

PREVALENCE OF DENTAL ANOMALIES THROUGH THE ANALYSIS OF RADIOGRAPHIES

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Received: 08/20/2015. Accepted: 12/26/2015

ABSTRACT

Dental anomalies have been studied in various countries by different people. There are many controversial results in the literature. The aim of this study was to evaluate the prevalence of 8 kinds of anomalies (supernumerary, agenesis, microdontia, macrodontia, transposition, fusion, concrescence and taurodontism), on a sample from Campo Grande, Mato Grosso do Sul Brazil, in a population group between 6 and 15 years old, through 1543 panoramic radiographies; characterize the prevalence observed and its respective hemisections and check if there had been any association of a kind of anomaly diagnosed in a patient (dental agenesis) with the emergence of other kinds on the same individual. For the sample, panoramic radiographies were not used either from patients wearing orthodontic braces or orthodontic retainer. The images were carefully analyzed by a calibrated observer. The results showed that 27.6% of the total sample presented some kind of anomaly. Agenesis was observed in 20.1% of the patients, microdontia in 5.8% of them, taurodontism in 3.1%, supernumerary teeth in 2.1%, macrodontia in 0.3% of the patients, dental transposition in 0.3% and fusion in 2 patients (0.1%). None of the patients presented dental concrescence. From the anomalies observed in this study, 32% involved the upper right hemiarch, 29.1% the upper left, 19.9% the lower right and 19% involved the lower left hemiarch. The presence of a second or third variation of normality was verified in patients who presented agenesis of incisors and premolar.

KEYWORDS: Radiography. Dental malformation. Congenital absence.

1. INTRODUCTION

Dental anomalies have been studied for years due to the problems they might cause if not diagnosed at the right moment. Thus, current figures and more accurate studies are not only a matter of interest for orthodontists but also for Public Health in general.

The main causes of congenital and acquired anomalies are nutritional problems, infections, traumas, temperature variation, as well as intoxication from chemical substances¹. The existence of an anomaly is clinically relevant to the early diagnosis of a possible association and might indicate an increased risk of other anomalies².

Studies about dental anomalies are important as it is possible to prevent the installation of occlusal problems in deciduous, mixed and permanent dentitions. The aim of this study was to, through the analysis of panoramic radiographies, look into the appearance of some kinds of dental abnormalities in individuals seen at private practices of Odontological Radiology and observe if, when agenesis was present in an individual, the same person presented other kinds of associated anomalies.

2. MATERIAL AND METHODS

The present study was submitted to the Research Ethic Committee (CEP) from UFMS, with approval under the protocol n° 545.578, from 27/02/2014. Only digital images were used, obtained at two Radiology Clinics from the city of Campo Grande (Brazil) through their database. The radiographies were analyzed in a dark room using a 27" computer (27" iMac – 8G memory).

1543 panoramic radiographies were selected, 818 from female patients and 725 from male patients, aged between 6 and 15 years old. The aim of this study was to obtain the prevalence of the following dental anomalies: supernumerary, agenesis, macrodontia, microdontia, transposition, fusion, concrescence and taurodontism. It was also evaluated in which hemisection there were more cases of anomalies and in which gender there were more cases. In the sample, panoramic radiographies were not used either from patients wearing orthodontic braces or orthodontic retainer, due to the fact that the orthodontic treatment requires, in most cases, that the patient has the third molars or the first pre-molars extracted. Patients carrying syndromes were not included in the sample either.

In order to evaluate dental agenesis in patients with mixed dentition, a table was used. The beginning of the appearance of the third molar crypt around 8 until 10 years old was considered. Thus, it was considered as a

third molar agenesis carrier, patients older than 10 years old, due to the fact that, according to what was expected, up to this age the crypt of these teeth must have appeared.

The analyzed radiographies were separated by filling in a form: by age, gender, and absence or presence of anomaly, tooth in question, and attempted hemi arcade. The images were carefully analyzed by a calibrated observer (through Kappa method) and the radiographic exams with absence of visualization standards and diagnosis were excluded from the research, as well as those which caused doubts on the interpretation of the images.

The evaluation of the association between the gender of the patients and the presence or non-presence of dental anomalies, as well as between the gender of the patients and the agenesis of pre-molar teeth or lateral incisors, with or without association to other anomalies, was made through chi-square test. On the other hand, the comparison between genders, in relation to the percentage of each one of the anomalies observed, was made through test z. The remaining results of the variables assessed in this study were presented either by descriptive statistics or by tables and graphics. The statistical analysis was carried out using the software SPSS, version 20.0 or SigmaPlot, version 12.5, considering a 5% level of significance.

