Prevalence of Hypodontia of Permanent Teeth in Children Visiting a University Hospital in Chennai- A Retrospective Study

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Abstract:
Hypodontia is one of the most common dental anomalies encountered in the normal dental practices which is a major cause for malocclusion among growing teens and requires replacement in adults. Hypodontia occurs due to congenitally missing teeth and are not found in radiographs. Early diagnosis would help to determine the eruption pattern of the other teeth and help in treatment planning.The aim of this study was to evaluate the prevalence of hypodontia of permanent teeth in the Chennai population. In this retrospective study design, patient case reports were evaluated, of which 6682 patient case sheets which matched the inclusion criteria were selected for evaluation for congenitally missing teeth and the treatment performed for each case with congenitally missing teeth was evaluated. The data was then tabulated and analysed in SPSS software. Descriptive statistics and Chi square tests were performed. The total percentage of study population with congenitally missing teeth was 0.64%. Mandibular incisors were the most common congenitally missing teeth.The prevalence of congenitally missing permanent teeth in the Chennai population was found to be 0.64%.

INTRODUCTION:

One among the most common dental anomaly which occurs in humans is hypodontia. Hypodontia is the term used for tooth agenesis which results in anomalies in tooth number in humans. Hypodontia can be either syndromic or non syndromic. Congenitally missing teeth are those teeth that fail to erupt in the oral cavity and remain invisible in a radiograph, which causes hypodontia which may be caused by disturbances during the early stages of tooth development (Hunstadbraten, 1973). Hypodontia, a commonly used term to describe the absence of one to six teeth, is one of the most common dental developmental anomalies in humans while absence of more than six teeth is termed oligodontia (Polder, Van't Hof, F. P. G. M. Van der Linden, *et al.*, 2004). Familial tooth agenesis or hypodontia is transmitted as an autosomal dominant, autosomal recessive, or X-linked genetic condition (Castaldi *et al.*, 1966). According to various reports, the prevalence of hypodontia excluding third molars ranges from 0.15% to 16.2% and based on gender differences, women are more affected than men (Rakhshan, 2013). The etiology of hypodontia is not clear but some probable factors are: Heredity gene mutations of the genes such as PAX9 and MSX1 (Arte *et al.*, 1996; Das *et al.*, 2002) and ectodermal dysplasia, localised inflammation, trauma, radiation, and systemic conditions such as rickets, syphilis, etc. (Werther and Rothenberg, 1939; Brook, 1984; Mostowska, Kobielak and Trzeciak, 2003).

 On the basis of the gene involved, inheritance can follow different modes of inheritance. Most genetically transmitted diseases are determined by the status of the two copies of a gene, one derived from the father and one from the mother. Recessive genetic disorders occur when an individual inherits a non-working gene from each parent and if an individual receives one working gene and one non-working gene of the disease, the person will be found to be a carrier for the disease, but usually will not show symptoms. The risk for two X linked recessive or carrier parents to both pass the non-working gene and, therefore, have an affected child is 25% with each pregnancy. The risk to have a child who is a carrier, like the parents, is 1:2 with each pregnancy while the chance for a child to receive working genes from both parents

is 1:4. When an individual's identification by other methods such as fingerprints and DNA comparisons are difficult, Congenitally missing tooth/teeth may come as an important dental record for identification may be considered as an alternative source of information which narrows the search field. Understanding the prevalence of a condition in a population helps to formulate appropriate treatment strategies and also helps the clinicians to nullify the ill effects expected because of the particular condition. Hence this study was conducted to estimate the prevalence of hypodontia in children of Chennai.

Our department is passionate about child care, we have published numerous high quality articles in this domain over the past 3 years (Govindaraju, Jeevanandan and Subramanian, 2017a, 2017b; Panchal, Gurunathan and Shanmugavel, 2017; Ravikumar, Jeevanandan and Subramanian, 2017a; Jeevanandan and Govindaraju, 2018; Nair *et al.*, 2018; Ravikumar *et al.*, 2018, 2019; Ravindra *et al.*, 2018, 2019; Subramanyam *et al.*, 2018; Vishnu Prasad *et al.*, 2018; Jeevanandan, Ganesh and Arthilakshmi, 2019; Ramadurai *et al.*, 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Veerale Panchal, Jeevanandan and Subramanian, 2019; Vignesh *et al.*, 2019; V. Panchal, Jeevanandan and Subramanian, 2019; Samuel, Acharya and Rao, 2020). With this inspiration we planned to pursue research to determine the prevalence of congenitally missing permanent teeth in the population of Chennai.

