

Prevalence of dental anomalies among the school children: An Epidemiological study in South-East Region of Bangladesh

ABSTRACT

Purpose: This study was conducted on a randomly selected group of secondary school adolescents in the Sadar Upazila under Cox's Bazar to assess the incidence of developmental dental (Deciduous, permanent and Mixed Dentition) anomalies concerning age, gender, and the relationship between jaws and teeth.

Methodology: A sample survey by an oral examination of 198 school students, 11–16 years of age, was drawn from a Kalatali, Cox's Bazar District school Bangladesh who were available on October 19, 2019. Our participants were limited to students whose parents were agreed to participate in the survey and provided informed consent. Clinical examination was performed to identify the prevalence of developmental dental anomaly using portable light, dental mirror, and oral explorer. Dental abnormalities were discovered after examining the complete maxillary and mandibular arch.

Results: Of the total respondents under the study, 56.6% were female, and 43.4% were male. Among the diagnosed disturbances, developmental anomalies in upper lateral incisors prevailed in 34.3% of cases. The cusp of Carabelli appeared to be the most dominant one covering almost 73.9% of the existing coverage of anomalies. However, the presence of the cusp of Carabelli in the permanent dentition was found in 76.2% of cases.

Conclusion: Out of several dental anomalies, cups of Carabelli came out as the most prevalent dental anomaly among the sample shows 11.15 Chi-square value of the study subjects.

Keywords: Cusp of carabelli, dental anomalies, gemination, oral examination, talon cusp

INTRODUCTION

The tooth is a specialized part of the human body, and understanding its development is really enigmatic and challenging. Dental anomalies can be defined as craniofacial abnormalities of form, function, or position of teeth, bones, and tissues of the jaw and mouth.^[1] These can include malformations, alterations in a number of teeth, inherited disturbances, oral environmental changes during teeth development, etc. Oral developmental anomalies are observed in the teeth and the soft tissue. Abnormalities or anomalies of teeth shape, number, and structure develop due to unusual events in the embryological development of teeth caused by genetic and environmental factors during the morpho differentiation or histodifferentiation stages of development.^[2] In fact, there are several types of developmental anomalies frequently observed in the

teeth that occur during the morphological differentiation stage of development. These anomalies usually can include malformations, alterations in teeth, inherited disturbances,

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oral environmental changes during teeth development, etc. Dental anomalies could be caused by genetic factors (inherited or mutagenic), environmental factors^[3] (infections, physical injuries, hormones, maternal diseases and defects, drugs and chemicals like antimetabolites, thiadiazole, etc).

Many earlier studies reported the frequencies of different dental anomalies in a diverse population, but the findings sometimes appear conflicting.^[4] The discrepancies in the earlier reports/findings were attributed to racial differences, variable sampling techniques, and diagnostic criteria. Oral developmental anomalies can exist both in the teeth and the soft tissue. Dental developmental anomalies appear due to disruption in the odontogenesis system by the action of particular disruption factors.^[5] However, the disruption factors can be genetic factors or environmental factors, or even a combination of these factors. Virtually, developmental anomalies are the result of disturbances of the epithelium and mesenchymal interactions of teeth. Dental developmental anomalies can be complications of number, size, shape, structure, or color.

In this study, the following developmental dental anomalies were assessed:

1. Shape of the upper lateral incisor - Peg shape, cone shape, barrel shape, canine shape
2. Cusp of carabelli
3. Microdontia
4. Macrodontia
5. Hypodontia
6. Hyperdontia
7. Talon cusp
8. Supernumerary tooth.

Nevertheless, it is always claimed that early diagnosis of developmental and eruption disturbances is important to detect the problem and start treatment at the optimal time to minimize the complications. Furthermore, grasping/understanding the common dental anomalies can obviously prove to be a valuable tool for forensic dentistry.^[6] Many studies have depicted the prevalence of dental anomalies and eruption difficulties in permanent dentition. Still, there is a lack of such studies in primary dentition in a specific area/country scenario. Hence, the present study was conducted to generate baseline data about the occurrence of developmental and eruption disturbances of teeth in both initial (primary) and mixed dentition of the patients and the associations between factors such as child's age and gender jaw and teeth affected, etc. It is expected that the study would provide valuable information to the relevant doctors and researchers to develop pertinent strategy plans, further

researches, and arrange facilities for proper preventive, curative, and treatment procedures in future.

