Prevalence of Hypodontia and Supernumerary Teeth in Patients Attending Private Pediatric Dental Clinic in Lebanon

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Purpose: Because of the high rate of agenesis and supernumerary teeth in orthodontic patients and the lack of studies in Lebanon that document the prevalence of those anomalies, the aim of this study was to determine the prevalence of hypodontia and supernumerary teeth in patients attending a pediatric dental office and examine the associated factors. **Study design:** This was a cross-sectional design study. The patients were clinically examined followed by panoramic radiograph. Two calibrated investigators have examined the radiographic films and diagnosed the dental anomalies. Tooth agenesis and supernumerary teeth were the outcome variables of the study. Tooth agenesis was diagnosed when there were no sign of crown calcification and no evidence or history of loss attributable to orthodontic treatment, caries, periodontal problems and dental trauma. Tooth agenesis and supernumerary teeth were the outcome variables of the study. Chi-Square tests and Fisher Exact tests were performed to assess the association between outcome variables, gender and presence of medical problem. **Results:** 334 participants (mean age 7.31±2.17 years) were included in the study. The presence of dental anomalies was not reported as a reason for dental visits. The rate of tooth agenesis was 8.7% in the whole sample, 9.9% among boys and 7.6% among girls with no difference (p=0.442). The rate of tooth agenesis was elevated in participant with medical problems (14.5%) compared to those with no medical problem (7.0%) (p=0.041). The rate of supernumerary teeth was 0.6% among boys and 0% among girls (p=0.485). **Conclusion:** Oral anomalies could be detected relatively at early age. It can help in a long-term and effective treatment planning. Early diagnosis and appropriate follow-up with panoramic radiograph is extremely important to avoid maxillofacial deformity and other complications.

Keywords: pediatric patients, tooth agenesis, supernumerary tooth, anodontia

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INTRODUCTION

Tooth agenesis is one of the common congenital anomalies seen in humans: anodontia is defined as the complete absence of teeth and hypodontia is the congenital absence of one or a few teeth only, the third molars are excluded[1]. A tooth is considered congenitally missing when it cannot be discerned clinically or radiographically and no history of its extraction exists.

The prevalence of hypodontia is strongly influenced by race and ethnicity [2] and has been estimated to vary between 2% and 10% approximately in the permanent dentition and less than 1% in the primary dentition [3]. Several studies have investigated the prevalence of dental anomalies which vary between 4 and 8% in the European Caucasian populations, and between 5.6 and 11.4% in Spanish population [4]. Other studies reported prevalence of 2.7% to 12.2 % in the permanent dentition (excluding third molars) [4-6]. The most frequently missing tooth reported was the mandibular second premolar [2] and maxillary lateral incisors [7,8].

Supernumerary teeth are another type of dental anomaly but less common than hypodontia [9-10]. Anomalies in tooth number may lead to disturbances in maxillary and mandible arc length and occlusion [11,12]. The congenital absence of teeth can harm esthetics,

masticator ability, speech development and decrease oral health related quality of life especially during the adolescence [13]. Since the clinical management of hypodontia is generally complex, the early diagnosis of agenesis or supernumerary teeth enhances management of the dental arch in the growing child [14].

Dental radiography is a popular and most frequently used diagnostic tool by dentists. Panoramic radiography is an extra oral procedure, which shows a two dimensional view of the maxillary and mandibular region on a single film [15]. Most principal advantage of panoramic radiography is the wide coverage of facial bones and teeth. Panoramic radiography is used in the routine screening of patients at various institutions and private clinics [16]. It plays an important role in the diagnosis and treatment planning. Pediatric dentists do not occasionally request for the panoramic radiography of children following initial visit or routine checkup as parents refuse to do it due to radiations or child unusual behavior [17].

But most pediatric dentists prefer to use panoramic radiography as their first choice for treatment planning and diagnosis because most children can accept it without difficulty since it is an easy procedure that allows a global view [18]. It provides vast information about the dental and maxillofacial region as well as erupted and unerupted teeth. Consequently, information obtained by these radiographic with the clinical findings, supports diagnosis (18). It also gives an easy inspection of dental anomalies, and allows discovering additional findings not related with patient's main complaint [19]. Furthermore, early detection of dental agenesis/surnumerary teeth by panoramic radiography may avoid orthodontic problems [20,21].