MATERIALS AND METHODS:

This retrospective study was conducted in the university setting . Data chosen for evaluation were patients who reported to a dental college for pedodontic treatment. The details of the patients were obtained from analysis of case records case sheets from June,2019 to March 2020 from patient case records.The details which are analysed includes case details, radiographs, intraoral and extra oral pictures and treatment records. All the data is maintained in a confidential manner. Ethical approval for the study was obtained from the Institutional Ethical Committee (Ethical approval number : SDC/SIHEC/2020/DIASDATA/0619-0320). After approval, 6682 patient case sheets were shortlisted for evaluation for congenitally missing teeth and the treatment performed for each case with congenitally absent tooth was evaluated. Cross verification was done with the help of photographs and radiographs of the patient available in the image gallery of online case records of the institution . To minimise sampling bias all data were included. Inclusion criteria: The study included all patients who were aged till 18 year,both males and females. Exclusion criteria: Patients with any syndromes and incompletely filled case sheets were excluded from the study. Data which was not required and the missing were excluded. An MS-Excel tabulation was done. The MS- Excel sheet was then imported to SPSS, descriptive statistics and Chi Square tests for associations were done . Results were obtained in the form of graphs and tables.

RESULTS AND DISCUSSION: The study included a total of 6682 patients (Figure 1)
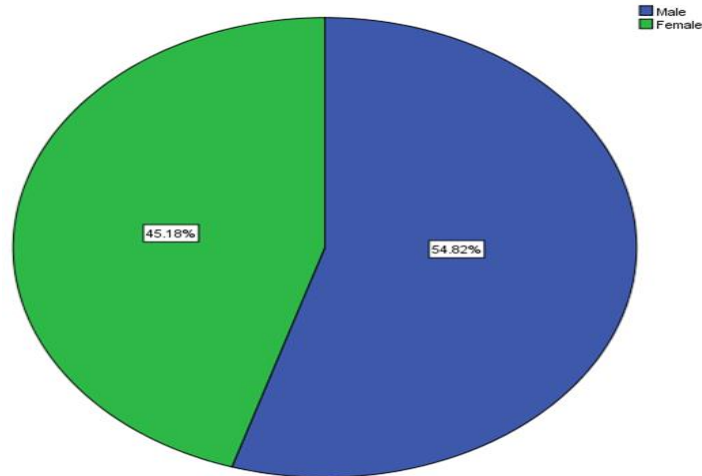

Figure 1 :The pie chart represents the frequency distribution of the study subjects based on gender. Blue colour represents male patients and green colour represents female patients. It was noticed that male patients (blue) were predominant (54.82%) when to compared to female patients (green) (45.18%).

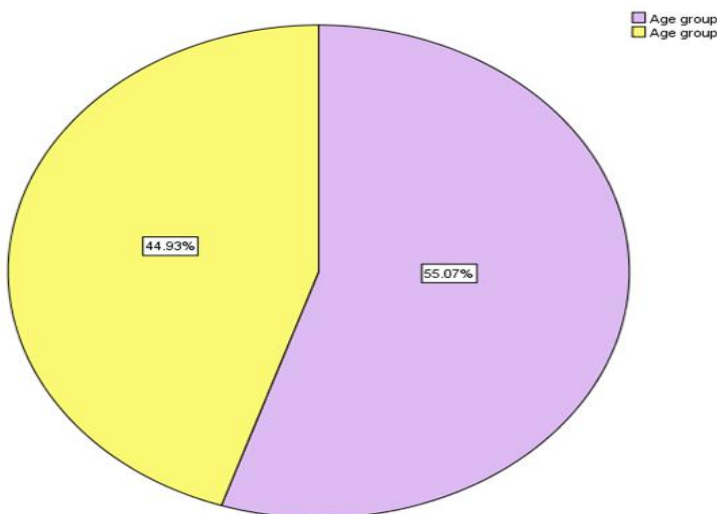with males (54.82%) and females (45.18%) between the age 6 to 18 years (Figure 2).

