalence of 4% among Saudi male school children. This suggests that a lower percentage of school children in Saudi Arabia had hypodontia compared to the sample of dental patients in the previous study.

A study conducted by Afify et al[15], which reported a high prevalence of congenitally missing teeth in the Western region of Saudi Arabia. A prevalence of 25.7% is quite high, indicating that a significant portion of the population in the Western region of Saudi Arabia may experience congenitally missing teeth. A study by Polder et al[16] reported that prevalence of dental agenesis differs by continent and gender. In European populations, the prevalence of dental agenesis is higher, with males having a prevalence of 4.6% and females having a prevalence of 6.3%.

Celikoglu et al[17] reported prevalence of oligodontia in the Turkish population is 0.3%, while among Danish school students, it is 0.16%. Oligodontia is a dental condition characterized by the absence of six or more permanent teeth, excluding third molars. A study conducted by Abu-Hussein et al[18] in the Arab population in Israel, the prevalence of hypodontia is reported to be 2.6%, which is on the higher end of the global range.

Another study emphasize the importance of being attentive to the potential presence of associated anomalies and their clinical implications in patients with missing permanent teeth. It suggests that when a patient is found to have missing permanent teeth, clinicians should be alert and consider the possibility of other related dental or oral abnormalities.

Limitations: The study may have a limited or non-representative sample, as it focuses on orthodontic patients. This population may not accurately reflect the general population's tooth agenesis prevalence, as orthodontic patients could have a higher incidence of dental anomalies.

CONCLUSION

Results of this study indicates that the study's findings regarding the occurrence of hypodontia are consistent with what has been reported in existing literature. The anterior segment of the dentition is particularly affected by hypodontia. Furthermore, early detection of hypodontia is important because identifying the condition at an early stage allows for more effective planning and treatment.

Author's Contribution:

Concept & Design of Study:	Iqra Gaffar
Drafting:	Zubair Hassan Awaisi
Data Analysis:	Zubair Hassan Awaisi
Revisiting Critically:	Iqra Gaffar, Zubair Hassan Awaisi
Final Approval of version:	Iqra Gaffar

Conflict of Interest: The study has no conflict of interest to declare by any author.

Source of Funding: None

Ethical Approval: No. 113468/71 dated 01.03.2020.

REFERENCES

1. Schonberger S, Shapira Y, Pavlidi AM, Finkelstein T. Prevalence and Patterns of Permanent Tooth Agenesis among Orthodontic Patients—Treatment Options and Outcome. Applied Sci 2022;12(23): 12252.
2. Shoaib A, Ahmed B. Tooth Agenesis in Human Population: Treatment Considerations in Subjects

with Tooth Agenesis. Pak J Med Res 2023;62(2): 92-9.
3. Gupta SP, Rauniyar S. Prevalence and distribution of dental agenesis among orthodontic patients of Kathmandu, Nepal. Arch Med Health Sci 2019;7:172-6.
4. Weise C, Lehmann M, Schulz MC, Reinert S, Koos B, Weise H. Tooth agenesis in German orthodontic patients with non-syndromic craniofacial disorder: a retrospective evaluation of panoramic radiographs. Clin Oral Invest 2022; 26(9):5823-32.
5. Sato D, Endo T. Size and bridging of the sella turcica in Japanese orthodontic patients with tooth agenesis. Odontol 2020;108:730-7.
6. Arai K. Tooth agenesis patterns in Japanese orthodontic patients with nonsyndromic oligodontia. Am J Orthodont Dentofacial Orthop 2019;156(2):238-47.
7. Meade MJ, Dreyer CW. Tooth agenesis: An overview of diagnosis, aetiology and management. Japanese Dental Sci Rev 2023;59:209-18.
8. Cunha AS, Dos Santos LV, Marañón-Vásquez GA, Kirschneck C, Gerber JT, Stuani MB et al. Genetic variants in tooth agenesis–related genes might be also involved in tooth size variations. Clin Oral Invest 2021;25:1307-18.
9. Zakaria NN, Kamarudin Y, Seong LG, Sulaiman NS, Anuar SA. Prevalence and pattern of permanent tooth agenesis among multiracial orthodontic patients in Malaysia. Australasian Orthodont J 2021;37(1):79-84.
10. Sato A, Arai K. Sexual dimorphism of tooth agenesis patterns in non-syndromic oligodontia in Japanese patients. Archiv Oral Biol 2021;124: 105038.
11. Ismail NA, Shafiai NA, Kamaruddin AF, Ismail K. Tooth Agenesis Code (TAC) Analysis of Non-syndromic Hypodontia. Malaysian J Med Health Sci 2021;i 17(SUPP9): 43-47.
12. Ajami BA, Shabzendedar M, Mehrjerdian M. Prevalence of hypodontia in nine - to fourteen - year - old children who attended the Mashhad School of Dentistry. Ind J Dent Res 2010;21:549-51.
13. Chung CJ, Han JH, Kim KH. The pattern and prevalence of hypodontia in Koreans. Oral Dis 2008;(7):620–625.
14. Albashaireh ZS, Khader YS. The prevalence and pattern of hypodontia of the permanent teeth and crown size and shape deformity affecting upper lateral incisors in a sample of Jordanian dental patients. Community Dent Health 2006;23:239-43.
15. Afify AR, Zawawi KH. The prevalence of dental anomalies in the Western region of Saudi Arabia. ISRN Dent 2012;2012:837270.
16. Polder BJ, Van't Hof MA, Van der Linden FP, Kuijpers-Jagtman AM. A meta-analysis of the prevalence of dental agenesis of permanent teeth. Community Dent Oral Epidemiol 2004;32(3): 217–226.
17. Celikoglu M, Kazanci F, Miloglu O, Oztek O, Kamak H, Ceylan I. Frequency and characteristics of tooth agenesis among an orthodontic patient population. Med Oral Patol Oral Cir Bucal 2010;15:e797-801.
18. Abu-Hussein M, Watted N, Watted A, Abu-Hussein Y, Yehia M, Awadi O, et al. Prevalence of tooth agenesis in orthodontic patients at Arab population in Israel. Int J Public Health Res 2015;3(3):77-82.