Because of the high rate of dental anomalies in orthodontic patients [22] and the lack of studies in Lebanon that document the prevalence of agenesis and supernumerary teeth and the factors associated with these anomalies, the aim of this study was to determine the prevalence of hypodontia and supernumerary teeth in patients attending a pediatric dental office in Beirut and examine the associated factors in order to prevent and intercept orthodontic problems [23,24].

MATERIALS AND METHOD

This was a cross sectional study. Participants were recruited in a pediatric dental office in Beirut, Lebanon. All children visiting the pediatric clinic from January 2003 till December 2015 were invited to participate in the study. Written informed consent was obtained from the parent of the children. Patient's characteristics were collected from questionnaire administered by one pediatric dentist. The questionnaire included sociodemographic data (age and gender). Parents were asked about the general health status of their child and the reason of dental visit. The health questions included information about medication, vaccination, bleeding problems, allergy, history and reason of hospitalization. It also included questions about the reason for their dental visit to pediatric dentist (pain, bleeding, dental trauma, eruption problems, soft-tissue lesions and dental caries).

The patients were clinically examined by one pediatric dentist followed by panoramic radiograph which were taken in different radiology centers in Beirut Lebanon. In order to reduce radiographic misinterpretation, two calibrated investigators (pediatric dentists) have examined the radiographic films for all participants and diagnosed the agenesis and supernumerary teeth separately by direct observational method using a view box. A consensus was obtained in case of divergent diagnoses.

Tooth agenesis was diagnosed when there were no sign of crown calcification on the radiograph and no evidence or history of loss attributable to orthodontic treatment, caries, periodontal problems. Third permanent molars were excluded from the study. Others informations were also obtained from the patients' panoramic radiographs as position of the supernumerary tooth and associated dental anomalies diseases.

The statistical analysis was performed using a software program (SPSS for Windows version 20.0, USA). The alpha error was set at 0.05. Tooth agenesis and supernumerary teeth were the outcome variables of the study. Their prevalence was determined. Chi square tests were performed to assess the association between tooth agenesis, gender and presence of medical problem. Fisher Exact tests were used to assess the association between supernumerary teeth, gender and presence of medical problem.

RESULTS

Characteristic of the participants

334 participants (mean age 7.31±2.17 years) with 162 boys (mean age 7.20±2.26 years) and 172 girls (mean age 7.42±2.08 years) were included in the study. The distribution of age categories according to gender is presented in the following table (Table 1). 77.2% of the participants did not report any medical problems (Table 2). The reasons of the dental visits were mainly the presence of decays (42.6% boys v/s 44.8% girls), dental pain (33.3% boys v/s 39.0% girls) and check up (21.6% boys v/s 19.2% girls). The presence of dental anomalies was not reported as a reason for dental visits (Table 3).

Table 1: Distribution of age categories according to gender

Age categories	Boys (N=162)	Girls (N=172)
[3-4[years	5(3.1%)	3(1.7%)
[4-5[years	10(6.2%)	12(7.0%)
[5-6[years	30(18.5%)	19(11.0%)
[6-7[years	36(22.2%)	35(20.3%)
[7-8[years	23(14.2%)	39(22.7%)
[8-9[years	24(14.8%)	24(14.0%)
[9-10[years	12(7.4%)	18(10.5%)
[10-11[years	4(2.5%)	10(5.8%)
[11-12[years	5(3.1%)	6(3.5%)
>12 years	7(4.3%)	2(1.2%)

Table 2: Medical problems reported during the pedodontist visit

Medical problems	Boys (n=162)	Girls (n=172)	Total
No medical problem	122	136	258
Epilepsy	1	0	1
Anemia	1	2	3
Allergy and/or asthma	37	28	65
Physical dysfunction	1	1	2
Bronchitis	1	0	1
Cancer	1	0	1
Eye disease	2	1	3
Cardiac disease	2	1	3
Renal disease	0	1	1
Gastro esophageal reflux	2	0	2
Mental disorders	0	1	1

Table 3: Reasons for the dental visits

Reasons for dental visits	Boys (n=162)	Girls (n=172)	Sig.
Decay	69(42.6%)	77(44.8%)	0.876
Check up	35(21.6%)	33(19.2%)	0.583
Dental abscess	23(14.2%)	31(18.0%)	0.343
Dental pain	54(33.3%)	67(39.0%)	0.286
Traumatism	4(2.5%)	0(.0%)	0.038
Delayed in the eruption of permanent teeth	1(.6%)	1(.6%)	1.000
Presence of dental anomalies	0(.0%)	0(.0%)	-

