Original Research

Prevalence of Congenitally Missing Maxillary Lateral and Mandibular Second Premolars in Panoramic Radiographs of 12 To 18 Years Old Patients Referred To the Sari Dental Clinic from 2013 To 2023

Haleh Hali[1], Foroozan Farahbod[2], Jamshid Yazdani Cherati[3], Seyed Saeed Seyedalhosseini[4], Melika Mollaei[5*]

1. Assistant Professor, Department of Pediatric Dentistry, Dental Research Center, Dental Faculty, Mazandaran University of Medical Sciences, Sari, Iran. Orcid: 0000-0001-9730-5959

2. Assistant Professor, Department of Oral and Maxillofacial Radiology, Dental Research Center, Dental Faculty, Mazandaran University of Medical Sciences, Sari, Iran. Orcid: 0000-0002-6927-4638

3. Professor, Department of Biostatistics, Faculty of Health, Health Science Research Center, Mazandaran University of Medical Sciences, Sari, Iran. Orcid: 0000-0002-4721-225X

4. Dentist, Mazandaran University of Medical Sciences, Sari, Iran. Orcid: 0000-0001-7466-5791

5. Dentistry student, Dental Research Center, Mazandaran University of Medical Sciences, Sari, Iran. Orcid:0000-0002-5012-3872

Corresponding Author: Dr Melika Mollaei, Dentistry student, Dental Research Center, Mazandaran University of Medical Sciences, Sari, Iran. E-mail: melika.mollaei.7@gmail.com

Abstract:

Background: One of the most prevalent developmental dental abnormalities, congenital tooth loss, occurs when tooth buds fail to form and causes a wide range of issues. The purpose of this study is to determine the frequency of congenital absence of the maxillary lateral incisor teeth and the mandibular second premolars in panoramic images among 12 to 18-year-old patients referred to the Dental Clinic of Sari between 2013-2023.

Method: This analytical study included panoramic radiographs of patients aged 12 to 18 years referred to the radiology department of Mazandaran University of Medical Sciences. Data such as the number of congenital absences of maxillary lateral and mandibular second premolars, age, and sex were gathered. SPSS V.25 was used for data analysis. A p-value of less than 0.05 was considered statistically significant.

Results: In this study, 1334 radiographs were examined over the course of eight years. Out of 1334 patients, 32 (2.4%) and 22 (1.65) patients had congenitally absent mandibular second premolars and maxillary laterals, respectively. Additionally, a statistically significant relation was observed in terms of the absence of these teeth on both sides in each jaw (P = 0.00). Nevertheless, no significant association was observed in terms of sex (P = 0.856).

Conclusion: The prevalence of absent lateral maxillary teeth and mandibular second premolars was 1.65% and 2.4%, respectively. Although girls were found to have the highest prevalence, this was not statistically significant. Additionally, the left side of each jaws had the highest prevalence of absent teeth which was not significant.

Keywords: Congenitally Missing Teeth, Maxillary Lateral Teeth, Mandibular Second Premolar Teeth

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Introduction

Oral health has a great impact on the individual's general health and oral disorders can clearly decrease the patients' quality of life (1, 2). One of the main importance of deciduous teeth is that they maintain space retention for the eruption of permanent teeth (3). Deciduous and permanent teeth begin to erupt when the child has approximately reached 6-months and 6 years of age respectively. A healthy child needs to have 32 permanent teeth, including the third molars, in addition to 20 deciduous teeth following the full eruption (4). Before beginning any treatment, the first step in evaluating a patient's oral health is to count their teeth to look for common dental malformations. These malformations require expensive interventions, one of which is congenital missing teeth (CMT) (5, 6). The ideal diagnosis of this anomaly requires careful radiographic and clinical examinations; sometimes even dental casts can be used. Depending on the number of affected teeth, theses anomalies are classified into three groups including: hyperdontia, oligodontia and anodynia and hypodontia (7). In comparison to the deciduous dentition, the permanent dentition has a higher prevalence of missing teeth. Its prevalence in deciduous teeth has been reported between 0.1% to 2.4%. While the prevalence of missing teeth, with the exception of third molars, in the permanent dentition ranges from 0.15% to 16.2% in various studies. The most common teeth that are affected, except for the third molars, are the mandibular second premolars and the maxillary lateral teeth. With a ratio of 3 to 2, women are more likely than men to have this anomaly. Congenital tooth loss affects more than 20% of people, and the prevalence varies across continents and countries. Since different methods are used to measure the prevalence of this type of anomaly and different populations are studied, the reported prevalence is different (8, 9). Studies have reported that missing teeth can cause problems with chewing, speaking, occlusion and beauty. Also, the lack of diecious tooth can adversely affect the balance of the neuromuscular system (10). CMT can lead to problems such as excess space between the teeth, tilt of the lateral teeth and interference in the design of dental treatments (11). Since the prevalence of predisposing factors varies greatly between different areas and the current statistics cannot be generalized to the Iranian population as well as the lack of proper studies in this field in Iran, this study aimed to assess the prevalence of congenital missing of maxillary lateral incisor and mandibular second premolar teeth based on panoramic images of patients aged 12 to 18 years referred to the Sari Dental Clinic in 2013 – 2021.