Objectives of the study

The specific objectives of the present study were as follows:

1. To identify the prevalence or existence of various dental anomalies among the school-going population in the selected area of Bangladesh
2. To determine/assess the distribution and differences in the prevalence of selected dental anomalies (a) according to the patient's age and (b) between sexes.

METHODOLOGY

Study area

The data used for this study were generated through conducting a sample survey. The survey was done in a public institution (Secondary school) named Kalatali High School under Sadar Upazila, falling under Cox's Bazar district situated in the South Eastern Region of Bangladesh.

Sampling and sample size

The present cross-sectional epidemiological study was primarily based on clinical examination of school Student's ages ranging from 11 to 16 years [Figures 1 and 2]. A random sampling technique (lottery method) was followed to select 1 secondary school in choosing the study samples. A total of 198 students were examined who were present in the school in the particular day, of which 86 were male and 112 were female. A checklist was used to record the patient's demographic details along with the medical and dental history, clinical findings, and relevant complications. The same examiner filled the checklist to ensure the uniformity of data.

The mode of data generation

The study was conducted in October 2019, which included Healthy children with no history of teeth missing due to caries, periodontal disturbances, and trauma or extraction. A comprehensive clinical examination was carried out to detect the presence of developmental and eruption disorders or disturbances and other dental anomalies. Children with medical history such as Down's syndrome, ectodermal dysplasia, Cleft lip and Cleft palate, history of extraction for orthodontic purpose or because of caries and trauma, medical problems were excluded from this study. However, in each case, a single examiner examined in a systematic manner using a dental mirror and a caries probe (the primary instruments used for oral examination) with no additional aid. The analysis included assessing the dental anomalies representing variations in tooth size, morphological status, and the number recorded in the checklist.

The anomalies taken into consideration in this study were: Cusp of carabelli: It is a distinctive morphological variant located on

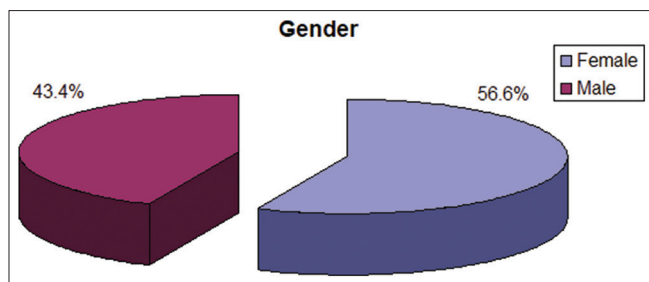


Figure 1: Distribution of gender of recruited respondents

the mesiopalatal surface of the upper first permanent molars and upper second primary molars. The degree and expression of the cusp of Carabelli can range from the small ridge, pit, furrow or as a tubercle,^[7] Microdontia: It is the presence of teeth which are physically smaller than usual,^[2] Macrodonia: It is the presence of teeth which is physically larger than usual,^[2] Hypodontia: It denotes the lack of development of one or more teeth,^[8] Fusion: It is union in dentin and/or enamel between two or more separately developed normal teeth.^[9] Gemination – It is incomplete division of a tooth germ,^[9] Talons cusp: Defined as an uncommon dental anomaly manifesting as an accessory cusp like structure projecting from the lingual or facial surface of anterior teeth of either dentition,^[10] Supernumerary teeth: Defined as teeth additional to the normal dentition,^[8] Dens in dente: This presents clinically as pit or fissure on the lingual surfaces of anterior teeth. The crown is almost always malformed if the coronal invagination is extensive.^[11]

Statistical analysis

Data management and graphical representation were carried out using MS Office Excel. Discrete (categorical) data were summarized in number (*n*) and percentage (%) and compared by Chi-square test using statistical software Stata 15.1 (Stata Corp, College Station, Texas 77845, USA). A two-sided $P < 0.05$ was considered statistically significant.

RESULTS AND DISCUSSION

The level of occurrence of dental anomalies

The level of developmental dental disturbances/anomalies as observed among the surveyed school students under the study area are furnished in Table 1 and Figure 3. Out of the total sample (198) students, 23 had different dental anomalies. Among the diagnosed anomalies, the cusp of carabelli appeared to be the most frequent/dominant one. This specific problem alone covered almost 73.9% of the existing coverage of dental anomalies among the sample respondents. Microdontia appeared to be the second crucial dental anomaly, and this one covered nearly 8.7% of the total cases with different dental abnormalities.

