

Hypodontia – A Dento-evolutionary Study

Yesha V Jani¹, Purva Butala², Vinay Rao³, Steffy Macwan⁴, Gopal Hirpara⁵, Aman Sayeed⁵

Contributors:

¹Reader, Department of Oral Medicine & Radiology, Ahmedabad Dental College & Hospital, Ahmedabad, Gujarat, India; ²Senior Lecturer, Department of Pedodontics & Preventive Dentistry, Ahmedabad Dental College & Hospital, Ahmedabad, Gujarat, India; ³Senior Lecturer, Department of Endodontics, AMC MET Dental College & Hospital, Ahmedabad, Gujarat, India; ⁴Ex-Tutor, Department of Prosthodontics, Ahmedabad Dental College & Hospital, Ahmedabad, Gujarat, India; ⁵Intern, Ahmedabad Dental College & Hospital, Ahmedabad, Gujarat, India.

Correspondence:

Dr. Jani YV. M10/74, Swatantra Senani Flats, Near Pragatinagar, Naranpura, Ahmedabad - 380 013, Gujarat, India. Tel.: +079-27410102. Phone: +91-9825522023. Email: yeshtami_84@yahoo.co.in

How to cite the article:

Jani YV, Butala P, Rao V, Macwan S, Hirpara G, Sayeed A. Hypodontia – A dento-evolutionary study. J Int Oral Health 2016;8(12):1057-1064.

Abstract:

Background: The human body undergoes growth and development from birth till adulthood. The disturbances arising in this process of development cause various anomalies. An example of such developmental dental anomaly is failure to develop the normal complement of 32 teeth.

Materials and Methods: A total of 51 patients, who were relevant to this study, were selected from the outpatient department of the institute. Intraoral examination was done for clinical confirmation of the absence of tooth/teeth and for any associated oral deformity. Intraoral peri-apical and/or orthopantomogram were taken according to the number and type of missing tooth/teeth and to rule out impacted teeth.

Results: Analysis of the data suggests that 0.66% patients had hypodontia and males had a higher predilection. The most common missing tooth was mandibular second premolar followed by mandibular incisors. Oral and facial malformations are commonly associated with hypodontia.

Conclusion: Hypodontia is a congenital condition causing many physiologic effects. It should be diagnosed as early as possible to prevent harmful sequelae. Successful outcomes in the management of patients with hypodontia depend on careful diagnosis and treatment planning.

Key Words: Hypodontia, missing teeth, oligodontia

Introduction and Review

Man has 32 teeth in his permanent set. It is frequently observed that many persons fail to develop one or more of their third molars, thereby causing the formula to lie between 28 and 32. A small percentage of persons also fail to develop even that allotted number.^{1,2} A tooth is labeled as congenitally missing

if it is neither erupted nor impacted (i.e., radiographically as well as clinically missing).^{2,3} Many terms appear in the literature to describe a reduction in number of teeth: Anodontia, hypodontia, aplasia of teeth, congenitally missing teeth, the absence of teeth, agenesis of teeth, and lack of teeth, with anodontia being the most commonly used terminology.³

The term anodontia literally means all missing teeth but it is used for congenitally missing primary and/or permanent teeth. It can be of two types: Complete or partial. Partial anodontia can be described as two terms: Hypodontia and oligodontia.

- Hypodontia: 1-6 teeth missing (excluding the third molars) (Prevalence 15%)⁴
- Oligodontia: More than 6 teeth are missing (excluding the third molars) (prevalence 0.25%)³⁻⁶
- Hypodontia and oligodontia are again classified as nonsyndromic or isolated hypodontia/oligodontia and syndromic hypodontia/oligodontia (hypodontia/oligodontia associated with syndromes).³

Missing teeth, one or more, is one of the most common human dental developmental anomaly. It is a more common in permanent teeth than deciduous. The third molar is the most commonly missing tooth in the permanent dentition, being absent in about one-fifth of the population.⁷ The prevalence of hypodontia in permanent teeth excluding third molars has been reported to vary from 1.6% to 9.6%.^{4,6-12} Deciduous teeth are less commonly involved with a prevalence of 0.5% up to 0.9%.^{4,8,10-14} As a general rule, a missing deciduous tooth is followed by/associated with missing permanent counterpart.⁸

In permanent dentition failure of one or more of the third molars to form occurs in 20% of the population.^{5,8} They are followed by permanent mandibular second premolars (3.4%), maxillary lateral incisors (2.2%), and mandibular incisors.^{6,11,15-27} In deciduous dentition, maxillary lateral incisors are the commonly missing trailed by mandibular central and lateral incisors.^{3,13}

The etiology of hypodontia is not fully understood. Both genetic and environmental factors have been proposed and dental evolutionary theories have been suggested.²⁶ Newman and Newman (1998) have given four main theories for the cause of agenesis of permanent teeth. They are:

1. Heredity or familial distribution,
2. Developmental disturbance,
3. Evolutionary changes, and
4. Local infection and inflammation.