3. RESULTS

Among the patients who were assessed, 72.4% did not present any dental anomaly, while 27.6% presented at least one kind of dental anomaly. In relation to gender, dental anomalies were observed in 27.1% of female patients and 28.1% of male patients.

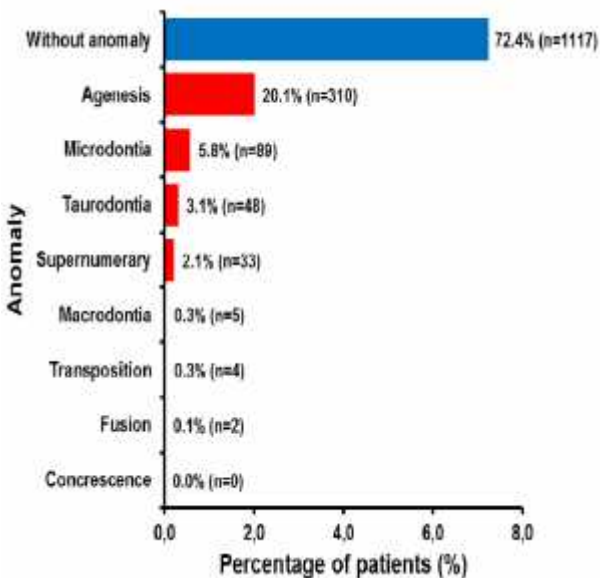


Figure 1. Graphic presenting the percentage of patients without anomalies and the percentage of patients with each one of the anomalies evaluated in this study. Each bar represents the percentage value.

There was no association between the gender of the patients and the presence or non-presence of dental anomalies (chi-square test, $p=0.703$). In general, the percentage of each anomaly found is displayed on the graphic below (Figure 1).

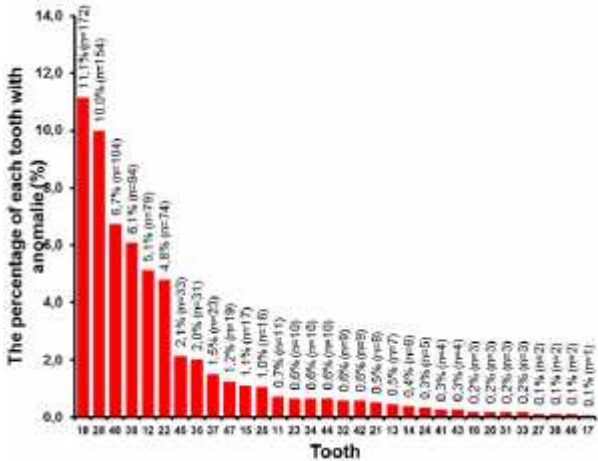


Figure 2. Graphic presenting the percentage of each tooth with anomalies evaluated in this study. Each column represents the percentage value.

Table 1. Distribution of teeth and malfunction of teeth with greater prevalence in each of the anomalies.

Teeth abnormality (n=921)			
Anomaly/tooth	% (n)	Anomaly/tooth	% (n)
Agnesis (71,1% - n=655)		Microdontia (14,0% - n=129)	
18	24,9 (163)	12	44,2 (57)
28	21,4 (140)	22	38,0 (49)
48	15,9 (104)	28	9,3 (12)
Taurodontia (9,1% - n=84)		Supernumerary (4,2% - n=39)	
37	23,8 (20)	11	15,4 (6)
47	22,6 (19)	23	15,4 (6)
35	15,5 (13)	21	12,8 (5)
Macrodonia (0,8% - n=7)		Transposition (0,5% - n=5)	
11	42,9 (3)	13/14	60,0 (3)
21	42,9 (3)	23/24	40,0 (2)
Fusion (0,2% - n=2)		Concrescence (0,0% - n=0)	
32/33	50,0 (1)	-	-
41/42	50,0 (1)	-	-

The percentage of male patients with supernumerary teeth (3.2%) was significantly higher than the female patients (1.2%). There was no significant difference be-

tween genders for the other anomalies and among patients who did not present any dental anomaly. The percentage of each tooth involved with anomalies in this study is presented in the Figure 2.