On the other hand, the prevalence of problems such as microdontia, macrodonia, and fusion was found with single students for each anomaly. Each of these problems

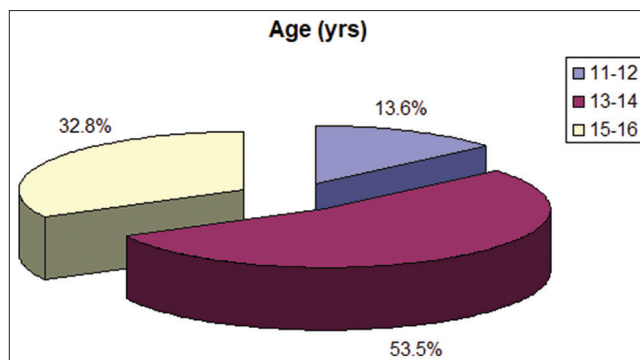


Figure 2: Distribution of age of recruited respondents

Table 1: Existence/prevalence and frequencies of dental anomalies exhibited in the total sample/respondents in the study area, (Cox's Bazar, Bangladesh)

Items	Number of sample respondents with anomaly	Prevalence of each anomaly (%)
Diagnosed dental anomalies	23	11.6
Cusp of carabelli	17	73.9
Microdontia	2	8.7
Macrodonia	1	4.3
Fusion	1	4.3
Super numerary	1	4.3
Dens in dente	1	4.3
Gemination	0	0.0
Talon cusp	0	0.0
Upper lateral incisor	33	16.7
Peg shape	12	36.4
Cone shape	12	36.4
Barrel shape	5	15.2
Canine shape	4	12.1
Total	56	28.3

Source: Survey, 2019

accounted for 4% of coverage out of the total number of students diagnosed with different anomalies, which was proportionately lesser than the figure reported in an earlier study by Nayak and Nayak.^[2] However, dental anomalies like gemination, talon cusp, dens evaginatus, etc., were not found in the present study.

Occurrence/prevalence of anomalies according to gender difference

In the current study, regarding gender distribution with respect to the prevalence of developmental dental anomalies, the empirical observations are depicted in Table 2 and Figures 3, 4. In case of upper lateral incisor, higher level of occurrences were observed in case of males (20.9%) while (13.4%) of female students had this problem. Even under categorical distribution of this dental anomalies, (e.g., peg shape, cone shape, barrel shape etc.) for all these types prevalence was higher incase of males compared to that of female. However, in case of developmental anomalies,

14.29% female had various anomalies while only 8.14% male respondents had those dental disturbances. These findings are quite consistent with the reported result by Deolia *et al.*^[12] and Buldur *et al.*^[13]

Prevalence of developmental and eruption disturbances with respect to the dentition stages

Data in Table 3 and Figure 5 show the level of occurrence/prevalence of developmental and eruption disturbances

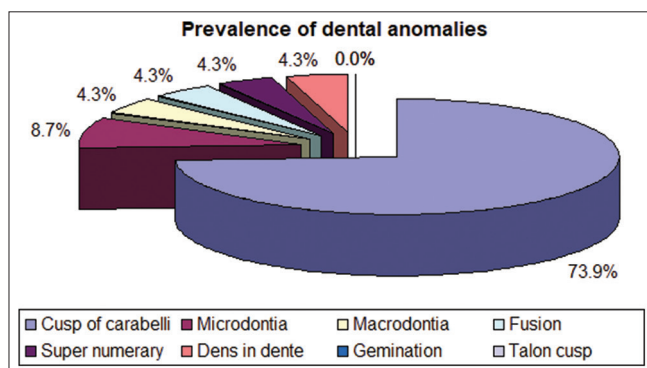


Figure 3: Distribution of prevalence of dental anomalies in recruited respondents

