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Research article

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Prevalence of Congenitally Missing Permanent Teeth in Aseer, KSA

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Abstract

Background: *Hypodontia or congenitally missing teeth is among dental anomalies with different prevalence in each region. The aim of this study was to evaluate the prevalence of congenitally missing permanent teeth in Aseer region population.*

Materials and Methods: *A descriptive, retrospective and cross-sectional study was done. Panoramic radiographs of 1050 patients (370 girls and 680 boys), 12-40 years old, were collected. The radiographs were studied for evidence of congenitally missing teeth. Data were analyzed using Paired t-test, Mann-Whitney test, Fisher exact test and Chi-square test (0.05).*

Results: *Prevalence of congenitally missing teeth was totally 7.42%. The most frequent congenitally missing teeth was mandibular second premolars (28.21%) followed by maxillary second premolars (25.64%). Upper jaw showed significantly higher number of congenitally missing teeth (P value 0.001). According to Chi-square test, congenital missing teeth were found approximately 7.42% in both females and males and there were no statistically significant difference between sexes (P 0.19).*

Conclusion: *The prevalence of congenitally missing teeth (CMT) in Aseer region permanent dentition was 7.42%. The most common congenitally missing teeth were mandibular second premolar fallowed by maxillary second premolars.*

Keywords: Congenital missing teeth, Hypodontia, panoramic, Prevalence

Introduction

The most common developmental and congenital dental anomaly is tooth agenesis. Congenitally missing teeth (CMT) refers to teeth whose germ did not develop sufficiently to allow the differentiation of the dental tissues [1]. It is defined as missing of one or more teeth [2]. It can be seen sporadic or in hereditary syndromes.

This anomaly occurs in three categories:

1. Hypodontia (Agenesis of less than 6 teeth, occurred without syndrome) [3-6].
2. Oligodontia (six or more teeth are missed) [7,8].
3. Anodontia (absence of all of the teeth, usually seen with ectodermal dysplasia) [9].

Etiology of tooth agenesis is not clear but some probable factors are: Heredity (mutations of the genes PAX9 and MSX1), Ectodermal dysplasia, localized inflammation, trauma, radiation, and systemic conditions such as rickets, syphilis, etc [1,6,10-20]. CMT causes problems in chewing, speech and aesthetics [5]. Knowledge of the condition may help to develop more effective treatments [2]. The aim of this study was to assess the prevalence of CMT in Aseer people's permanent dentition.

Materials and Methods

In this retrospective study, quota sampling was used. A total of 1050 panoramic radiographs of patients referring faculty of dentistry in King Khalid University in KSA, Aseer region were reviewed. According to exclusion and inclusion criteria 1050 panoramic radiographs (64.76% males, 35.23% females) were selected. The patients were 12-40 years old. Inclusion criteria were: Having no specific syndromes, age more than 12 years old. Exclusion criteria were: History of tooth extraction or tooth loss due to trauma, caries, Specific Syndromes, Cleft Lip & Palate, Ectodermal Dysplasia, periodontal disease or orthodontic extraction, not enough radiographic quality to accurately diagnose the CMT. A tooth was considered congenitally missing when the absence of crown mineralization was confirmed in the panoramic radiographs. Data were collected and entered into the SPSS software (Windows XP) then analyzed using Paired t-test, Mann-Whitney test, independent t-test, Chi-square test and Fisher exact test ($\alpha = 0.05$).

Results

The patients were obtained from 12 to 40 years old patients OPG. Prevalence of CMT is 7.42%. A total of 78 teeth, (males = 52, females = 26) in 73 patients were congenitally missing, with an average of 0.71 ± 0.34 teeth per patient. The most common congenitally missing teeth were mandibular second premolars 28.21%, maxillary second

premolars 25.64%, maxillary lateral incisors 23.8% and maxillary first premolars 12.82%, respectively (Table 1).