Heredity or familial distribution is the primary cause. In familial hypodontia, the type of inheritance in the majority of families seems to be autosomal dominant with incomplete penetrance and variable expressivity. The second is hypodontia due to developmental disturbances during jaw development. Svinhufvud *et al.* concluded that the selection for tooth agenesis is anatomic rather than evolutionary. They also suggested that certain tooth bearing areas during tooth development (e.g., embryonic fusion area) are more likely to undergo epigenetic influences causing agenesis of tooth, e.g., most frequently missing mandibular tooth is the second premolar. It occurs because it is at the distal end of the primary dental lamina, and because it is more susceptible to agenesis, thus it is called a "fragile" site.^{3,8,12,16} Third, a reduction in the dentition is regarded as nature's attempt to adapt the shortened dental arches (an expression of the evolutionary trend).^{16,21,24} Butler's field theory, Terminale Reduktion theory or Sofaer's model of compensatory tooth size interactions were the theories which made it possible to explain these changes.¹² Butler's theory (1939) says that mammalian teeth are classified as incisors, canines, and premolars/molars. Each type has one "key" tooth which is stable; secondary teeth within the type become progressively less stable. For each quadrant in mammals, the key tooth in the molar/premolar field is the first molar.^{8,12} Fourth is localized inflammation or infectious diseases of the jaw and systemic conditions such as rickets (nutritional deficiency) or syphilis (STD), scarlet fever (bacterial infection) or nutritional disturbances during pregnancy or infancy, severe intrauterine disturbances and disturbance of the endocrine system have all been proposed as possible factors.^{3,11,12,28,29} Recent advances have reported many genes which cause hypodontia. It has been reported that genes MSX1, AXIN2 and PAX9 interaction play a role in human tooth agenesis (Vieira *et al.*, 2004). The usual mode of inheritance is autosomal dominant, but autosomal-recessive inheritance and X-linked and polygenic or multifactorial models of inheritance have also been reported.^{4,17,30}

Almost all studies suggest a female predilection though there is a large variation in its ration. Some studies suggest that a slight female predilection for hypodontia with a female to male ratio equaling 1.5:1,^{2,3,9,14,24,26,28,32,33} whereas other indicate much higher female to male ratio (up to 4:1).^{9,12,14,26,32}

Many dental deformities are associated with hypodontia such as microdontia, transposition of permanent teeth, ectopic permanent canine, taurodontism, infraocclusion of primary molar teeth, delayed formation and eruption of teeth, short roots of teeth, rotation of premolars and/or maxillary lateral incisors, enamel hypoplasia, and presence of supernumerary teeth.^{3,7,34,35} The terms, "concomitant hypodontia and hyperdontia" and "oligo-pleiodontia" have been used to describe the condition in which developmental absence of teeth and supernumerary teeth are present in the same individual.²⁷

This is a rare condition and only few cases have been reported in the literature.^{15,27,36}

Online mendelian inheritance in man (OMIM) lists over 60 different syndromic conditions that include hypodontia as part of their phenotypic spectrum of anomalies and candidate genes have been identified for many of these conditions.^{5,12,33} Some of the best known of these syndromes are ectodermal dysplasia, isolated cleft lip/palate, Down syndrome, Cleidocranial dysostosis, congenital syphilis, Ehler Danlos syndrome, Blepharo-Cheilo syndrome, and osteopetrosis.^{1,10,13,21,32,38} Most commonly associated syndrome is ectodermal dysplasia.