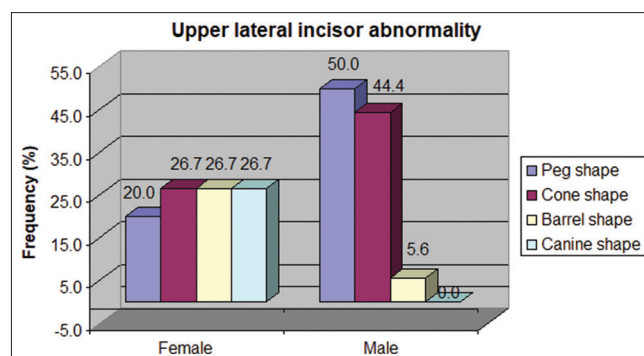


Figure 4: Distribution of the presence of upper lateral incisor abnormality according to gender in recruited respondents

Table 2: Structure of dental anomalies as observed among the sampled students according to gender difference in the study area

Items	Female (n=112), n (%)	Male (n=86), n (%)	χ^2	P
Upper lateral incisor abnormality	15 (13.4)	18 (20.9)	1.99	0.158 (NS)
Peg shape	3 (20.0)	9 (50.0)	9.94	0.019*
Cone shape	4 (26.7)	8 (44.4)		
Barrel shape	4 (26.7)	1 (5.6)		
Canine shape	4 (26.7)	0 (0.0)		
Developmental anomalies present	16 (14.3)	7 (8.1)	1.79	0.181 (NS)
Cusp of carabelli	12 (75.0)	5 (71.4)	3.97	0.554 (NS)
Microdontia	1 (6.3)	1 (14.3)		
Macrodontia	1 (6.3)	0		
Fusion	1 (6.3)	0		
Gemination	0	0		
Talon cusp	0	0		
Super numerary	0	1 (14.3)		
Dens in dente	1 (6.3)	0		

Figures in parentheses indicate percent. Source: Survey, 2019. NS= $P > 0.05$, * $P < 0.05$. NS: Non significant

Table 3: Level of occurrence/prevalence of developmental and eruption disturbances in teeth with respect to dentition stage among the sample students

Anomalies or disturbances	Deciduous dentition (<6 years), n (%)	Mixed dentition (6-12 years), n (%)	Permanent dentition (>12 years), n (%)	χ^2	P
Upper lateral incisor (abnormal)	0	18 (9.1)	15 (7.6)	0.55	0.460 (NS)
Peg shape	0	6 (33.3)	6 (40.0)	3.96	0.266 (NS)
Cone shape	0	6 (33.3)	6 (40.0)		
Barrel shape	0	2 (11.1)	3 (20.0)		
Canine shape	0	4 (22.2)	0		
Developmental anomalies (present)	0	2 (1.0)	21 (10.6)	31.39	<0.001***
Cusp of carabelli	0	1 (50.0)	16 (76.2)	11.15	0.049*
Microdontia	0	0	2 (9.5)		
Macrodontia	0	0	1 (4.8)		
Fusion	0	1 (50.0)	0		
Super numerary	0	0	1 (4.8)		
Dens in dente	0	0	1 (4.8)		
Gemination	0	0	0		
Talon cusp	0	0	0		

NS= $P > 0.05$, * $P < 0.05$, *** $P < 0.001$. Source: Field survey, 2019. NS: Non significant

in teeth with respect to dentition stages among the sample students. Although the present study covered handful (enough) number of teenagers of mixed dentition stage, happenly no developmental anomaly was observed in the deciduous teeth [Figure 6] among the students fallen under this sample group. However, out of the total examined subjects (sample), almost 18.18% fell under permanent dentition stage. Among the students falling under mixed and dentition, developmental anomalies were observed in different permanent tooth. Out of those diagnosed problems however, abnormal shape of the upper lateral incisor appeared to be the dominant one covering 33%. The presence of cusp of carabelli in upper or maxillary first and second molar tooth was found in 17 cases (covering 8.58%).

The apprehensive complications with the diagnosed dental anomalies

Several developmental anomalies were detected among the school students under the present study. Several associated problems are delineated in Table 4. Nevertheless, cusp of carabelli appeared to be the most common or frequent developmental anomaly. This problem is further associated with brown pigmentation in the ventral surface of the tongue, creates repeated irritation in patients tongue and

eventually results in the formation of ulcer. Dental problems, for example, both peg shape lateral, and microdontia are always regarded to be highly associated with esthetics and spacing. As such patients need to be cautious and further careful. Dens in dente, although was not observed within this particular sample, it is always associated with quite early pulpal connectivity. However, the associated problems commonly delineated with this as: the required recovery from dental problem through root canal treatment becomes difficult due to the complex anatomy of the particular tooth for the patients having this.