Figure 2 : The pie chart represents the frequency distribution of study subjects based on age group. Yellow colour represents the age group 6-12 years and pink colour represents the age group 13-18 years. It was noticed that patients of 6-12 years (pink) were predominant (55.07%) compared to patients 13-18 years (yellow) (45.93%).

Age group of 6-12 year was predominant (55.07%) compared to patients 13-18 years (45.93%). The most prevalent missing tooth (Figure 3)
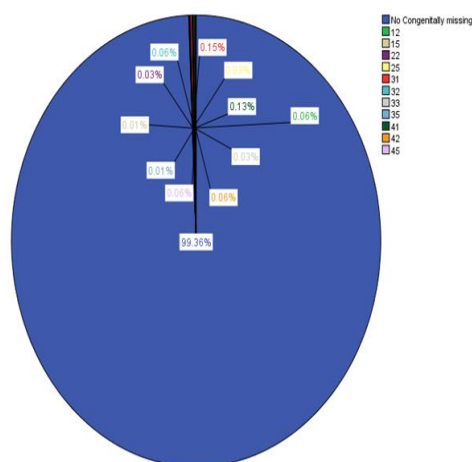
Figure 3 - The pie chart represents prevalence of individual's congenitally missing teeth (in FDI notation) in the study population. It was noticed that the children with no congenitally missing tooth (blue) were predominant (99.36%), followed by the child with missing 31 (red) (0.15%) , child with missing 41(dark green) (0.13%), child with missing 12(green), child with missing 32(cyan),child with missing 42(orange),child with missing 45(pink), child with missing 22(violet), child with missing 33(grey),child with missing 25(yellow) (0.03%) and child with missing 15(gold), child with missing 35(light blue)(0.01%).

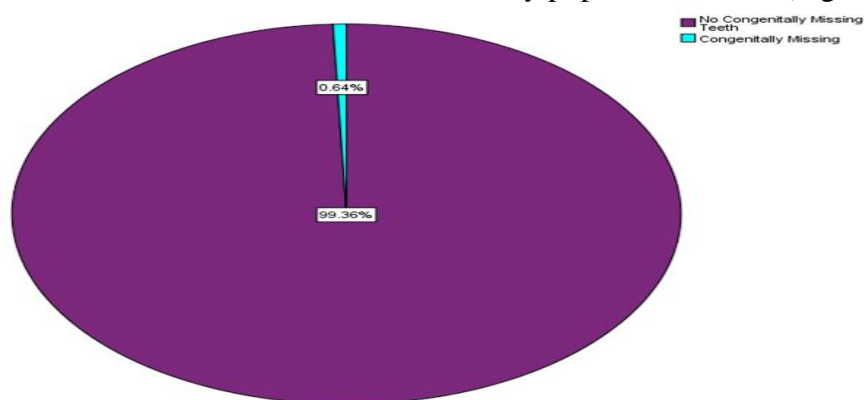was found to be 31 (0.15%) and 41 (0.13%). Of the study population 0.64% (Figure 4)

Figure 4 - The pie chart represents prevalence of hypodontia in the study population.Violet colour represents the population without any congenitally missing teeth and blue colour represents the population with congenitally missing teeth. Majority of the patients in the Study population did not have any congenitally missing teeth (violet) 99.36% and the study population with hypodontia (blue) was (0.64%). The prevalence of hypodontia in the children visiting the university dental hospital was 0.64%.

of the population were diagnosed with congenitally missing teeth. Among the group of patients with

