PREVALENCE OF DENTAL ANOMALIES IN CHILDREN AND TEENAGERS FROM A BRAZILIAN NORTHEASTERN POPULATION

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ABSTRACT

Odontogenesis is a complex process that involves a reciprocal interaction between the dental lamina and ectomesenchyma originating from neural crest cells. Failures can occur during this process, causing dental anomalies. We aimed to evaluate, in children and adolescents, the prevalence of dental anomalies. We conducted a clinical-radiographical descriptive, cross-sectional, retrospective study of young patients to evaluate the prevalence of dental anomalies resulting from failures in odontogenesis. Three hundred and four (304) records were analyzed, with 75 anomalies found, distributed among 66 patients. Between the patients with these anomalies 41 (62%) were female and 25 (38%) were male. The most frequent dental anomalies were: agenesis (7.6%), enamel hypoplasia (4.6%), giroversion (4.6%), imperfect amelogenesis (1.6%), supernumerary tooth (1.6%) and root dilacerations (1.6%). According to the affected arch we found the following results: mandible (45.3%), maxilla (32%), maxilla and mandible (22.7%). According to the side affected by anomalies, the data were as follows: left (28.7%), right (24.3%), left and right (46.9%). It was observed a high prevalence of dental anomalies in the studied population, emphasizing the importance of epidemiologic research to recognize the occurrence and characteristics of those lesions in young patients in order to improve Dental Surgeon`s knowledge, since they need to be able to diagnose and treat it.

KEYWORDS: Dental anomalies, pediatric dentistry, orthodontics.

1. INTRODUCTION

In mammals, odontogenesis is a complex process that involves reciprocal interaction between the dental lamina derived from the early oral epithelium and adjacent ectomesenchyme that originates from the neural crest cells[1]. As in any natural course of development, failures can occur during any of the odontogenesis stages, leading to changes or dental anomalies[2]. These changes are common in children and can lead to serious problems if not diagnosed early. The clinical complications by dental anomalies range from speed, eruption disorders, diastema or root resorption, to more serious conditions such as cysts and tumors that significantly change the dentomaxilofacial development of young patients[3].

Among the anomalies of tooth development, there are number, shape, position and structural anomalies[2]. Although its causes are not fully understood, studies have suggested a genetic and hereditary tendency in the etiology of dental anomalies and eruption disorders[4,5]. Therefore, most research in this area seeks to characterize each of the dental anomalies, as seems to be the clear influence of environmental factors and ethnic features in its manifestation[6,7].

Early diagnosis of these changes is essential for planning, treatment and prognosis, and it is indispensable for the success of dental treatment, minimizing stress and costs to patients[8]. Therefore, it is clear the importance of the study and treatment of dental development anomalies since, apart from causing aesthetic discomfort for the patient, such anomalies can create disturbances in the length of the maxillary and mandibular arches and generate malocclusion, complicating the planning of dental treatment especially in the case of orthodontics[9].

Although many of these conditions can be detected clinically and radiographically while the child is still in the stages of deciduous or mixed dentition, little attention has been given to the investigation of these dental anomalies in the young patient. Considering that through an early diagnosis it is possible to prevent the installation of occlusal problems and to improve treatment planning in Orthodontics and Pediatric Dentistry, this study aimed to evaluate the prevalence and distribution of dental anomalies in children and adolescents from the town of Sao Luis - MA.

2. MATERIAL AND METHODS

This research consisted of a descriptive, cross-sectional and retrospective study of young patients to evaluate the prevalence of dental changes due to failures in odontogenesis. The sampling took place in a non-probabilistic convenience way. The research project was submitted to the Ethics Committee of the Federal University of Maranhão (CEP-UFMA), São Luís – MA, and was approved under the Protocol 006794/2011-80.

The population base was established at 1200 dental records of patients treated at the Clinic of Pediatric Dentistry, Federal University of Maranhão (UFMA) and the Specialist Clinic of Orthodontics, Brazilian Dental Association Maranhão section (ABO-MA), from 2007 to 2012. From these records, only 304 were evaluated, considering they measured up to the sample inclusion criteria.

The inclusion criteria for the sample were based on the condition that the records presented complete clinical data of the patient and quality full-mouth periapical or panoramic radiographs that would provide an adequate view of the teeth.

In order to perform the data collection, we used dental records of each chart, duly completed and evaluated by a single researcher. The data collected were noted in a form prepared for this research. The radiographic interpretation was carried out under conditions of adequate lighting under the inverted light a light box, in the dark, with the aid of a magnifying glass.