Tooth agenesis

The rate of tooth agenesis in the whole sample was 8.7%. The prevalence of tooth agenesis was 9.9% among boys and 7.6% among girls but we did not find a significant difference between boys and girls ($p=0.442$). The age of the diagnosis of the tooth agenesis is illustrated in table 4. The agenesis of the upper lateral incisor was more frequent in boys (44.8% for the left lateral incisor; 31.3 % for the right lateral incisor) compared to girls (23.1% for the left lateral incisor; 12:0% for the right lateral incisor) ($p<0.001$). Also, the agenesis of the upper second premolar was more frequent in boys (31.3% for the right upper second premolar; 31.3% for the left upper second premolar) compared to girls (15.4% for the right upper second premolar; 15.4% for the left upper second premolar) ($p<0.001$). However, the agenesis of the lower second premolar was more frequent in girls (53.8% for the left lower second premolar; 23.1% for the right lower second premolar) compared to boys (12.5% for the left lower second premolar; 18.8% for the right lower second premolar) ($p<0.05$). The type of tooth agenesis is described in table 5 and figure 1.

Table 4: Age detecting the agenesis of the tooth according to gender

Age	Boys (n=16)	Girls (n=13)	Total
[3-4[years	2	1	3
[4-5[years	2	0	2
[5-6[years	1	0	1
[6-7[years	3	1	4
[7-8[years	0	6	6
[8-9[years	4	1	5
[9-10[years	1	0	1
[10-11[years	1	2	3
[11-12[years	0	1	1
>12 years	2	0	2

Figure 1: The type of tooth agenesis among boys and girls

	12	22	32	42	13	15	25	35	45
Boys	31.3%	43.8%	6.3%	0.0%	6.3%	31.3%	31.3%	12.5%	18.8%
Girls	0.0%	23.1%	7.7%	7.7%	0.0%	15.4%	15.4%	53.8%	23.1%
Total	17.2%	34.5%	6.9%	3.4%	3.4%	24.1%	24.1%	31.0%	20.7%
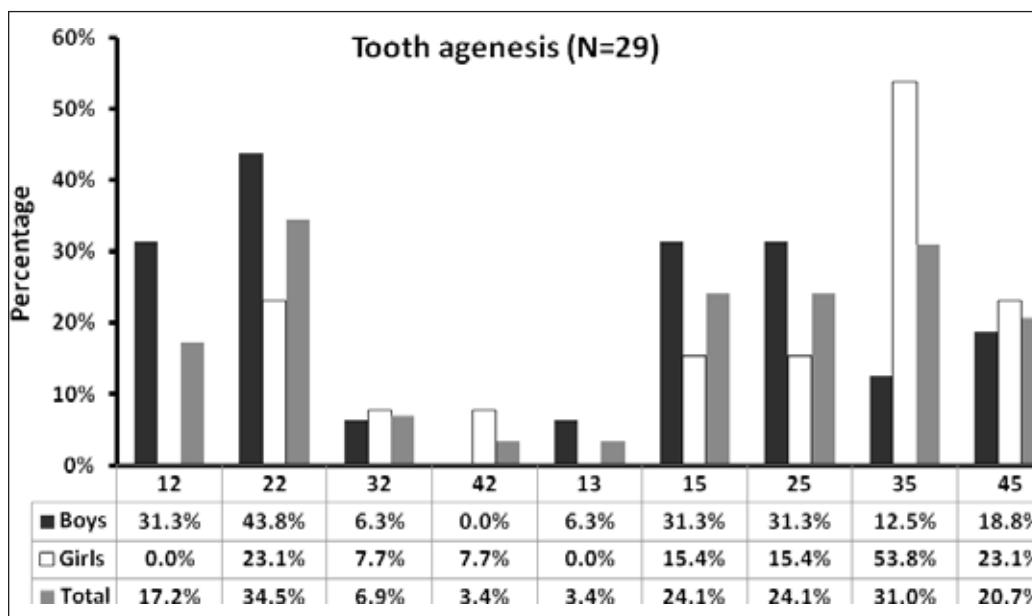
Table 5: The type of tooth agenesis among boys and girls

Tooth agenesis	Boys (n=16)	Girls (n=13)	Total
12	1	0	1
12,13, 15, 22	1	0	1
12,22	2	0	2
12, 22, 15, 25	1	0	1
15,25	2	0	2
15, 25, 35, 45	1	2	3
22	3	3	6
25	1	0	1
32	1	1	2
35	1	5	6
42	0	1	1
45	2	1	3

The rate of tooth agenesis was 9.9% among boys and 7.6% among girls but we did not find a significant difference between boys and girls (p=0.442). Moreover, the rate of tooth agenesis was elevated in participant with medical problems (14.5%) compared to participants with no medical problem (7.0%) (p=0.041) (Table 6).