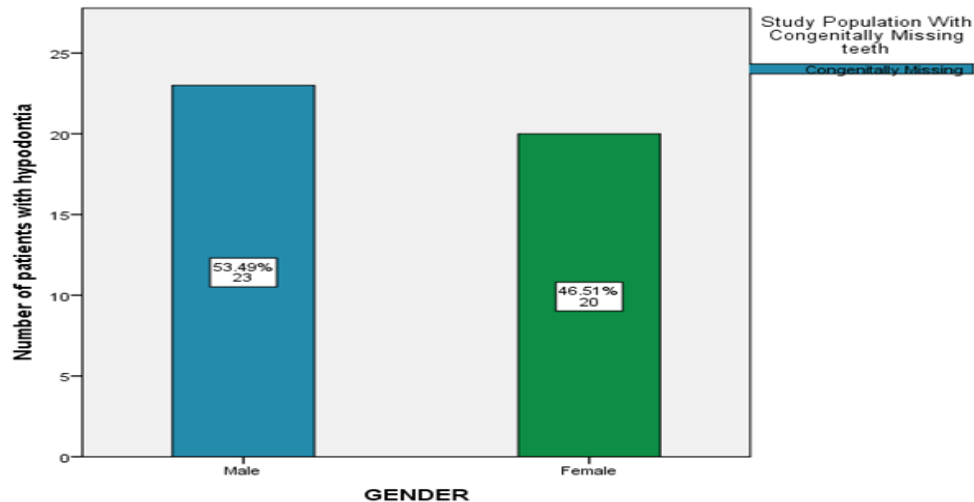hypodontia or congenitally missing teeth/tooth (Figure 5) ,

Figure 5:This bar graph represents frequency of the gender distribution of the study population with congenitally missing teeth. X-axis represents the gender and Y-axis represents the number of patients with congenitally missing. A male predilection is observed for congenitally missing teeth.

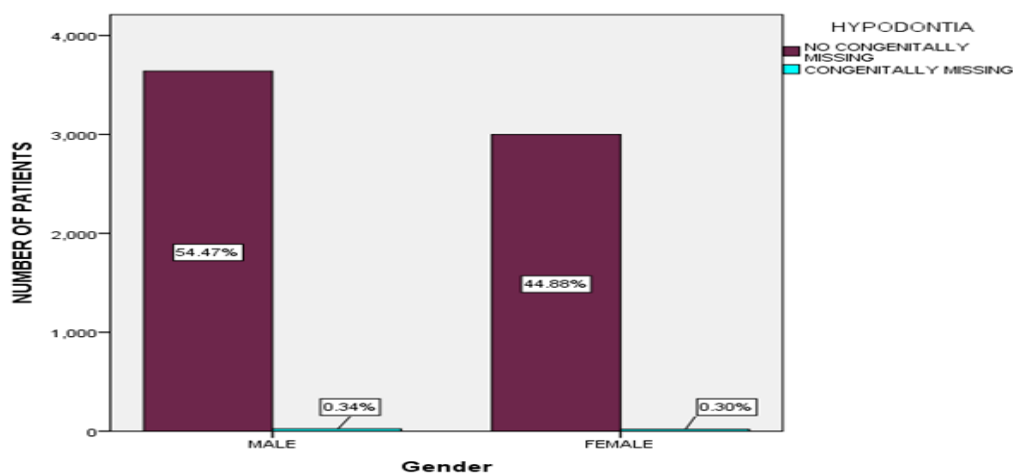the percentage of patients with hypodontia (Figure 6)

Figure 6:This bar graph represents the association between gender and hypodontia. X-axis represents the gender distribution and Y-axis represents the number of patients. A male predilection is observed for

congenitally missing teeth. Chi-square test was done and association was found to be statistically not significant (p value: 0.879(>0.05), not statistically significant).

was found to be slightly higher in males (0.34%) when compared to females (0.30%). Chi-square test was done and association was found to be statistically not significant . Pearson's Chi square value: p value: 0.879(>0.05). Hence, it is not statistically significant. a male predilection was seen and single tooth hypodontia (Figure 7)
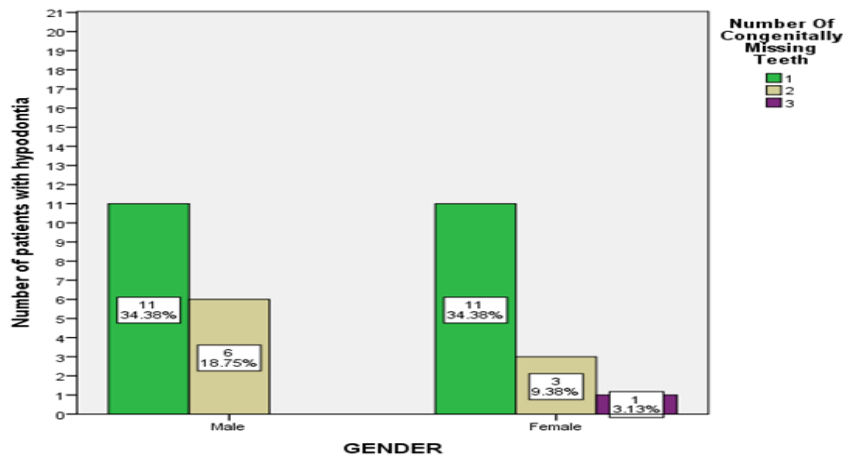