Studied anomalies and diagnostic criteria

1. Agenesis: absence of one or more dental elements. The definition was based on the age of the individuals and the period in which the initial dental formation should be present on radiographs. Regarding the agenesis of third molars, it was taken into consideration the radiographs of patients over 12 who did not present history of permanent teeth loss and it was considered the missing tooth when there was no radiographic sign of crypt formation. In the case of second premolars, it was considered only the radiographs of patients over the age of eight years.
2. Supernumerary teeth: presence of one or more extra teeth. When one of the teeth was located on the middle line, it was named mesiodens.
3. Macrodontia: when the tooth had a larger size when compared to other elements of arcade.
4. Microdontia: teeth smaller than the standard, when compared to the rest of the teeth.
5. Peg-shaped lateral incisors: were recorded when the incisive mesial-distal length of the tooth crown was less than the cervical width.
6. *Dens invaginatus*: invagination of the crown or root surface before calcification.
7. *Dens evaginatus*: forming an elevation (tubercle) that extends from the occlusal tooth.
8. Gemination and fusion: division of a tooth germ or union of two germs, considered when two teeth appear to be united.
9. Concrescence: root cement joining two or more teeth.
10. Taurodonty: characterized by an increase of the tooth body and a shortening of the roots, with furcations displaced apically.
11. Radicular Laceration: deviation or curvature of the linear relationship between the crown and root of the tooth. Angulation or sharp turn of 90 degrees or more at the root of a developed tooth.
12. Tooth rotation: rotation of the tooth on its own axis. Evaluated through X-rays and confirmed by clinical observations noted in the chart.
13. Defects of development of enamel and dentin: enamel hypoplasia, imperfect amelogenesis and imperfect dentinogenesis; assessed through the dental record data.

Data analysis

A descriptive statistical analysis of quantitative data to determine the means and standard deviations was performed. We used the software *Epi Info*™ 7.1.2 to analyze the prevalence and confidence intervals for qualitative variables.

3. RESULTS

The age of patients studied ranged from 1 to 18 years (mean age was 12 years and the standard deviation was 4.6). Of the 304 records, 164 (54%) were females and 140 (46%) males.

Among the analyzed medical records, it was found that 66 (21.7%) patients had some type of dental anomaly, with 41 (62.1%) being females and 25 (37.9%) males.

Regarding the color of the skin of patients with dental anomalies, 13 were black (19.4%), 12 white (17.9%), 27 browns (40.3%) and 15 who did not have skin color recorded.

In our study we found eleven different types of anomalies, totaling 75 cases distributed among the 66 patients. The proportion of anomalies found was 1:4.6. The prevalence of patients with dental anomalies was 24.6%, as shown in Table 1.

Regarding the diagnostic method used, 23 (30.7%) cases were observed only through clinical examination data (enamel hypoplasia, imperfect amelogenesis and imperfect dentinogenesis, natal teeth) and 47 (62.7%) cases were observed in clinical chart and had a confirmed diagnosis with radiographs (agenesis, supernumerary teeth, mesiodens, peg-shaped teeth, microdontia and giroversion). Finally, only 5 (6.6%) cases were diagnosed only by radiographs (radicular laceration).

Table 1. Prevalence of all dental anomalies found in this population.

Dental anomaly	Number of cases	Prevalence	Confidence interval
Dental agenesis	23	7.6%	4.5% to 10.5%
Enamel hypoplasia	14	4.6%	2.7% to 7.7%
Supernumerary teeth	5	1.6%	0.02% to 3.1%
Mesiodens	2	0.65%	0.02% to 1.5%
Microdontia	2	0.65%	0.03% to 0.09%
Peg-shaped tooth	1	0.33%	0.03% to 0.09%
Imperfect Amelogenesis	5	1.6%	0.02% to 0.3%
Tooth rotation	14	4.6%	2.2% to 6.9%
Radicular Laceration	5	1.6%	0.02% to 3.1%
Natal teeth	1	0.33%	0.03% to 0.09%
Imperfect dentinogenesis	3	0.98%	0.03% to 0.09%
Total	**75**	**24.6%**	**17%** to **26.3%**

According to the affected dental arche, 45.3% of the anomalies were found in the mandible, 32% in maxilla and 22.7% in both arches. Regarding the affected side, 46.9% of patients had both sides affected by anomalies, 28.7% showed anomalies only on the left side and 24.3% on the right side.