Many treatment modalities are available for hypodontia but it mainly depends on the age of the patient and severity of hypodontia. The principal aims of treatment should be restoration of missing teeth, establishment of normal vertical dimension, and support for orofacial soft tissues.³² It is divided into space closure, orthodontic space redistribution, and conventional restorative procedures. Orthognathic surgery is possible cases of severe hypodontia. Prosthetic appliances and implants comprise conventional restorative treatments.^{7,16,19,21,29} The treatment of hypodontia improves the esthetics, phonetics, and masticatory ability of the patients and also prevents psychological trauma, development of incorrect oral habits and tipping of the adjacent teeth.¹⁹

The purpose of this study was to determine the prevalence of occurrence of hypodontia in patients reporting to the Department of Oral Medicine and Radiology at Ahmedabad Dental College and Hospital. Along with that evaluation of most commonly missing teeth, sex predilection, deciduous/permanent dentition predilection, deformities and syndromes associated with hypodontia, physiological impact and various treatment modalities of hypodontia were also done.

Materials and Methods

A total of 51 patients, who were relevant to this study, were selected from outpatient Department (OPD) of Oral Medicine and Radiology of Ahmedabad Dental College and Hospital. The ethical committee approval for the study was obtained from the ethical committee of the institute. Patients were selected on the basis of clinically missing tooth/teeth along with radiographic confirmation or when missing teeth were observed during routine radiographic evaluations with no history of extractions. The patient with any past or present systemic diseases, suffering from acute or chronic infection or having impacted teeth were excluded from the study.

Method of the study

- All the patients under the study were thoroughly examined, and the findings were recorded in a pro forma, specially prepared for the study
- The consent for including the patients in the study was obtained from them, and a written informed consent was

- signed by each of the patients
- Intraoral examination was done for clinical confirmation of the absence of tooth/teeth and for any associated oral deformity
- Extra oral examination was done for any facial or skeletal deformities and other developmental abnormalities especially if they were associated with hypodontia
- Intra oral peri-apical and/or orthopantamogram were taken according to the number and type of missing tooth/teeth and to rule out impacted teeth
- Effect on the esthetics and physiologic functions such as speech and mastication were determined and treatment modalities were decided accordingly.

Results

A total of 51 patients were included in the study, selected from the OPD (7649 patients) of Ahmedabad Dental College and Hospital. The prevalence of hypodontia calculated from it was 0.66%. Out of 51 patients 49 were having non-syndromichypodontia and 2 were having syndromichypodontia.

Table 1 shows age distribution of patients with hypodontia. Out of 51 patients youngest patient was of 5 years and oldest patient was of 55 years of age. Maximum (20 [40.81%]) patients with hypodontia were found between 11 and 20 years of age and minimum patients were found between the age of 51-60 years (1 [1.96%]). In the range of 0-10 years only 1 (2.08%) patient of 5 years of age was with missing deciduous (Figure 1), thus only 1 patient (1.96%) had involvement of deciduous dentition. One patient with syndromic hypodontia was of 9 years of age (ectodermal dysplasia), whereas another patient was of 29 years of age (Axenfeld-Rieger syndrome). Mean age for the analysis was 24.41 years with a standard deviation of 11.99 years.

Table 2 shows gender distribution of patients with hypodontia. 30 (58.82%) males and 21 (41.17%) females were found with hypodontia from which one male (ectodermal dysplasia) and one female (Axenfeld-Rieger syndrome) had syndromic hypodontia. Applying Chi-square test shows the study is not significant as $P > 0.5$, so we have to accept the null hypothesis.

Table 3 shows distribution of patients with hypodontia according to their chief complaint. Out of 49 patients with nonsyndromic hypodontia 26 (50.98%) patients came with a chief complaint related to effects caused by hypodontia out of which 15 (30.61%) patient had complaint regarding spacing and 11 (22.44%) patients had complaint regarding over retained deciduous teeth (Figure 2). 15 (30.61%) patients had no complaints related to hypodontia, i.e. it was an incidental finding, only 7 (16.32%) patients complained about missing teeth. Out of 2 patients with syndromic hypodontia 1 patient had complaint of missing teeth and the other did not have a complaint related to hypodontia.

Table 1: Age distribution of patients with hypodontia.

Age (in years)	Number of patients		Total (%)
	Without syndrome (%)	With syndrome (%)	
0-10	4 (7.84)	1 (50)	5 (9.80)
11-20	20 (40.81)	0	20 (39.21)
21-30	11 (22.44)	1 (50)	12 (23.52)
31-40	8 (16.32)	0	8 (15.69)
41-50	5 (10.20)	0	5 (9.80)
51-60	1 (2.04)	0	1 (1.96)
Total	49 (96.07)	2 (3.92)	51

Table 2: Gender distribution in patients with hypodontia.