Figure 7:This bar graph represents the association between the gender with the number of congenitally missing teeth .X-axis represents the gender distribution of the study population with the number of congenitally missing teeth and Y-axis represents the number of patients with hypodontia.Green colour represents single tooth hypodontia, beige colour colour represents two teeth hypodontia and purple colour represents three teeth hypodontia. Single tooth hypodontia was found to be the most prevalent type of hypodontia. Chi-square test was done and association was found to be statistically not significant (p value: 0.879(>0.05), not statistically significant).

was more prevalent when compared to hypodontia of two or three teeth.On comparison of the each tooth and the most prevalent congenitally missing tooth, (Figure 8)
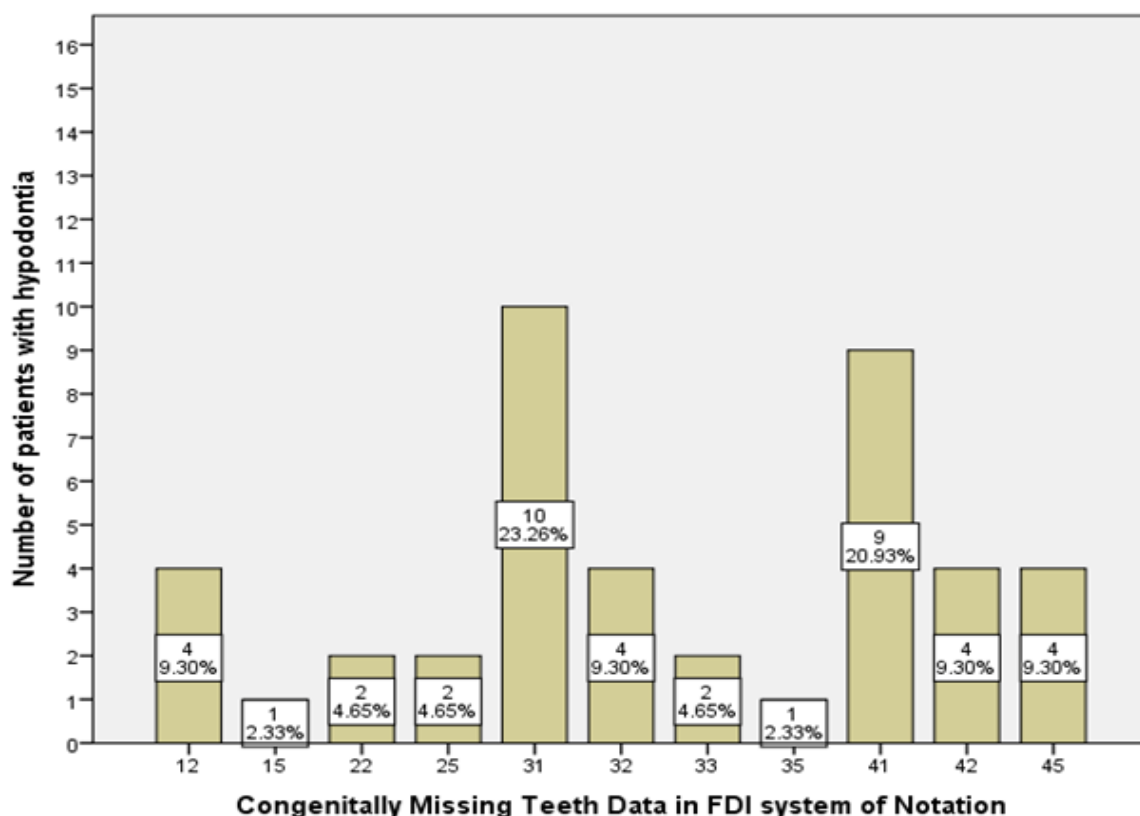
Figure 8:This bar graph represents the distribution of individual's congenitally missing teeth in patients with hypodontia. X-axis represents the congenitally missing teeth in the FDI system of notation and Y-axis represents the number of patients with hypodontia. It was noticed that mandibular central incisors were the most frequently missing teeth followed by mandibular laterals.