The studied patients had a number of teeth affected by dental anomalies ranging between 1 and 28, each patient had an average of 2.84 affected teeth. Most patients had only one (54.5%) or two (28.7%) teeth with anomaly or extra teeth.

The tooth agenesis was the most prevalent abnormality in the sample, affecting some dental groups (Figure 1).

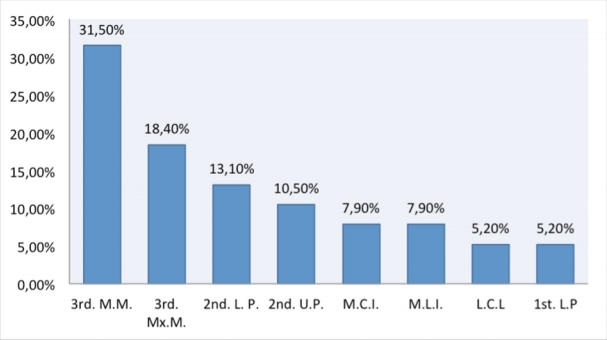

Figure 1. Frequency of agenesis in dental groups.
M.M: mandibular molar; Mx.M: maxillary molar; L.P: lower premolar; U.P: upper premolar; M.C.I: maxillary central incisor; M.L.S: maxillary lateral incisor; L.C.I: lower central incisor.

We tabulated the distribution of agenesis according to the number of affected teeth and the gender (Tables 2 and 3, respectively).

In this sample, it was found that the number of anomalies represented by agenesis and supernumerary teeth were the most prevalent. Followed by anomalies represented by enamel hypoplasia, imperfect amelogenesis and imperfect dentinogenesis. The hypoplasia affected 14 patients, totaling 30 teeth. The most affected teeth were central incisors and canines, followed by lateral incisors and first molars.

Table 2. Distribution of the number of teeth agenesis by patients.

Number of agenesis	Number of Patients	Total agenesis
1	14	14
2	6	12
3	2	6
6	1	6
Total	23	38

Table 3. Distribution of agenesis according to gender.

Gender	Number of subjects with agenesis	Prevalence of subjects with tooth agenesis
Female	14	4,6%
Male	9	2,9%
Total	23	7,5%

Among the position anomalies, we observed 14 (18.6%) patients with tooth rotations, totaling 22 teeth. Regarding the extra teeth, the prevalence of supernumerary teeth was 1.60% and 0.65% of mesiodens.

4. DISCUSSION

Currently, many researchers, especially in the area of Orthodontics, have paid attention to dental developmental anomalies in order to uncover their causes, given that these can cause various clinical complications[9,10]. However, we observed differences between epidemiological studies. These conflicting results may have been given due to geographical and phenotypic differences and sampling techniques used, given that studies have researched different types of dental anomalies[11,12]. The differences can also be explained by influences of the local environment and the nutritional status of patients[13,14].

The prevalence of patients with dental anomalies found in this population approaches the results found in a study developed by Libério *et al.* (2002)[13] at another treatment center in São Luís - MA. However, it differs from that found in a survey conducted with students from Rio de Janeiro - RJ[7] and 4-12 years-old children from Niteroi - RJ[12], where the prevalence was 11.9 % and 11.4 %, respectively. Yet, in surveys conducted in Turkey the prevalence ranged from 5.46%[14] to 40.3%[15]. We believe that the high prevalence of dental anomalies found in this study may have been given because the samples were collected in reference centers in Orthodontics and Pediatric Dentistry, in which complaints related to the consequences of the anomalies are common. We also emphasize that while some studies have reported data only through imaging studies[7,12], this research conducted a clinical and radiographic study, justifying a higher prevalence of anomalies found.

Regarding gender, there was no statistically signifi-

cant difference (p = 0.074). This value is close to those found by Coutinho *et al*. (1998)[12] and Altug-Atac & Erdem (2007)[14]. This fact makes us believe that probably the dental anomalies are not associated with gender.

We noticed that the jaw was the most affected dental arch. This result differs from the values found by other studies[11,12,14,15] in which the maxillary arch was the most affected by the anomalies. This result may suggest a genetic difference of the affected population, with greater predisposition to dental anomalies in the lower jaw.

