

Frequency of Hypodontia in a Tertiary Care Hospital of Karachi

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ABSTRACT

Objective: To compare frequency of missing teeth in samples of population from Karachi.

Study Design: Cross-sectional study

Place and Duration of Study: This study was conducted in Department of Orthodontics, Karachi Medical & Dental College from October 2011 to October 2012.

Materials and Methods: During the study period, 465 panoramic radiographs were evaluated and according to exclusion and inclusion criteria 309 panoramic radiographs were selected, out of which 109 (35.27%) were males and 200 (64.73%) were females. The patients were 12-25 years old. Data were collected and entered into the SPSS software (version 18; Chicago) to calculate frequencies, percentages and mean $\pm$ SD.

Results: 02 males were found with hypodontia (1.83%) while 10 females were found with hypodontia (5%). Few teeth like maxillary central incisors, 1st premolar & 1st molar in both arches show no congenital absence. A total of 17 teeth, (males = 3, females = 14) in 12 patients were congenitally missing. The most common congenitally missing teeth were maxillary left 2 incisor 23.52% followed by mandible left 2 pre-molar 17.64%.

Conclusion: By early detection of missing teeth, alternative treatment modalities can be planned and minimize the complications of CMT. In this study it has been observed that among the population of Karachi threshold for agenesis of maxillary left 2nd incisors is the most commonly missing, followed by mandibular 2nd premolars.

Key Words: Hypodontia, Congenitally missing teeth.

INTRODUCTION

Congenitally missing teeth (CMT) refers to teeth whose germ did not develop sufficiently to allow the differentiation of the dental tissues. It is defined as missing of one or more teeth.¹ 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).²
2. Oligodontia (six or more teeth are missed).³
3. Anodontia: (absence of all of the teeth, usually seen with ectodermal dysplasia).⁴

Etiology of tooth agenesis is not clear but some probable factors are: Heredity (mutations of the genes PAX9 and MSX1),⁵ Ectodermal dysplasia, localized inflammation, trauma, radiation, and systemic conditions such as rickets, syphilis, etc.⁶ CMT causes problems in chewing, speech and aesthetics.² Knowledge of the condition may help to develop more effective treatments.¹ By considering and completion information from studies of Silva MR and Sisman Y, *et al* the prevalence of CMT varies in different populations from 0.3% to 34.3%.^{1,7} CMT was reported 10% by McDonald.⁴ The objective of this study was to compare frequency of missing teeth in samples of population from Karachi.

MATERIALS AND METHODS

This cross-sectional study was conducted in Department of Orthodontics, Karachi Medical & Dental College from October 2011 to October 2012. During the study period, 465 panoramic radiographs were evaluated and according to exclusion and inclusion criteria 309 panoramic radiographs were selected, out of which 109 (35.27%) were males and 200 (64.73%) were females. The patients were 12-25 years old. Inclusion criteria were: Having no specific syndrome Ectodermal dysplasia, no lip/palate cleft, age more than 12 years old. Exclusion criteria were: Missing 3rd molar, history of tooth extraction or tooth loss due to trauma, caries, 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 Statistical Package of Social Sciences (SPSS version 18; Chicago) to calculate frequencies, percentages and mean $\pm$ SD.

RESULTS

Table No.1: Frequency of Congenitally Missing Teeth by Tooth Type

Tooth Type	Frequency (%)	Tooth Type	Frequency (%)
Lower Right Canine	11.76	Upper Right Canine	5.88
Lower Left Canine	11.76	Upper Left Canine	5.88
Lower Left 2 Incisor	5.88	Upper Right 2 Incisor	11.76
Lower Right 2 Pre-Molar	5.88	Upper Left 2 Incisor	23.52
Lower Left 2 Pre-Molar	17.64		

