

Prevalence Of Missing Teeth In Adult Orthodontic Patients - A Retrospective Study On South Indian Population

Research Article

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Abstract

Background: Tooth agenesis is one of the most commonly encountered dental dysplasias, but all teeth are not equally affected. This malformation can be classified into hypodontia (upto 6 missing teeth except third molars), oligodontia (more than 6 missing teeth except third molars), and anodontia (complete absence of teeth). Teeth may be congenitally missing or extracted if the tooth is diseased.

Objective: To assess the prevalence, patterns, gender distribution and association of missing teeth with different malocclusions in the South Indian population. Methods: In this study, a total of 999 records of orthodontic patients from the database of a private dental hospital was evaluated to assess the prevalence of hypodontia. Chi square tests were carried out for statistical analysis of the data.

Results: Prevalence of missing teeth was found to be 7.7% with equal predilection for both genders. 14.83% of mandibular central incisors, 8.38 % of mandibular right lateral incisors, 7.09% of mandibular left lateral incisors maxillary lateral incisors, 8.03% of mandibular left 1st molars were the most commonly missing teeth. Mandibular arches (61.93%) and maxillary as well as mandibular anterior regions (70%), Class 1 malocclusion patients (50.65%) had a higher prevalence of missing teeth.

Conclusion: Hence, knowledge about the prevalence of missing teeth is essential in early diagnosis and intricate orthodontic treatment planning.

Keywords: Angle Class I; Malocclusions, Angle Class II; Malocclusions; Hypodontia; Malocclusions; Tooth Agenesis.

Introduction

Tooth agenesis is one of the most commonly encountered dental dysplasias, but all teeth are not equally affected. This malformation can be classified into hypodontia (upto 6 missing teeth except third molars), oligodontia (more than 6 missing teeth except third molars), and anodontia (complete absence of teeth). Teeth may be congenitally missing or extracted if the tooth is diseased[1,2]. Etiology of dental agenesis can be contributed to a series of factors. It could be genetic[3], environmental, syndromic, non-

mic[4]. Absence of teeth in the oral cavity are often accompanied with functional problems like inability to chew, incoherent speech, different skeletal malocclusions, periodontal complications, alveolar bone insufficiency which at length affect esthetics and might have a negative impact on emotional well-being and quality of life[5][6]. This necessitates the need of a thorough knowledge of prevalence of hypodontia among different races and populations. Multidisciplinary approach for assessing and treating the condition is essential as a wide array of problems are associated with it. Treatments may vary from tooth replacements with dental

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implants, fixed partial dentures, autotransplantations or orthodontic intervention[7,8]. Intricate treatment planning is essential as hypodontia could be associated with variations in craniofacial morphology and dentition, which in turn might alter the final occlusion[9].

Hence, assessing the prevalence of missing teeth in different populations plays a pivotal role in early diagnosis and effectual treatment planning.

The prevalence of hypodontia excluding third molars in various populations have been in the range of 0.15 - 16.2%[10,11]. The prevalence has been reported in different populations all around the globe[12,13]. But there is a dearth of evidence about dental agenesis in the South Indian population.

Hence, this study aims at assessing the prevalence, patterns, gender distribution and association of missing teeth with different malocclusions in the South Indian population .

Materials And Methods

In this retrospective study, a total of 999 (472 males and 527 females) Orthodontic patients' records such as orthopantomograms, digital models, intraoral photographs stored in the database of a university based private dental college were evaluated. Any incomplete inconclusive data files were eliminated. Missing third molar prevalence was excluded from this study. Data of permanent missing teeth alone was considered in this study.

The prevalence of hypodontia in the total population was assessed. The prevalence of missing teeth in gender, different types of malocclusions was also evaluated. Prevalence of many parameters such as the most commonly missing tooth, the site of hypodontia - maxilla or mandible, right or left side, anterior or posterior, unilateral or bilateral agenesis, single tooth or multiple teeth hypodontia were all critically analysed.