According to the affected side, the prevalence of abnormalities was higher on both sides, disagreeing with the findings of Coutinho *et al.* (1998)[12] who found a greater prevalence of the anterior superior region; however, these authors did not report if both quadrants were affected. Furthermore, Küchler *et al.* (2008)[8] also found greater bilateral occurrence of dental anomalies. This result can be explained by the odontogenesis, since the teeth of the same group are formed simultaneously on both sides[2].

The agenesis or absence of dental elements has been the subject of several studies around the world, where it has been shown that genetics probably is the primary etiology of these anomalies[4]. This anomaly was the most prevalent in the studied sample. A result that confirms the data found in the literature[7,11,12,15,16]. The differences in the prevalence of each study can be justified by the phenotypic characteristics of each population. In African and Australian groups, for example, the prevalence of Hypodontia is 1%, while in Japanese groups it is 30 times higher[16].

Regarding the teeth most affected by agenesis, third molars were those who had the highest prevalence, especially mandibular third molars, followed by the upper and lower second premolars. These results corroborate those found by Borba *et al.* (2010)[17] in Campo Grande - MS, Costa *et al.* (2007)[18] in Sao Paulo - SP and the findings of Altug-Atac & Erdemb (2007)[14] for the third molars and premolars, respectively. However, the study of Borba *et al*. (2010)[17] only researched the prevalence of agenesis of third molars, while this study compared it with agenesis of other teeth.

The teeth most affected by dental agenesis were exactly the posterior dental groups of terminal elements (third molar and second premolar). This can be attributed to a phylogenetic evolution, and third molars have a strong tendency to disappear in future generations[17].

In Brazil, dental anomalies of structural type are poorly studied, although they lead to aesthetic problems, dental sensitivity and may be predictors of dental caries[19]. After the dental agenesis, anomalies of the structural type were the most prevalent in this population, and enamel hypoplasia was the most common one. These data are similar to those found in the literature[19-22]. We should emphasize that some studies evaluated only primary teeth and other assessed both the primary dentition as the mixed and permanent.

The primary teeth were the elements most affected by enamel hypoplasia in this sample. This finding is similar to those found by Pinho *et al.* (2011)[21]. However, unlike the findings of Li *et al.* (1995)[22]. We can explain this difference by variations in environmental factors surrounding each population, such as nutrition. Furthermore, the fact that deciduous teeth have been more affected by hypoplasia can be explained by the chronic vitamin deficiency during pregnancy (where these teeth are being formed), particularly of vitamin D, which is the most common cause of enamel defects. Vitamins A and C are also related to the enamel hypoplasia[21].

Still regarding structural dental anomalies, the prevalence of imperfect amelogenesis was low; the same result was observed by Altug-Atac & Erdem (2007)[14] in a Turkish population. Among the position anomalies, the most prevalent was tooth rotation. The same was observed by Armond et al. (2008)[8], but it differed from that found by Teixeira *et al.* (2008)[6]

In concern to the supernumerary teeth, adding to mesiodens, there was a prevalence similar to that found in a survey conducted by Moura et al. (2013)[23] in Teresina - PI. The results also are close to those found by Armond *et al.* (2008)[8], Girondi *et al*. (2006)[11] and Coutinho *et al* (1998)[12].

The results of this study are similar to those of Uslu *et al.* (2009)[15] and Coutinho *et al*. (1998)[12], regarding the root lacerations. However, it differs from Teixeira *et al.* (2008)[6], which probably occurred due to the difference between the mean age of the patients, which was higher in the latter study (mean age = 16.16) and indicates the presence of a larger number of evaluated teeth to root laceration.

We found only one case of peg-shaped tooth and natal tooth. Unlike other researches[7,10,14,15], we found no cases of macrodontia, concrescence, gemination, fusion, *dens invaginatus*, *dens evaginatus*, enamel pearls and taurodontism.

We noticed that some results differ from those reported in the literature. There is a wide divergence in methodologies employed. This makes us suggest that other studies be conducted involving young populations non-specific from dental services and greater standardization in research methods, so that they can make inferences that help elucidate the real prevalence and etiology of dental development anomalies, in order to contribute to their treatment and its complications.

5. CONCLUSION

This study demonstrated a high prevalence of dental anomalies in the studied population, especially dental agenesis and enamel hypoplasia, which frequently leads

to undesirable aesthetic and functional consequences for the patient. Thus, the epidemiological research is fundamental to determine the occurrence and characteristics of dental anomalies in young patients, which provides for orthodontists, pediatric dentists and clinical dental surgeons general information that assist in the diagnosis and treatment of these disorders.

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