Sex	Number of patients		Total (%)
	Without syndrome (%)	With syndrome (%)	
Male	29 (59.18)	1 (50)	30 (58.82)
Female	20 (40.82)	1 (50)	21 (41.17)
Total	49	2	51

Table 3: Distribution of patients with hypodontia according to their chief complaint.

Chief complaint	Without syndrome (%)	With syndrome (%)	Total
Missing teeth	7 (16.32)	1 (50)	8 (17.64)
Related to effects caused by hypodontia			
Spacing between teeth	15 (30.61)	0	15 (29.41)
Related to over retained deciduous	11 (22.44)	0	11 (21.56)
Incidental finding	15 (30.61)	1 (50)	16 (31.37)
Total	49		51



Figure 1: Radiograph of same patient confirming missing 71, 81, and missing tooth buds of 31, 41.

Table 4 shows number of missing teeth in patients with hypodontia. Hypodontia (1 to 6 teeth missing) is seen in 45 patients (88.23%) (Figure 2), oligodontia (more than 6 teeth missing) is seen in 6 patients (11.76%), and none of the patient presented with total anodontia. Maximum number of patients had 2 teeth missing (22 patients [43.14%]) and least number of patients was with 3 teeth missing (2 patients [3.92%]).

Table 5 shows arch-wise distribution of missing teeth among patients with hypodontia. Excluding third molars, 167 congenitally missing teeth were observed in 51 patients. Most commonly missing teeth found were mandibular second premolars (36 teeth [21.55%]) followed by mandibular central incisors (30 teeth [17.96%]) (Figure 2). Other missing teeth in decreasing frequency of occurrence were maxillary lateral incisors (22 teeth [13.17%]), maxillary second premolars (18 teeth [10.77%]), mandibular second molars (15 teeth [8.98%]), and mandibular lateral incisors (13 teeth [7.78%]).

Table 6 shows oral malformations found in patients with hypodontia. The most common malformation was over retained deciduous teeth (32 [45.71%]) (Figure 2) followed by infraocclusion of primary molar (20 [28.57%]) (Figure 2).

There were 2 patients with syndromes. One had ectodermal dysplasia and the other associated syndrome was Axenfeld-Rieger syndrome. Patient with ectodermal dysplasia had hypotrichosis (1 [1.96%]), depressed nasal bridge (1 [1.96%]), and hypohydrosis (1 [1.96%]) (Figure 3) with oral malformations like multiple over retained deciduous teeth and resorption of alveolar ridge (Figure 4). Patient with Axenfeld-Rieger syndrome had glaucoma (1 [1.96%]) with supernumerary tooth, microdontia, and taurodontism as oral malformations (Figure 5).

Table 7 shows analysis of treatment given to patients with hypodontia. Patients (16 patients [31.37%]) with nonsyndromic hypodontia require orthodontic correction. Prosthodontic and endodontic treatment were done in 12 patients (24.48%) each. The patient with ectodermal dysplasia was given prosthodontic treatment (Figure 6), whereas the patient with Axenfeld-Rieger syndrome was given endodontic treatment.

Discussion

Congenital absence of teeth is commonly classified as hypodontia, indicating the absence of <6 teeth, oligodontia,



Figure 2: Radiograph of patient in Figure 5 confirming missing 31, 41, 35, 45 and over retained 75 and 85.

meaning congenital absence of more than 6 teeth and anodontia, implying the total absence of teeth. Oligodontia and anodontia are very rare, but hypodontia is relatively common.²¹ The prevalence of hypodontia in this study was 0.66%. Large differences in the prevalence of hypodontia have

Table 4: Number of missing teeth in patients with hypodontia.

Missing teeth	Number of patients (%)		Total
	Without syndrome	With syndrome	
1	14 (28.57)	0	14 (27.45)
2	22 (44.88)	0	22 (43.14)
3	2 (4.08)	0	2 (3.92)
4	4 (8.16)	0	4 (7.84)
Multiple	7 (14.28)	2 (100)	9 (17.64)
Complete anodontia	0	0	0
Total	49	2	51

Table 5: Arch-wise distribution of missing teeth in patients with hypodontia.

Teeth	Number of teeth		Total
	Without syndrome	With syndrome	
Maxillary			
Central incisors	2	2	4
Lateral incisors	19	3	22
Canines	3	3	6
First premolars	5	2	7
Second premolars	16	2	18
First molars	0	0	0
Second molars	10	0	10
Mandibular			
Central incisors	28	2	30
Lateral incisors	11	2	13
Canines	1	2	3
First premolars	1	2	3
Second premolars	32	4	36
First molars	0	0	0
Second molars	13	2	15
Total			167

Table 6: Oral malformations in patients hypodontia.