The patients were classified into different skeletal malocclusions on the basis of ANB values (class I: 2 to 4 degrees, class II: > 4 degrees, class III < 4 degrees), confirmed by wits appraisal (class I: 0 to -1, class II: positive value, class III: negative) and beta angle (class I: 27-35 degrees, class II: < 27 degrees, class III: >35 degrees).

Statistical analysis: Descriptive statistics analysis and Chi- Square associations were done to evaluate the association of missing teeth with various malocclusions and gender, association of various malocclusions with the missing teeth at various sites, and various types of hypodontia. All these statistics were performed using SPSS Statistics software.

Results And Discussion

The prevalence of missing teeth in this population was calculated to be 7.7%.

The total number of teeth that were missing were 155. Out of which, the most common missing teeth were mandibular right and left central incisors followed by mandibular right and lateral incisors and maxillary right lateral incisors in the posterior region,

the mandibular left 1st molar was the most common missing tooth. Except for the maxillary left 2nd molar and mandibular right canine, all other teeth in the oral cavity were found missing in one patient or the other.

Prevalence of missing teeth in males and females is almost equal in our study. The toothwise association between gender and hypodontia show that missing lower incisors are common in both males as well as females. Chi-square association showed statistically non-significant results too.($p>0.05$).

Prevalence was highest in Angle's Class I followed by Angle's Class II patients. Toothwise association between malocclusion and hypodontia showed mandibular incisors to be the most common missing teeth in all classes and chi-square test didn't show any significant association ($p>0.05$).

Prevalence of hypodontia was considerably higher in the mandibular arch as compared to the maxillary arch. All types of malocclusions had missing teeth more prevalent in the mandibular arch. The association of hypodontia prevalence between malocclusions and dental arches was statistically insignificant ($p>0.05$).

Prevalence was higher in the anterior region than the posterior region. All different types of malocclusions showed higher prevalence in anterior regions. Unilateral and bilateral prevalence of missing teeth in different malocclusions in our study correspond with each other. Multiple teeth agenesis was frequently noticed than single tooth agenesis in different types of malocclusions. Chi- square association between malocclusion and anterior/posterior regions. unilateral/bilateral, single or multiple teeth prevalence were statistically non-significant. ($p>0.05$)

Dental Agenesis And Age

Literature states that mineralization and calcification of most permanent tooth buds ensues after 9- 10 years of age, hence assessing the prevalence of missing teeth in primary dentition can give us false results. Owing to this, paediatric patients were excluded from the study. Our study evaluated patients between 13- 50 years of age.

Prevalence Of Hypodontia/ Dental Agenesis (Table 1)

Endo et al recorded prevalence rates in the range of 3.9 and 11.3% in Caucasian subjects[8]. A study byFekonja et al showed 11.3% prevalence in Slovenian populations[14] . Studies by Gupta et al, Hegde DMN et al on Indian population had a very low prevalence of 1 % to 4 % respectively.[12,15].

Prevalence of hypodontia in our study is in coordination with the results of 7.54% prevalence reported by Sismanet al[16], 6.77% by Topkara et al[17], 7.68%[18]. These differences may be due to the fact genetics and environmental factors are different in different populations.

Toothwise Prevalence Of Hypodontia (Table 2)

Literature showed that the work done by Jawad et al, Hedayatiet al reported upper lateral incisors to be the most frequently missing tooth[19,20] Some studies conducted by Goya HA et al, have shown mandibular 2nd premolar to be the most frequently absent

tooth[6,21]. Few researches by Chung CJ et al, Davis PJ et al, Hanaoka et al favoured our results stating that the high prevalence of hypodontia was in mandibular central and lateral incisors[6,21-23].

Clinical Implication Of Missing Teeth In Orthodontics

If a missing tooth is to be replaced, it can be done by maintaining the space throughout the orthodontic treatment or if patients are concerned with aesthetics, a temporary acrylic tooth can be given at rectangular wire stage of treatment, as engaging a temporary tooth early on a round wire might cause it to rotate in the archwire.