mandibular central incisors (31,41) were found to be the most frequently missing teeth followed by mandibular laterals (32,42). Hypodontia is one of the most common developmental abnormalities of teeth(Altug-Atac and Erdem, 2007). Environmental and genetic factors contribute to the occurrence of hypodontia.(Nunn *et al.*, 2003). These include infection, trauma, and medicines, as well as genes associated with certain

syndromes.(Wu, Wong and Hägg, 2007; De Coster *et al.*, 2009).Considering the high frequency of hypodontia and its serious aesthetical, physiological,

functional, and even emotional complications (particularly during the turbulent adolescence years),(Nunn *et al.*, 2003) its early diagnosis seems to be necessary for enabling clinical teams to plan alternative preventive multidisciplinary treatment modalities.(Kokich and Kokich, 2006; Sisman, Uysal and Gelgor, 2007; Chung, Han and Kim, 2008). In this study, the prevalence of congenitally missing teeth was 0.64% which is similar to certain studies such as (BYRD and ED, 1943) who found a prevalence rate of 0.027% . Another author (Mattheeuws, Dermaut and Martens, 2004) also compared other populations within the same region to give a prevalence range of 0.024% to 10.1%. These variations could be ascribed to differences in the racial derivations of the

groups examined, sampling methodologies, diagnostic criteria and sample sizes. The reason for this difference could be due to lower sample sizes in other populations, which might affect the overall prevalence.The gender association was not significantly different in the study population with hypodontia, but the number of teeth congenitally missing was slightly higher in males when compared to females. Although in many studies, the average prevalence of hypodontia was concluded to be more in females than males,(Polder, Van't Hof, F. P. Van der Linden, *et al.*, 2004; Fekonja, 2005; Endo *et al.*, 2006; Sisman, Uysal and Gelgor, 2007; Peker, Kaya and Darendeliler-Yaman, 2009; Jawad *et al.*, 2015).Few authors (Silva Meza, 2003)in Mexico,(Chung, Han and Kim, 2008) in Korea and Behr, *et al*.(Behr et al. 2011) in Germany concluded that hypodontia in females and males are almost equal. The lower mandibular incisors followed by upper lateral incisors were found to be frequently missing when compared to other teeth which is similar to studies conducted in Asian countries(Endo *et al.*, 2006) and unilateral hypodontia was found to be more frequent when compared to bilateral or more (Polder, Van't Hof, F. P. G. M. Van der Linden, *et al.*, 2004; Lakshmanan *et al.*, 2020) as opposed to a study by (Gurunathan and Lakshmanan, 2019). There is a lack of consistency in the knowledge among general dentists regarding hypodontia and traumatic dental injuries of primary teeth. There is a need to create awareness and education regarding such topics and their treatment options.(Gurunathan and Shanmugavel, 2016; Ravikumar, Jeevanandan and Subramanian, 2017b). The presence of hypodontia will lead to primarily malocclusions among children.This will require orthodontic treatment in order to maintain a proper occlusion and prevent malocclusions in future. Proper and early diagnosis would help to minimise the severity of the malocclusion and help to identify the type of orthodontic treatment to be provided and proper prosthodontic replacement in time. The limitations of the study include a retrospective study design whereby direct examination is not possible and only the data is reilied from past dental records, incomplete records and different ethinic profiles were not maintained .

CONCLUSION:

Within the limitations of the study, it was found that the prevalence of hypodontia in children of chennai was 0.64% with the most common congenitally missing tooth being the lower mandibular central incisors and with a slight gender predilection for males which was not significant .

ACKNOWLEDGEMENT:

CONFLICT OF INTEREST:

None declared.

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