CONCLUSION

The issue of developmental dental anomalies is thought to great concern in the arena of dentistry. Although it encompasses a specific region of Bangladesh, this study dealt with a representative sample of teenagers having several vital early dental disturbances. In this study, the cusp of carabelli 17 became a significant dental anomaly (was the most prevalent dental anomaly) among the sample students, which covers 8.59% of the study participants. The prevalence of fusion in the present study was 0.8% which is higher than

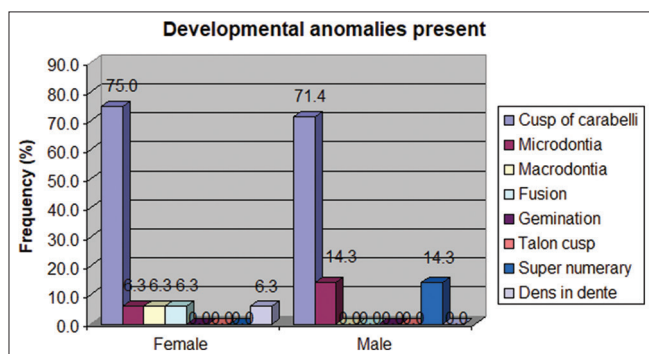


Figure 5: Distribution of the presence of development of dental anomalies according to gender in recruited respondents

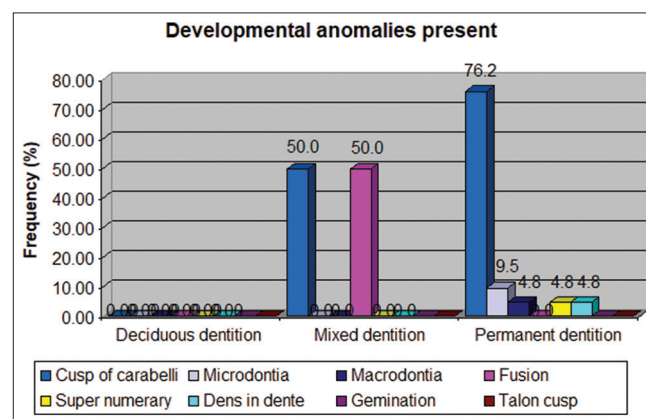


Figure 6: Distribution of the presence of developmental anomalies with respect to dentition stage among the recruited respondents

Table 4: Scenario of observed/diagnosed complications associated with developmental disturbances among the sample students

Specific dental anomalies	Cases diagnosed (n=35), n (%)	Associated complications
Cusp of carabelli	17 (48.6)	Irregular irritation in tongue and results in ulcer formation Irregular/brown pigmentation in the ventral surface of the tongue
Shape anomalies of the lateral incisor	12 (34.3)	Esthetic
Microdontia	2 (5.7)	Esthetics and spacing
Macrodontia	1 (2.9)	Crowding, malocclusion, and impaction
Fusion	1 (2.9)	With deeper extension subgingivally, the probability rises for zonal bacterial plaque accumulation
Super numerary	1 (2.9)	Impaction, delayed eruption, ectopic eruption, overcrowding, spacing
Dens in dente	1 (2.9)	Early pulpal involvement, RCT becomes difficult due to the complex anatomy of tooth
Gemination	0	If very deep and extend subgingivally, the possibility of bacterial plaque accumulation becomes high
Talon cusp	0	Esthetic, diagnostic, functional, esthetic, and pathological

Source: Field survey, 2019, RCT: Root canal treatment

results reported by few previous studies but lower than the results reported by Buldur *et al.*^[13]

Regarding gender, the tooth number anomalies were more common, followed by shape, positional, and structural anomalies among the school-going students in the southeastern region of Bangladesh. However, various surveys conducted on different populations have provided variable results concerning the prevalence of these dental anomalies. This variation highlights the need for establishing data from multiple areas to examine the effects of genetics, development, and environment on dental development. Nonetheless, it is widely agreed that early recognition and management of developmental anomalies can prevent children suffering from esthetic, orthodontic, and other periodontal problems in a substantive way.

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Conflicts of interest

There are no conflicts of interest.

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