On table 1, the distribution of teeth by anomaly is presented, as well as the teeth with higher prevalence of anomaly in each one of them. Among the 921 anomalies observed in this study, 71.1% of them were dental agenesis, 14.0% were microdontias, 9.1% were taurodontism, 4.2% were supernumerary teeth, 0.8% were macrodontias, 0.5% were tooth transposition and 0.2% were dental fusions. Dental agenesis was most observed on tooth 18 (24.9%), microdontia on tooth 12 (44.2%), taurodontism on tooth 37 (23.8%), supernumerary teeth on tooth 11 (15.4% - n=6), macrodontia also on tooth 11 (42.9%), dental transposition on teeth 13/14 (60.0%) and dental fusion on teeth 32/33 and 41/42 (50% - 1 in each pair).

Table 2. distribution of patients according to gender and agenesis of pre-molar or lateral incisor teeth, with or without association to other anomalies.

Agenesis	Gender		p Value	Total % (n)
	Female % (n)	Male % (n)		
Premolars	(n=23)	(n=28)		(n=51)
Agenesis of 1 premolar tooth	34.8 (8)	39.3 (11)	0.968	37.3 (19)
Other abnormalities, including agenesis of the other premolars	65.2 (15)	60.7 (17)		62.7 (32)
Other types of defects as well as agenesis (among other defects)	20.0 (3)	29.4 (5)	0.838	25.0 (8)
Lateral incisors	(n=22)	(n=20)		(n=42)
Agenesis of 1 lateral incisor tooth	22.7 (5)	10.0 (2)	0.490	16.7 (7)
Other abnormalities, including agenesis of other lateral incisors	77.3 (17)	90.0 (18)		83.3 (35)
Other types of defects as well as agenesis (among other defects)	47.1 (8)	66.7 (12)	0.407	57.1 (20)

From the 33 patients who presented supernumerary teeth, 33.3% of them were mesiodens. From the 310 patients who presented agenesis, 16.5% of them were from pre-molar teeth and 13.5% from lateral incisors. Among those who presented pre-molar agenesis, 37.3% of them presented agenesis only in one of the pre-molar teeth, without any other anomaly, while the others (62.7%) presented other anomalies, including agenesis in other pre-molar teeth. On the other hand, among those

who presented agenesis on lateral incisors, 16.7% of them presented agenesis only in one of the lateral incisors, without any other anomaly, while 83.3% of them presented other anomalies, including agenesis in other lateral incisors. There was no association between the gender of the patients and this agenesis (chi-squared test, pre-molar: $p=0.968$; lateral incisor: $p=0.490$). These results are presented on table 2.

In this study, 655 dental agenesis were observed, in which 76.5% involved third molar teeth. From the anomalies observed in this study, 32% involved the upper right hemiarch, 29.1% the upper left, 19.9% the lower right and 19% involved the lower left hemiarch.

4. DISCUSSION

There are many studies on the prevalence of dental anomalies, but few talk about the association among different anomalies on the same individual. This can be explained by the difficulty to compare results with several variables, like this one, samples with different sizes, different ethnics and ways of interpreting distinct images.

The presence of dental anomalies is usually missed by most patients because there are no symptoms. However, even silent, these dental variations might be associated to clinical problems, such as teeth cysts, radicular reabsorption, and late eruption of other dental elements. Besides, it may cause aesthetic issues, as in the case of micro teeth (such as conoids – lateral incisors of reduced size).

The radiographic exams used in this study were evaluated by a single observer³⁻⁶ and the compliance of the intra-observer analysis (0.83) was considered high, as seen in other studies about dental anomalies^{6,7}.

The population researched hereby was mostly composed by female individuals^{3,8-13} aged between 6 and 15 years old, as many other studies about this subject^{3,4,5,7,14,15} however, diverging from many authors who used extremely different age range^{6,7,11,14} what may compromise the sample as older patients might have cases of undocumented dental extractions. Thus, using a reduced age range, the probability of error regarding dental extractions was decreased. It was also taken into consideration the bone density in regions which might have suffered some kind of exodontia.

The sample was composed by individuals who did not present any kind of syndrome^{12,15} as many syndromes are characterized by shape or quantity alterations of dental elements, i.e., this study tried to evaluate the population in general, without tending to alterations which could be already expected in certain kinds of patients. Images from patients wearing orthodontic braces or orthodontic retainer were not used, as seen in most studies^{3,5,11,15} in order to avoid any kind of tendentious sample, as many patients search for orthodontic treat-

ments because of aesthetic issues and these might be caused by dental anomalies.

It was observed, in the total sample, a prevalence of 27.6% of dental anomalies, which matches a published study⁶; however, it is different from others^{2,16}, what may be attributed to the different age range, different kinds of population and ethnics found on several existent studies. When comparing the prevalence between both genders, there was no association between the gender.