Table 1

Tooth type	Prevalence (%)	Tooth type	Prevalence (%)
Upper left canine	37.5	Upper Right Canine	62.5
Upper Left 1 premolar	40	Upper right 1 Premolar	60
Upper left 2 incisor	61.1	Upper right 2 Incisor	38.3
Upper Left 2 premolar	50	Upper Right 2 premolar	50
Lower left 2 premolar	54.5	Lower right 2 Premolar	45.4

In this study, bilateral missing tooth in maxilla (60%) was more than mandible (40%) (Table 2). Prevalence of CMT in mandible (28.8%) was less than maxilla (71.2%) (Table 3). The least common missing teeth were first and second molars of both jaws (with no missing case) followed by mandibular canine.

Table 2

Jaw	Male (%)	Female (%)	Total (%)	Side	Male (%)	Female (%)	Total (%)
Maxillary	38(73.1)	18(69.23)	56(71.7)	Right	32(61.5)	6(23.5)	38(42.5)
Mandible	14(26.9)	8(30.7)	22(28.8)	Left	20(38.5)	20(76.5)	40(57.5)
Total	52(100)	26(100)	78(100)	total	52(100)	26(100)	78(100)

Table 3

Absent tooth (%)	Upper lateral	Upper canine	Upper 1 premolar	Upper 2 premolar	Lower 2 premolar	total
Unilateral missing	17(23.3)	8(10.9)	10(13.7)	18(24.6)	20(27.4)	73(100)
Bilateral missing	1(20)	0	0	2(40)	2(40)	5(100)

Discussion

CMT is the most common developmental abnormality of teeth [1]. Several factors are proposed as etiology of CMT such as radiation, chemotherapy, some syndromes (such as Down syndrome, etc), infection and local inflammation, specific pattern of innervations, some systemic diseases, the changes resulting from human developmental and genetic factors, etc; however the main cause is still unknown [1,2,5]. Although CMT occurs in many syndromes, the incidence of non-syndromic and familial form is more. Some studies believe that it has been happening more commonly in recent decades. The aim of this study was to determine the prevalence of CMT without focusing on a special patient group in Aseer region. There are differences between results of studies on CMT. The main reasons for these differences were:

Different methods and materials

1. Whether the study included third molar or not.
2. How many people were included in the study?
3. Was sampling performed randomly or from specific groups (such as orthodontic patients)?
4. What should the age range of patients be?
5. What are the excluding criteria?
6. What method was used to provide radiographs?

Genetics

The role of heredity in the incidence of CMT has been identified and even several involved genes have been introduced [20]. Behr, et al. studied on two different races in South of Germany and found that not only was CMT observed more in some races, but also type of prevalent missing teeth could be different among them.

Social and environmental factors in low socioeconomic communities, oral health may be poor and consequently higher caries and dental infections occur. According to a number of findings that declare local infection and inflammation to be etiologic factors for CMT, the incidence of CMT caused by these factors will be higher [1].

Prevalence of congenitally missing teeth in our study, prevalence of CMT is 7.42%. This value is higher than most of previous studies and similar to Chung's report in Korea (7.83%) and finding of Fekonja in Slovenia (8.2%) [5]. Prevalence of CMT in our research is lower than Michael Behr's study in Germany (12.6%). Altogether, prevalence of Aseer region in KSA CMT, is higher than many communities. According to data obtained from Australian (6.3%), North America (3.5%) and Europe (5.5%), are much lower than Aseer region in KSA community and this can be due to racial differences and different oral hygiene in Aseer region in KSA society.

Males and females

In the present study, prevalence of CMT is 66.6% in males and 33.3% in females. Although in many studies, the average prevalence of CMT in females are more than males, Silva, et al. in Mexico, Chung, et al. in Korea and Behr, et al. in Germany concluded that CMT in females and males are almost equal [2]. In all of these studies differences of genders were not significant [5]. Only Polder, et al. concluded that CMT in females are 1.3 times more probable than males with significant differences [5]. We suggest the fact that women are more anxious than men about dental visits, leads to higher prevalence of CMT for them.

Maxilla and mandible

In our study, 71.7% of CMT were in maxilla and 28.8% in mandible, therefore prevalence in maxilla is more than mandible significantly. Our findings were similar to the results of many previous studies [2]. While Backman, et al. in Sweden reported the prevalence of CMT in mandible more than maxilla [5]. Polder, et al. reported that the prevalence of CMT in both jaws is almost equal. Pattern of tooth innervations may be one of the risk factors of CMT in the maxilla. Perhaps different type of innervations can justify more frequent CMT in this jaw. However, further studies should be conducted.