A total of 309 panoramic radiographs, which fulfilled the inclusion criteria were selected in the Department of Orthodontics, Karachi Medical & Dental College, from October 2011 to October 2012. Among 309 panoramic radiographs, 109 (35.27%) were males and 200 (64.73%) were females. The patients were 12 to 24 years of age (19.5 ± 4.2). Among 109 male panoramic radiographs, 02 males were found with hypodontia (1.83%) while among 200 female panoramic

radiographs 10 females were found with hypodontia (5%), as shown in Figure # 1. Few teeth like maxillary central incisors, 1st premolar & 1st molar in both arches show no congenital absence. A total of 17 teeth, (males = 3, females = 14) in 12 patients were congenitally missing, with an average of 1.42 ± 0.66 teeth per patient. The most common congenitally missing teeth were maxillary left 2 incisor 23.52% followed by mandible left 2 pre-molar 17.64% (Table # 1). Bilateral missing tooth in maxilla (66.6%) was more than mandible (33.33%), as shown in Table # 2. Frequency of CMT in mandible (52.95%) was greater than maxilla (47.05%), as shown in table # 3. In this study, 64.70% were in the left side of jaws and 35.30% of CMT were in the right side of jaw (Table # 4).

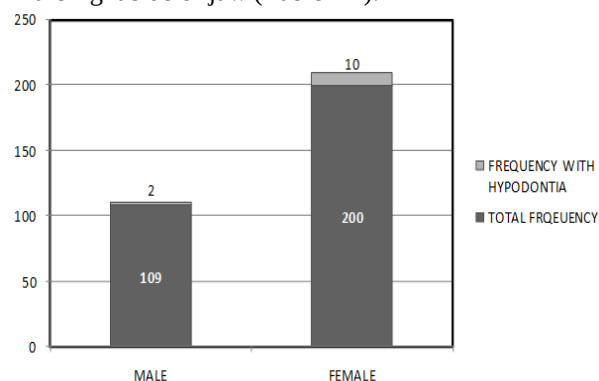


Figure No.1: Frequency of Hypodontia among Genders

Table No. 2: Distribution of Unilateral and Bilateral Congenitally Missing Teeth in Various Types of Teeth

Absent Tooth	Upper Lateral	Upper Canine	Upper 1 Pre-Molar	Upper 2 Pre-Molar	Lower Lateral	Lower Canine	Lower 1 Pre-Molar	Lower 2 Pre-Molar	Total
Unilateral Missing	2 (22.2%)	0	0	0	1 (11.1%)	2 (22.2%)	0	4 (44.4%)	9 (100%)
Bilateral Missing	2 (50%)	1 (25%)	0	0	0	1 (25%)	0	0	4 (100%)

Table No. 3: Distribution of Congenital Missing Teeth by Jaw

Jaw	Male	Female	Total
Maxilla	2 (66.66%)	6 (42.85%)	8 (47.05%)
Mandible	1 (33.33%)	8 (57.15%)	9 (52.95%)
Total	3 (17.64%)	14 (82.36%)	17 (100%)

Table No. 4: Distribution of Congenital Missing Teeth by Sides

Side	Male	Female	Total
Right	1 (33.33%)	5 (35.71%)	6 (35.29%)
Left	2 (66.66%)	9 (64.29%)	11 (64.71%)
Total	3 (17.64%)	14 (82.36%)	17 (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 Although CMT occurs in many syndromes, the incidence of non-syndromic and familial form is more.⁸ Some studies believe that it has been happening more commonly in recent decades.⁷ We had taken the cases of age in between 12 to 25 years. Michael Behr, et al believed that after age of 10 differences in results are negligible.⁹ Endo, et al reported that calcification of premolars could be delayed until ages 9-12 years.¹⁰

In the present study, frequency of CMT was 5% in females and 1.8% in males. This result is similar to many studies, where the average frequencies of CMT in males were also less than females.^{2,7,10-11} Silva, et al⁵ in

Mexico, Chung, *et al*¹² in Korea and Behr, *et al*⁹ in Germany concluded that CMT in females and males were almost equal with no significant differences of genders. Only Polder, *et al*¹¹ concluded that CMT in females were 1.3 times more probable than males with significant differences. We suggest the fact that women are more anxious than men about dental visits, leads to higher prevalence of CMT for them.