In the number dental alterations, frequencies of 20.1% of agenesis were observed in the total sample, which matches some known studies^{8,10,11} and are diverging from the prevalence found by others^{2,3,4,17}. These diverging data might be associated to the population studied as well as the different age range used in the studies. When assessing age range, the percentage changed to 6.1% in patients aged between 6 and 9 years old and 27.7% in patients aged between 10 and 15 years old. Still considering number alterations, there was a prevalence of 2.1% supernumerary teeth, diverging from some studies^{18,19}, but very close to numbers published in others^{2,12,20}.

Regarding shape alterations, a prevalence of 5.8% of microdontia could be observed, close to a study previously published about this anomaly; however²¹, diverging from many other studies^{2,19,20,22}. Still in relation to teeth shape alteration, a prevalence of 0.3% of macrodontia was found, a number close to a study carried out in 2012¹⁹. Little could be compared regarding this variable as the studies about it are scarce. Back to alterations on teeth configuration, a frequency of 3.1% of taurodontism was found, a number close to a study already published²⁰, but diverging from others^{2,14,19}. In the prevalence of taurodontism, distinct populations and some subjectivity present on the diagnosis criteria might have been determinant in relation to this result. At last, the rate found for fusion was 0.1%, a number close to previous studies^{19,20}. No case of concrescence was found¹⁹.

In relation to the alteration of position studied, transposition, four cases were found (0.3%), same number as a study already published⁷. The prevalence found was small and might be related to the fact that, as this alteration interferes a lot in the aesthetic part of the patients, more episodes could have been found in patients submitted to orthodontic treatment.

When seeking to evaluate which teeth were attempted most in the studied sample, a frequency of 11.1% was found for the upper right third molar, 10% for the upper left third molar, 6.7% for the lower right third molar and 6.1% for the lower left third molar. This fact might be related to the frequency of agenesis in the total sample (n=655) and in the sample when excluding the third molars (n=154), which are the most attempted teeth by dental agenesis^{17,23}.

Among the 921 anomalies observed in this study,

71.1% of them were dental agenesis, 14.0% were microdontias, 9.1% were taurodontism, 4.2% were supernumerary teeth, 0.8% were macrodontia, 0.5% were teeth transposition and 0.2% were dental fusions. Dental agenesis was mostly observed on tooth 18 (24.9%), microdontia on tooth 12 (44.2%), taurodontism on tooth 37 (23.8%), supernumerary on tooth 11 (15.4%), macrodontia also on tooth 11 (42.9%), dental transposition on teeth 13/14 (60.0%) and fusion on teeth 32/33 and 41/42 (50% - 1 in each pair).

From the 33 cases of supernumerary teeth, 33% were of mesiodens, fact that can be associated to documented reports²⁴ of this kind of alteration in which was verified a higher presence of these teeth in the medium line.

The presence of agenesis in pre-molars showed a strong association between this dental absence and the appearance of other kinds of anomalies on the same patient. From the studied images, 62.7% presented other kind of anomaly associated to the pre-molar agenesis, as well as in other study¹⁰ that found association between this factor and other agenesis on the same individual, as well as the appearance of microdontia.

The lateral incisors agenesis were evaluated and the conclusion was that there is also a strong association (83.3% presented other kind of anomaly) between this kind of dental absence and the appearance of other abnormalities on the same individual, like other studies^{11,15} that found association between the lack of the upper lateral incisor and other agenesis and microdontias.

When assessing the most attempted hemiarches in the sample, it was verified that 32% of the dental anomalies affected the upper right hemiarch, 29.1% the upper left hemiarch, 19.9% the lower right hemiarch and 19% the lower left hemiarch, which is directly related to the teeth that were mostly attempted in the whole sample, the third molars, which were more absent in the maxilla than in the jaw²³.

Thus, according to what was observed in this study, the panoramic radiographies continue to be great exams to detect problems which require a wide vision of the maxilla, being the chosen examination in order to investigate abnormalities on the dental development of the individual.

5. CONCLUSION

Based on what might be concluded that:

- Among the population studied, the most predominant anomaly was dental agenesis (20.1%). There was no association between the gender (male or female) and the appearance of the abnormalities researched.
- According to the observation of the mostly affected quadrants by the 8 variables analyzed, the upper ones were the ones which had more teeth attempted.
- Regarding the frequency between agenesis of pre-molars and lateral incisors, a strong relation was

observed between them and the appearance of other anomalies on the same individual, what may suggest that there is genetic association between the mechanisms that promote the manifestation of these findings.

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