Supernumerary tooth

The rate of surnumerary teeth in our study population was 0.3%. The supernumerary tooth among boys was the right lower second incisor The rate of supernumerary teeth was 0.6% among boys and 0% among girls and the difference was not significant (p=0.485). Moreover, surnumerary tooth was not found to be significantly associated with the presence of medical problems (p=0.228) (Table 6).

Table 6: Factors associated with dental anomalies

	Tooth agenesis		-p-value
	Yes	**No**	
Gender			
Boys	16(9.9%)	146(90.1%)	0.442
Girls	13(7.6%)	159(92.4%)	
Medical problem			
Present	11(14.5%)	65(85.5%)	0.041
Absent	18(7.0%)	240(93.0%)	
	Supernumerary teeth		**-p-value**
	Yes	**No**	
Gender			
Boys	1(0.6%)	161(99.4%)	0.485
Girls	0(0.0%)	172(100.0%)	
Medical problems			
Present	1(100.0%)	75(22.5%)	0.228
Absent	0(0.0%)	258(77.5%)	

DISCUSSION

This study has been conducted to determine the prevalence of tooth agenesis and supernumerary tooth in patients attending a pediatric dental office in Beirut Lebanon based on panoramic radiographs taken between 2003 and 2015. Our study was the first to estimate the prevalence of dental anomalies in Lebanon and panoramic radiography has been widely used in screening and in epidemiological studies, because it is convenient quick and simple.

The prevalence of congenitally missing teeth was observed in the permanent dentition of 8.7% of Lebanese pediatric participants. This rate was 9.9% among boys and 7.6% among girls. Nevertheless, our results are different from the prevalence determined in others studies which confirm the great variation in the prevalence of hypodontia in different societies and ethnicities. Nik-Hussein, 1989 [25] and Meza 2003 [26] found that the prevalence was 2.8% and 2.7% respectively. On another hand, Fekonja, 2015 [27] and Goya 2008 [28] found that the prevalence of hypodontia was 11.3% and 9.4% respectively.

Our findings revealed that the prevalence of hypodontia was not significantly related to gender which is in accordance with previous studies [27,29-31].

The main reasons of the participants' dental visits were the presence of decays and pain although the recognition of tooth anomalies resulted only from a chance observation or from family history. Diagnosis of tooth agenesis should be done and acknowledged after the age of six because the mineralization of the permanent dentition can be predictable, this could explain the age of our study population (between 7 and 13 years). The pediatric dentist may be the first to observe congenital absence of teeth in a young child. Hence, pediatric dentist is in a position to educate the child about preventive care, prevent future malocclusions, provide interim restorations, and counsel the child to help him or her cope with the situation. There is much to be gained from a multidisciplinary management of young children presenting with hypodontia. The aim of the dental team should be to maintain the existing dentition, improve esthetics and speech, allow proper mastication, and promote the child's emotional and psychological well-being. The pediatric dentist's role is to manage the child's behavior, maintain good oral hygiene, manage malocclusion; and provide intermediate restorations like removable or fixed partial dentures and resin retained bridges.

Unlike tooth agenesis, the prevalence of supernumerary teeth in our sample was not statistically different from that of the general population (Table 1). This suggests that these anomalies have different or independent etiologic factors. This is understandable, considering that tooth agenesis is a hypoplastic dental anomaly, whereas supernumerary teeth are hyperplastic anomalies.

Our results corroborate the findings of Baccetti, 1998 [32] and Garib, 2010 [7] who did not find higher frequencies of supernumerary teeth.

CONCLUSION

Oral anomalies could be detected relatively at early age, as presented in the present study. Our data point to the importance of a detailed and careful radiographic examination as panoramic radiographs. This could help in a long-term and effective treatment planning according to a child's individual. Early diagnosis and appropriate follow-up with panoramic radiograph is extremely important, it could avoid maxillofacial deformity and other complications. The results of this study cannot be considered representative of Lebanese children. However, the prevalence, location and distribution of hypodontia could provide useful data for future studies.

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