Methods

This study was analytically conducted on 12-18-year-old patients referred to the Department of Oral and Maxillofacial Radiology of Sari Dental School from 2013 to 2023. The sample size was determined by panoramic radiography according to Partovi et al.(12) Since the buds of mandibular premolars may not be calcified enough to be seen on radiography by the age of 10, therefore the absence of buds on radiographs can be mistakenly diagnosed as is CMT of premolars at younger ages. The minimum age for inclusion in the study was set at 12 years in this study to prevent this error (13). Cases of oligodontia and anodontia, ectodermal dysplasia syndrome, history of systemic diseases, history of tooth extraction, history of trauma to the jaw, poor quality radiography and incomplete records were also excluded. After selecting eligible individuals based on inclusion criteria, their panoramic radiographs were extracted from the archives of the radiology department of Sari Dental School. Data including the number of congenital missing teeth, age, sex, the presence of congenital maxillary lateral teeth as well as mandibular second premolars, unilateral or bilateral and right or left jaw involvements were collected. The percentage and overall prevalence of congenital absence and also the degree of congenital absence of these teeth were calculated based on the type of the missing tooth, unilateral or bilateral

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involvement and the most involved side in both genders. In this study, a final-year general dental student examined the radiographs with the supervision of an expert in oral and maxillofacial radiology. Finally, the data were entered into the SPSS software version 25 for logistic regression analysis. Descriptive statistics techniques, such as mean and standard deviation and frequency tables, were used to analyze data. This study's significance level ($p < 0.05$) was taken into account.

Results

In the current investigation, 1334 radiographic stereotypes, belonging to 1334 patients were examined. Out of the 1334 radiographs that were examined, 32 patients (2.4%) and 22 (1.65) had congenital malformations of the mandibular premolars and lateral maxillary teeth, respectively. The frequency of absence of these teeth in both sexes is shown in Table 1.

Furthermore, the frequency of CMT was greater in the left side and in the mandibular jaw (Table 2).

As observed in Table 3, the chi-square value obtained from comparing the frequencies of the two groups in the two genders is equal to 12.065, which, when combined with the value of 0.001 for p, indicates that there is a statistically significant difference between the prevalence of congenital missing maxillary lateral teeth and mandibular premolars.

Moreover, the two sexes' differences in the frequency of missing mandibular second premolars were not statistically significant. For independent samples, the Mann-Whitney u test was used to compare the prevalence of missing second premolars in boys and girls. The null hypothesis, which states that the prevalence distribution between the two sexes is not significant, is accepted when $P = 0.330$ is taken into account. (Table 4).

According to Table 4, the amount of chi-square obtained from the chi-square test was 0.0033 and the P-value of 0.856 indicates that the prevalence of missing maxillary lateral teeth was not significantly associated with the patients' sex. The Mann-Whitney u test was used to examine the prevalence of lateral maxillary missing teeth between boys and girls for independent samples. Given its P- value (0.856), the null hypothesis that the difference in the distribution of the prevalence of absence is not significant is established between the two genders.

The Mann-Whitney u test was used to investigate the prevalence of the missing maxillary lateral and second premolars in the right and left jaws for independent specimens. Considering its P-value (0.000), the prevalence of the absence of these teeth in the upper and lower sides is significantly different, which is also confirmed by the chi-square values.