Malformations	Number of malformations (%)		Total (%)
	Without syndrome	With syndrome	
Over retained deciduous tooth/teeth	30 (46.87)	2 (33.33)	32 (45.71)
Infraocclusion of primary molar teeth	20 (31.25)	0	20 (28.57)
Resorption of alveolar ridge	6 (9.37)	1 (16.66)	7 (10)
Microdontia	5 (7.81)	1 (16.66)	6 (8.57)
Supernumerary tooth/teeth	1 (1.56)	1 (16.66)	2 (2.85)
Taurodontism	0	1 (16.66)	1 (1.42)
High arched palate	1 (1.56)	0	1 (1.42)
Tongue tie	1 (1.56)	0	1 (1.42)
Total	64	6	70

been reported worldwide, varying from 0.3% in Jerusalem to 36.5% in Caucasoid population. The wide range of hypodontia prevalence can be attributed to differences in the methods of sampling and examination, age distribution, sex, and racial origin.⁶

In this study maximum patients with hypodontia were found in 11-30 years of age group. Crown development of all the permanent teeth (except for 3rd molars) is normally completed by 10 years of age, so all the cases after 11 years can be included in hypodontia. Also around this age children become more concerned about their aesthetics. After 31 years, few patients were

found because they may be unaware of the missing teeth due to the presence of over-retained deciduous teeth in place of missing permanent teeth which does not cause other physiologic effects like spacing, and esthetics is not an issue at this age. According to the literature hypodontia is a congenital condition but it is not diagnosed until the eruption age of a particular tooth is crossed.¹

This study suggests that males have a slightly higher predilection than females which is in accordance with the study of Ngang *et al*. Gender predilection is variable among different studies, most studies conclude female to male ratio of 1.5:1 up to 4:1.²¹

Table 7: Analysis of treatment given to patients with hypodontia.

Treatment	Number of patients (%)		Total (%)
	Without syndrome	With syndrome	
Orthodontics	16 (32.65)	0	16 (31.37)
Prosthodontics	12 (24.48)	1 (50)	13 (25.50)
Endodontics	12 (24.48)	1 (50)	13 (25.50)
No treatment	9 (18.36)	0	9 (17.64)
Total	49 (96.07)	2 (3.92)	51

This study shows the most common chief complaint related to effects caused by hypodontia as spacing and over retained deciduous teeth which coincide with other studies. Other common complaints of dental patients with hypodontia are missing teeth, spacing in the dental arches, and poor aesthetic appearance.³⁷ Depending on the number and location of hypodontia it causes masticatory, speech or esthetic problems.⁶ When the permanent successor is congenitally missing, a primary tooth may be retained beyond the normal time. In the absence of a proper stimulus from the eruption of a permanent tooth, the process of normal exfoliation and resorption may be slower than normal.²⁰ Some patients do not even notice hypodontia due to over retained deciduous teeth which led it to be an incidental finding.

In this study, hypodontia is most commonly seen as two teeth missing followed by single tooth missing which is in accordance



Figure 3: Patient with scanty hair on eyebrows and everted lips due to hypodontia of upper and lower anterior.

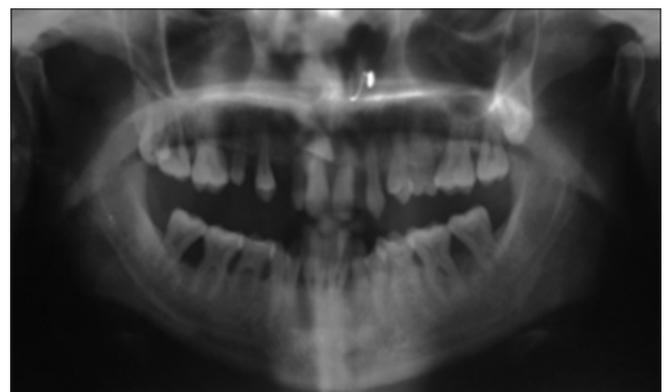


Figure 5: Radiograph of a patient with hypodontia of 15, 22, 35, and 45 with taurodontism in relation with 36 and 46 and supernumerary teeth in relation with place of 15.