Aesthetic problems associated with missing incisors could be median diastema and shift, spacing, over-retained deciduous teeth. In retruded profile and low angle angle cases, orthodontic bio-mechanics should include space opening and later prosthetic replacement whereas space closure in high angle cases. To maintain adequate bone levels for future implant placement in place of missing lateral incisors, canines can be protracted anteriorly and then retracted again[24].

For missing premolars, if the deciduous tooth is retained then maintaining space in the arch is less critical and would help maintain the alveolar bone levels for future prosthetic reconstruction

Table 1 depicts the prevalence of hypodontia in gender and different types of malocclusion.

GENDER	TYPE OF MALOCCLUSION				P VALUE
	CLASS I	CLASS II	CLASS III	TOTAL	
	N (%)	N (%)	N (%)	N (%)	
MALES	17(22.08)	18(23.38)	4(5.19)	39(50.65)	0.25
FEMALES	22(28.57)	15(19.48)	1(1.30)	38(49.95)	
TOTAL	39(50.65)	33(42.86)	5(6.49)	77	

Table 2 depicts tooth-wise prevalence of hypodontia in males and females, and in different types of malocclusions. Association of prevalence of with gender and Malocclusion showed Statistically insignificant results. *p value >0.05.

MISSING TEETH		TYPE OF MALOCCLUSION			GENDER		TOTAL
		CLASS I	CLASS II	CLASS III	MALE	FEMALE	
MAXILLA-RIGHT	CENTRAL INCISOR	1	1	0	2	0	2
	LATERAL INCISOR	5	5	1	6	5	11
	CANINE	2	1	0	1	2	3
	1ST PREMOLAR	0	4	0	2	2	4
	2ND PREMOLAR	1	0	0	0	1	1
	1ST MOLAR	4	2	0	5	1	6
	2ND MOLAR	1	0	0	1	0	1
MAXILLA-LEFT	CENTRAL INCISOR	7	2	1	8	2	10
	LATERAL INCISOR	6	1	1	3	5	8
	CANINE	2	1	0	1	2	3
	1ST PREMOLAR	0	3	0	1	2	3
	2ND PREMOLAR	0	1	0	0	1	1
	1ST MOLAR	2	0	1	2	1	3
MAN-DIBLE-RIGHT	CENTRAL INCISOR	13	10	0	13	10	23
	LATERAL INCISOR	6	5	2	8	5	13
	1ST PREMOLAR	0	1	0	0	1	1
	2ND PREMOLAR	0	1	0	1	0	1
	1ST MOLAR	3	5	0	2	6	8
	2ND MOLAR	1	0	0	1	0	1
MANDI-BLE-LEFT	CENTRAL INCISOR	12	10	0	11	11	22
	LATERAL INCISOR	6	4	1	4	7	11
	CANINE	1	0	0	0	1	1
	1ST PREMOLAR	1	1	0	0	2	2
	2ND PREMOLAR	0	1	0	1	0	1
	1ST MOLAR	6	8	0	7	7	14
	2ND MOLAR	1	10	0	0	1	1
TOTAL		81	67	7	80	75	155
P VALUE		0.73			0.45		

Table 3 depicts the prevalence of hypodontia seen in different sites: maxilla or mandible, anterior or posterior regions, unilaterally or bilaterally, single or multiple teeth and their associations with different classes of malocclusions.

***p value >0.05, Statistically insignificant results.**

HYPODONTIA	TYPE OF MALOCCLUSION				P VALUE
	CLASS I	CLASS II	CLASS III	TOTAL	
N (%)					
MAXILLA	30 (19.35)	24 (14.84)	5 (3.23)	59 (38.06)	0.24
MANDIBLE	47 (30.32)	47 (30.32)	2 (1.94)	96 (61.93)	
TOTAL	77	71	7	155	
ANTERIOR	61 (39.35)	42 (27.09)	6 (3.8)	109 (70.32)	0.16
POSTERIOR	20 (12.9)	25 (16.1)	1 (0.64)	46 (29.67)	
TOTAL	81	67	7	155	
UNILATERAL	19 (24.68)	15 (19.48)	4 (5.19)	38 (49.35)	0.35
BILATERAL	20 (25.97)	18 (23.38)	1 (1.30)	39 (50.64)	
TOTAL	39	33	5	77	
SINGLE	17 (22.08)	14 (18.18)	4 (5.17)	35 (45.45)	0.27
MULTIPLE	22 (28.57)	19 (24.68)	1 (1.30)	42 (54.54)	
TOTAL	39	33	5	77	