Common missed teeth

In this study, the most frequent missing tooth was mandibular second premolars (28.21%), maxillary second premolar (25.64%), maxillary lateral incisors (23.08%), and maxillary first premolars (12.82%). Prevalence of other teeth is illustrated in (Table 1). There are some differences between the prevalence of other teeth. In contrast with our finding, in most of the studies which evaluated orthodontic patients, the most common CMT was maxillary lateral

incisors, followed by mandibular and maxillary second premolars [2]. The cause of these differences refers to different sampling which is not limited to orthodontic patients in the present study, however the results of Behr, et al. in Germany (2011) is accurately similar to our findings. Interestingly, results of studies with general population are different.

As Polder, et al. reported in Europe, North America and Australia, the most common congenitally missed teeth are mandibular second premolars followed by maxillary first premolars and maxillary second premolars. The results of this study in first prevalent CMT are consistent with results of our study. Ethnic differences in our population may be cause of disparity in second prevalent teeth.

Also, Endo, et al. in Japan and Rahardjo, et al. in China in their studies on orthodontic patients concluded that most frequent CMT after third molars are: Mandibular second premolars, maxillary lateral incisors and mandibular lateral incisors, respectively. Also, Chang, et al. in South Korea declared that the most frequent CMT is mandibular lateral incisors, followed by the mandibular second premolars and maxillary second premolars. Probably racial differences in mongoloid race in East of Asia, is the most important factor that which made mandibular lateral incisors the most common CMT in Korea, Japan and China.

It is clear that our results are more similar to studies whose population is not limited to orthodontic patients. Although not extensible, it can probably demonstrate the role of tooth region in prevalence of CMT in orthodontic patients, least prevalent missing teeth Our findings reveal that the least prevalence of CMT belongs to first and second molars of both jaws (0.0%), (Table 1). Our results agree with studies conducted by Chung, et al. in Korea, Endo, et al. in Japanese, Peker, et al. in Turkey and Fekonja, et al. in Slovenia. Albeit in Sisman, et al. study, in Turkey and Backman, et al. study in Sweden the least prevalence was pertaining to upper and lower canines [5].

Unilateral and bilateral

In all of the assessed radiographs, number of individuals with unilateral CMT is more than those with bilateral CMT, but this difference is not significant (Table 2). While in all of the assessed radiographs, total number of bilateral CMT are more than unilateral. In study of Chung, et al. in South Korea and Polder, et al. in Europe, Australia and North America revealed same results and unilateral CMT was significantly more than bilateral. In the present study, bilateral CMT in maxilla (60%) is significantly higher than mandible (40%) (Table 2). This is due to the relatively high frequency of bilateral CMT in maxillary lateral incisors. Like our finding, Polder, et al. stated in their meta-analysis study that bilateral missing of maxillary lateral incisors is much more than unilateral and for other teeth unilateral CMT is more frequent. Our findings are in contrast with findings of Silva, et al. in Mexico and Endo, et al. in Japan, probably due to racial differences of assessed communities [2].

Right and left sides

In this study, 42.5% of CMT are in the right and 57.5% are in the left side of jaws, but the difference was not significant (Table 3). Our results agree with result of Sisman, et al. in Turkey and in contrast with the findings of Fekonja, et al. in Slovenia. While Silva, et al. in Mexico, Endo, et al. in Japan and Al-Mehrat, et al. in Jordan concluded that the incidence of CMT is equal in both sides [2]. Of course they did not find any significant relationship in this regard. Our findings are more similar to studies limited to specific groups, such as orthodontic patients.

Conclusion

The prevalence of CMT in Aseer, KSA is more in comparison with many population groups; therefore the importance of diagnosis and management of these teeth is most important. By early detection of missing teeth, alternative treatment modalities can be planned and minimize the complications of CMT. The most frequent missing teeth were mandibular second premolar fallowed by maxillary second premolar and maxillary lateral incisor.

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