Figure 4: Radiograph of patient in Figure 3 confirming oligodontia



Figure 6: Photograph of a patient before and after prosthesis.

with other studies.^{6,7,33,39} This study shows that multiple missing teeth are more common in nonsyndromic hypodontia than syndromic hypodontia which is in accordance with Ilkay *et al.* where it is suggested that although hypodontia can occur with over 60 different syndromes, it commonly occurs without association with any syndrome or systemic disease.^{10,33} This study also concludes that hypodontia is more common than oligodontia and anodontia which is suggested by other authors also.³⁻⁶

Regarding distribution in dentition, this study suggests a higher predilection for permanent dentition than primary dentition which coincides with other studies.^{3,4,7,10,12,13,14,29,33}

Most commonly missing teeth found were mandibular second premolars followed by mandibular central incisors. Other common missing teeth are maxillary lateral incisors and maxillary second premolars in a decreasing order as per suggested in other studies also.^{6,8,11,15-25} The least commonly affected teeth were first molars which are suggested as the key teeth of the dental arches.^{4,11,12,33} This occurrence can be explained on the basis of theories of dental evolution, developmental anomaly and hereditary pattern.

The etiology of hypodontia has generated considerable debate. There is still no precise, factual description for the causal factors responsible for the lack of formation of certain teeth.¹ However, Newman and Newman (1998) have described four theories depicting causes of agenesis of teeth. Bolk described theory of dental evolution known as "Terminale Reduktion." His theory was that the commonly missing teeth were "vestigial organs" which had very less practical value for today's modern man. In the evolutionary process, they do not provide any particular advantage to us and hence were lost. Observations have suggested that the most posterior tooth or the last tooth in the type (incisors, premolars, and molars) was missing mostly.^{6,12,35} Clayton *et al.* studied human subjects and observed same results as this study that the most common missing teeth is mandibular second premolar.

Another theory of tooth agenesis described by Svinhufvud *et al.* suggested that the selection for tooth agenesis is not evolutionary but it is anatomic. They said that certain areas of jaws during tooth development (e.g., embryonic fusion area) are predisposed to undergo epigenetic influence which leads agenesis of tooth. For example, agenesis of tooth occurs frequently in symphysis region where the two lower central incisors develop. Here, to form the mandible the fusion of the two mandibular processes occurs. Other site for missing or deformed tooth in upper arch is the lateral incisor, which develops in the area where embryonic fusion occurs between the lateral maxillary and medial nasal processes.^{1,12} The areas suggested for teeth agenesis in these previous studies coincide with this study.

Considering this study, it is shown that over retained deciduous tooth is most frequent dental anomaly trailed by infraocclusion of deciduous primary molar. Other common oral malformations found were resorption of alveolar ridge, microdontia, supernumerary tooth and least commonly associated oral malformations were high arched palate, tongue tie, and taurodontism. Several dental anomalies have been reported together with congenitally missing teeth.³ Two-thirds of hypodontia patients were reported to have infraocclusion of primary molars.⁷ A reciprocal association exists between infraocclusion of primary molars and aplasia of premolars.³ Hypodontia and microdontia are very commonly seen together, which is a very well established fact. A most striking example of crown-size reduction associated with hypodontia is a peg-shaped upper lateral incisor.³ Coexistent hypodontia and supernumerary teeth is a rare mixed numeric anomalous condition of human dentition. Still rarer is presence of this condition in the same area of dental arches.^{27,36} The terms used are, "concomitant hypodontia and hyperdontia" and "oligo-pleiodontia."²⁷ A higher prevalence of taurodontism was reported in hypodontia patients; the mandibular first permanent molar being affected in one-third of them, which is much higher than in the normal population.⁷ Moreover, there seems to be a genetic relationship in the determination of different dental anomalies, considering the high frequency of patterns of association with hypodontia. A single genetic defect may result in different phenotypic expressions including varying traits such as tooth agenesis, microdontia, taurodontism, high arched palate, tongue tie, ectopic tooth position, and delayed development of different teeth.³⁴

In this study, there were 2 patients with syndromes. One had hypohydrotic ectodermal dysplasia. This patient presented with oligodontia of permanent teeth, heat intolerance, hypotrichosis, and depressed nasal bridge. The other patient had Axenfeld-Rieger syndrome. She presented with a history of familial glaucoma, hypodontia, and taurodontism of lower 1st molars. All the features along with hypodontia are in coordination with the available literature.^{1,7,29,40} Facial and other systemic malformations are common in syndromic hypodontia. OMIM lists over 60 different syndromic conditions that include hypodontia as part of their phenotypic spectrum of anomalies and candidate genes have been identified for many of these conditions.^{5,12,33}