In this study, we had included present orthodontic treatment candidates with excluding 3rd molar, the importance of this is so much that Polder, *et al*¹¹ in their meta-analysis study, excluded studies including only orthodontic patients. However, selection of orthodontic patients for CMT assessment is for easier access and sufficient number of their records like panoramic radiographs and some studies discussed that this approach neither causes overestimation of CMT,^{1,12} nor differs in missing patterns.^{7,11} i.e., Sisman, *et al*⁷ reported the prevalence of CMT in orthodontic patients was the same as general population.

In our study, frequency of CMT was 3.88%. This value was lower than most of the European studies as mentioned in studies of Silva MR and Sisman Y, *et al*^{1,7} and higher than the frequency of Altug-Atac AT, *et al*,¹³ this can be due to racial differences and different oral hygiene in Iran's society.

In our study, 47.1% of CMT were in maxilla and 52.9% in mandible, therefore frequency of CMT in mandible was more than maxilla. Our findings were similar to the Backman, *et al*² in Sweden while differ from many previous studies.^{1,7,9,12-14} Polder, *et al*¹¹ reported that the prevalence of CMT in both jaws was almost equal. Pattern of tooth innervations may be one of the risk factors of CMT in the maxilla.¹⁵

In all of the assessed radiographs, number of individuals with unilateral CMT was more than those with bilateral CMT. In study of Chung, *et al*¹² in South Korea and Polder, *et al*¹¹ 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 (75%) was significantly higher than mandible (25%). This was due to the relatively high frequency of bilateral CMT in maxillary lateral incisors. Like our finding, Polder, *et al*¹¹ stated in their meta-analysis study that bilateral missing of maxillary lateral incisors was much more than unilateral and for other teeth unilateral CMT was more frequent. Our findings were in contrast with findings of Silva, *et al*¹ in Mexico and Endo, *et al*¹⁰ in Japan, probably due to racial differences of assessed communities.

The present study discloses that the least frequency of CMT belongs to first and second molars of both jaws (0.0%), followed by mandibular canine (1.29%). These results agree with studies conducted by Endo, *et al*¹⁰ in Japanese, Chung, *et al*¹² in Korea and Peker, *et al*⁸ in Turkey. Albeit in Sisman, *et al*'s study, in Turkey and

Backman, *et al*'s study in Sweden the least frequency was pertaining to upper and lower canines.^{2,7}

The most common form of CMT was single tooth missing (2.91%), and double teeth (1.29%). Therefore, our study supports other studies; however the percentages were relatively different.^{7,10-12}

In this study, 64.70% were in the left side of jaws while 35.30% of CMT were in the right side of jaws and the difference was significant. These results disagree with result of Sisman, *et al*⁷ in Turkey and in contrast with the findings of Fekonja, *et al*¹⁶ in Slovenia and O'Dowling IB, *et al*¹⁷ in Ireland, while Silva, *et al*¹ in Mexico, Endo, *et al*¹⁰ in Japan and Al-Mehrat, *et al*¹⁸ in Jordan concluded that the incidence of CMT was equal in both sides. Of course they did not find any significant relationship in this regard.

The role of heredity in the incidence of CMT has been identified and even several involved genes have been introduced.¹⁹ Behr, *et al*⁹ 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.

CONCLUSION

The importance of diagnosis and management of CMT is most important. By early detection of missing teeth, alternative treatment modalities can be planned and minimize the complications of CMT. In this study it has been observed that among the population of Karachi threshold for agenesis of maxillary left 2nd incisors is the most commonly missing, followed by mandibular 2nd premolars.

Recommendations: We suggest selecting equal number of males and females for more accurate evaluation of sex ratio. We also recommend taking diagnostic radiographs after the eruption of permanent teeth to evaluate the presence or missing of them, predict feasible use of space retainer and other supportive therapies to reduce the esthetic as well as functional concerns of CMT, as Hakan Tuna, *et al*²⁰ emphasized in their clinical report. Limitation of the present study is inaccessibility of the whole society. Due to ethical considerations, one cannot prescribe panoramic radiographies for the patients randomly. Therefore, we had to select the cases from subjects referring to the Orthodontics Department of KMDC. We suggest designing studies to assess familial history aspects of CMT in retrospective or prospective approach to provide better estimation and evaluation of role of genetic in CMT.

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