Discussion

CMT is considered as one of the most frequent dental anomalies commonly diagnosed during routine dental examinations. The etiology of these deficiencies is unknown, but it is commonly attributed to genetic abnormalities and syndromic disorders (14). Out of 1334 radiographs examined in this study, 32 patients (2.4%) and 22 patients (1.65) had congenital malformations of the mandibular premolars and the lateral maxillary teeth, respectively. Among the 32 patients with missing second premolars, most cases were reported in girls, with 22 girls and 11 boys. In terms of the greater prevalence of this deficiency in girls, the findings of the current study are similar to those of Lakshmanan et al. In the study of Lakshmanan et al., the frequency of congenital missing second premolars was 1.02% (47 cases), of which 27 were girls and 18 were boys. The higher prevalence of this anomaly in girls can be attributed to the fact that their jaws are smaller than boys and have more inadequate space (15).

In an investigation by Afzal et al., Which was conducted on 361 panoramic radiographs, 9.42% of cases had congenital missing maxillary lateral teeth, of which about 56% were males. Also, in terms of the prevalence of this absence on both sides of the maxilla and being unilateral or bilateral, the highest prevalence was related to

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bilateral cases and had a higher prevalence on the left it than on the right (16). In the present study, the results showed that the frequency of the absence of these teeth on both sides of the face were significantly different. The chi-square values confirm this fact, as their prevalence was more on the left than on the right. The findings of these two studies were in line with the most frequent missing teeth in the present investigation which was on the left side of the jaw, but the results are different in terms of prevalence in both sexes since girls showed higher percentage of missing teeth in the current study. In the investigation by Mahjoub et al. (11), the highest frequency of lateral maxillary teeth was seen bilaterally and, on the left, and the highest prevalence was reported in the mandibular second premolars, bilaterally, while our study, the frequency of the missing of these two teeth was more unilaterally than bilateral. In the Mahjoub et al. study, despite the greater prevalence of the missing of these two teeth bilaterally, no statistically significant relationship was observed (P- value = 0.659), which is therefore similar to our findings. In the present study, based on Table 5, the prevalence of missing teeth in the maxilla and mandible is significantly different, which is confirmed by the Chi-square values, the highest prevalence in mandible was 59.3%.

Gokkaya et al. (17) reported the highest prevalence of CMT in the mandible which was 40.8%, but this relationship was not statistically significant, which is different from the results of the present study. The reason for this difference can be due to the shorter time period in which more teeth, including canines and molar teeth, were examined. Although hypodontia and CMT can be seen in more than 60 different syndromes, this type of anomaly can occur in non-syndromic conditions. These epidemiological and epidemiological studies can increase public awareness as well as dentists about this anomaly to provide appropriate treatment in a timely manner and minimize the complications of CMT.

Conclusion

According to the findings of the present investigation, the prevalence of CMT in the maxillary lateral teeth was 1.65% and this amount was 2.4% in the mandibular second premolars. Although girls were found to have the highest prevalence, this finding was not statistically significant. Additionally, the left side of the jaw had the highest prevalence of CMT, though this finding was not statistically significant, either.

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Table & Figure:

Table 1. Frequency and percentage distribution of demographic variables of the patients

Mandibular second premolar teeth		Maxillary lateral teeth		Gender	
Percentage	Frequency	Percentage	Frequency		
98.1	560	98.4	562	Without missing	Male
1.9	11	1.6	9	With missing	
100.0	571	100.0	571	Total	
97.2	742	98.3	750	Without missing	Female
2.8	21	1.7	13	With missing	
100.0	763	100.0	763	Total	
97.60	1302	98.35	1312	Without missing	Total
2.40	32	1.65	22	With missing	
100	1334	100	1334	Total	

Table 2. The position of congenital missing of maxillary lateral and mandibular second premolars

Mandible	Maxilla	Right	Left	5.5	2.2	2.5	5	2	Total number of people with missing teeth
32	22	34	36	11	7	3	32	22	Frequency
16.1	11.1	17.1	18.1	5.5	3.5	1.5	16.1	11.1	Percentage

Table 3. Prevalence of congenital missing lateral maxillary and premolar mandibular teeth based on non-parametric Chi-square test

P value	Chi-square	Total	Total number of people with or without CMT of the lateral teeth			
0.001	12.065		with	without		
		1302	19	1283	without	Total number of people missing premolar teeth
		97.6%	86.4%	97.8%		
		32	3	29	with	
		2.4%	13.6%	2.2%		
		1334	22	1312	Total	
		100.0%	100.0%	100.0%		

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