Successful outcomes in the management of patients with hypodontia depend on careful diagnosis and treatment planning. Treatment should be aimed for restoration of missing teeth, establishment of normal vertical dimension and providing support for oro-facial soft tissues.³² Not only the number but also the distribution of the missing teeth is important variables in the estimation of treatment need.²⁶ Two categories are present for treating a patient with hypodontia either orthodontically or prosthodontically, but in cases of

over retained deciduous teeth, endodontic treatment with full coverage crown is also an option. A few Swedish studies indicate a higher orthodontic treatment need for patients with dental agenesis than for those in which all teeth are present.²⁶ Greater objective needs for orthodontic treatment exists for patients with missing anterior teeth or with two or more missing teeth in the same quadrant. Patients with oligodontia definitely need replacement treatment in the form of prosthetic appliances or dental implants. In the present study patients with nonsyndromic hypodontia were treated with orthodontic correction. In patients with syndromic hypodontia where multiple teeth were missing prosthodontic appliances were given. In patients with over retained deciduous teeth endodontic treatment was done.

Conclusion

Hypodontia is a congenital condition causing many physiologic effects. Hypodontia is associated with many syndromes; a dentist is often the first one to diagnose it. It should be diagnosed as early as possible to prevent harmful sequelae. Successful outcomes in the management of patients with hypodontia depend on careful diagnosis and treatment planning.

References

- Dudhia B, Shah J. A study on partial anodontia with and without syndromes. *J Indian Acad Oral Med Radiol* 2004;16(2):98-103.
- Brekhus PJ, Clarence P, Montelius G. A study of the pattern and combinations of congenitally missing teeth in man. *J Dent Res* 1944;23(2):117-31.
- Sirpa A, Sinikka P. Hypodontia. *Orphanet Encyclopedia*, May 2004. p. 1-7.
- Lidral AC, Reising BC. Molecular basis of tooth development related to dental defects causing tooth loss. *J Dent Res* 2008;87(7):617-23.
- Cobourne MT. Familial human hypodontia – Is it all in the genes? *Br Dent J* 2007;203(4):203-8.
- Goya HA, Tanaka S, Maeda T, Akimoto Y. An orthopantomographic study of hypodontia in permanent teeth of Japanese pediatric patients. *J Oral Sci* 2008;50(2):143-50.
- Charlene CW, Wong RW, Hagg U. A review of hypodontia: The possible etiologies and orthodontic, surgical and restorative treatment options—Conventional and futuristic. *Hong Kong Dent J* 2007;4(2):113-21.
- Whittington BR, Durward CS. Survey of anomalies in primary teeth and their correlation with the permanent dentition. *N Z Dent J* 1996;92(407):4-8.
- McNamara C, Foley T, McNamara CM. Multidisciplinary management of hypodontia in adolescents: Case report. *J Can Dent Assoc* 2006;72(8):740-6.
- Akif M, Ozkan D. Severe hypodontia: Four case reports and review of the literature. *Ataturk Univ Di Cilt* 2007;1:51-4.
- Londhe SM, Viswambaran M, Kumar P. Multidisciplinary management of oligodontia. *Med J Armed Forces India* 2008;64(1):67-9.
- Vastardis H. The genetics of human tooth agenesis: New discoveries for understanding dental anomalies. *Am J Orthod Dentofacial Orthop* 2000;117(6):650-6.
- Shashikiran ND, Karthik V, Subbareddy VV. Multiple congenitally missing primary teeth: Report of a case. *Pediatr Dent* 2002;24(2):149-52.
- Dinesh Rao B, Hegde S. A talon cusp on fused teeth associated with hypodontia: Report of a unique case. *Eur J Dent* 2010;4(1):75-80.
- Bateman G, Mossey PA. Ectopia or concomitant hypohyperdontia? A case report. *J Orthod* 2006;33(2):71-7.
- Nagaveni NB, Umashankara KV. Congenital bilateral agenesis of permanent mandibular incisors: Case reports and literature review. *Arch Orofac Sci* 2009;4(2):41-6.
- Silva ER, Reis-Filho CR, Napimoga MH, Alves JB. Polymorphism in the *Mx1* gene associated with hypodontia in a Brazilian family. *J Oral Sci* 2009;51(3):341-5.
- Al-Emran S. Prevalence of tooth loss in Saudi Arabian school children: An epidemiological study of Saudi male children. *J Dent Res* 1980;59:1936-40.
- Steiner-Oliveira C, Gavião MB, dos Santos MN. Congenital agenesis of premolars associated with submerged primary molars and a peg-shaped lateral incisor: A case report. *Quintessence Int* 2007;38(5):435-8.
- Hsu KW, Shen YF. Esthetic restoration of infra-occluded retained primary mandibular incisors with all-ceramic crowns in adult dentition. *Chang Gung Med J* 2004;27(12):911-7.
- Nganga RN, Nganga PM. Hypodontia of permanent teeth in a Kenyan population. *East Afr Med J* 2001;78(4):200-3.
- Raigrodski AJ, Saltzer AM. Clinical considerations in case selection for all-ceramic fixed partial dentures. *Pract Proced Aesthet Dent* 2002;14(5):411-9.
- Valencia R, Saadia M, Grinberg G. Controlled slicing in the management of congenitally missing second premolars. *Am J Orthod Dentofacial Orthop* 2004;125(5):537-43.
- Mattheeuws N, Dermaut L, Martens G. Has hypodontia increased in Caucasians during the 20th century? A meta-analysis. *Eur J Orthod* 2004;26(1):99-103.
- Peck S, Peck L, Kataja M. Site-specificity of tooth agenesis in subjects with maxillary canine malpositions. *Angle Orthod* 1996;66(6):473-6.
- Polder BJ, Van't Hof MA, Van der Linden FP, Kuijpers-Jagtman AM. A meta-analysis of the prevalence of dental agenesis of permanent teeth. *Community Dent Oral Epidemiol* 2004;32(3):217-26.
- Zhu JF, Crevoisier R, Henry RJ. Congenitally missing permanent lateral incisors in conjunction with a supernumerary tooth: Case report. *Pediatr Dent* 1996;18(1):64-6.
- Reddy N, Jain U. Congenitally missing teeth: A case report. *Ann Essence Dent* 1999;28:15-20.
- Nunn JH, Carter NE, Gillgrass TJ, Hobson RS, Jepson NJ,