or implant placement. If all other premolars need extraction for crowding and incisor proclination correction, the agenesis is a minor finding. The more critical finding could be extractions are not warranted [25]. For missing molars, mesial drifting of the adjacent molar is a wise choice of management except anchorage control would be complex. Replacing teeth with dental implants is a good choice for adults. But, for adolescents where adjacent teeth have not fully erupted may cause infra occlusion of the implant in future [26][27].

Prevalence Of Hypodontia Among Gender (Table 1 and 2)

Endo T et al showed the prevalence to be equal with a very negligible predilection to males [28] consistent with our study and Aktan et al high prevalence in females [28,29].

Prevalence Of Hypodontia In Different Malocclusions (Table 1 and 2)

Studies from literature complementing our findings include the one done by Celikoglu et al stating that Angles Class 1 malocclusion had more prevalence. [30][14]. Maximum prevalence in Angle's Class II cases was recorded by Gowdet al [31] and in Angle's Class III by Chung et al [6]. Many studies have attributed reasons for missing teeth to be more prevalent in Angle's Class III patients to a retrognathic maxilla with a short arch.

Prevalence Of Hypodontia Across Arches And Its Association With Malocclusions

Studies in consensus with our findings were reported by Chung et al, Kim et al, [6][32][33] stating higher prevalence in mandibular arches and disagreement with our findings were reported by Gomes et al [34].

Prevalence of hypodontia across anterior and posterior regions: Prevalence higher in the anterior region could affect esthetics. Missing teeth in the posterior regions could affect function. Studies have suggested anterior agenesis to be contributed by genetic

factors while posterior agenesis could be sporadic [35]. Results similar to our research were obtained by Afshari et al, Aminiet al, [36,37], and conflicting results were obtained by Endo T et al [28].

Unilateral And Bilateral Prevalence Of Hypodontia

A study by Polder et al stated that the maxillary lateral incisor could be the most common missing tooth bilaterally [38]. Bilaterally missing teeth were seen in many studies conducted by Chunj, Hedayatiet al, Goya et al, Soni H et al [6,21,22][20], [6,21,22] Unilaterally missing tooth could create a dilemma to the questionable therapeutic removal of the contralateral tooth. In cases with anterior missing tooth, midline shift could be an issue or deepening of bite might arise on removal of another anterior tooth which might pose problems in low angle cases. [24,39].

Prevalence Of Single Tooth Or Multiple Teeth Agenesis

Hedayatiet al showed that in most patients single tooth agenesis was common [20]. Multiple missing teeth can be associated with cleft patients [4,40] and ectodermal dysplasias [4].

Hence, multidisciplinary approach necessitating involvement of the Endodontists, Pedodontists, Prosthodontists and Orthodontists is required for critical planning of missing teeth management to achieve the best possible results in terms of aesthetics and function.

Hence, while planning a treatment, the severity of crowding, genetic history, local factors, age of the patient, profile of the patient, periodontal and alveolar bone conditions, growth patterns, and craniofacial morphology should be evaluated closely.

Limitations

Study was a unicentric study and should be conducted on a large scale in different regions of South India to increase the validity of the study.

Conclusion

The results of the study concluded that both genders stood equal chances with a general prevalence of hypodontia at 7.7%. Mandibular central and lateral incisors were most common missing teeth. Prevalence of hypodontia was higher in Angle's Class I malocclusions, in the mandibular arch, in the anterior regions of the both the jaws and multiple teeth agenesis was repeating in a number of patients. The association between different types of malocclusions and hypodontia was not statistically significant.

Hence, knowledge about the prevalence of missing teeth is essential in early diagnosis and intricate orthodontic treatment planning.

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