- Meechan JG, *et al.* The interdisciplinary management of hypodontia: Background and role of paediatric dentistry. *Br Dent J* 2003;194(5):245-51.
30. Vieira AR, Meira R, Modesto A, Murray JC. MSX1, PAX9, and TGFA contribute to tooth agenesis in humans. *J Dent Res* 2004;83(9):723-7.
 31. Selvarani R, Sumithra R, Sangeetha A, Harshavardhan B. Coexisting dental anomalies hypodontia and taurodontism – A case report. *J Indian Acad Oral Med Radiol* 2005;17(2):76-9.
 32. Peker I, Kaya E, Darendeliler-Yaman S. Clinic and radiographical evaluation of non-syndromic hypodontia and hyperdontia in permanent dentition. *Med Oral Patol Oral Cir Bucal* 2009;14(8):e393-7.
 33. Garib DG, Peck S, Gomes SC. Increased occurrence of dental anomalies associated with second-premolar agenesis. *Angle Orthod* 2009;79(3):436-41.
 34. Garn SM, Lewis AB, Kerewsky RS. Size interrelationships of the mesial and distal teeth. *J Dent Res* 1965;44:350-4.
 35. Das G, Sarkar S, Bhattacharya B, Saha N. Coexistent partial anodontia and supernumerary tooth in the mandibular arch: A rare case. *J Indian Soc Pedod Prev Dent* 2006;24(5):33-4.
 36. Kokich VG, Kokich VO. Congenitally missing mandibular second premolars: Clinical options. *Am J Orthod Dentofacial Orthop* 2006;130(4):437-44.
 37. Dressler S, Meyer-Marcotty P, Weisschuh N, Jablonski-Momeni A, Pieper K, Gramer G, *et al.* Dental and craniofacial anomalies associated with Axenfeld-Rieger syndrome with PITX2 mutation. *Case Rep Med* 2010;2010:621984.
 38. Mamopoulou A, Hägg U, Schröder U, Hansen K. Agenesis of mandibular second premolars. Spontaneous space closure after extraction therapy: A 4-year follow-up. *Eur J Orthod* 1996;18(6):589-600.
 39. Anderson BL, Thompson GW, Popovich F. Evolutionary dental changes. *Am J Phys Anthropol* 1975;43(1):95-102.