

A Statistical Study of the Association of Seven Dental Anomalies in the Brazilian Population

Estudio Estadístico de la Asociación de Siete Anomalías Dentales en la Población Brasileña

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SUMMARY: The objective of this study was to show the association patterns among seven types of dental anomalies (second pre-molar agenesis, upper side incisive reduced in size, lower first molar infra-ochlesis, enamel hypoplasia, first molar ectopic eruption, supra numerous teeth and upper canine ectopic eruption) in a population sample without dental treatment ranging in age from 7 to 14. A total of 172 patients were attended and underwent the clinical examination at the Clínica Infantil da Fundação Educacional de Barretos. Eleven patients from this total were selected according to a first dental anomaly diagnosis and submitted to panoramic radiography. A significant association ($p < 0.05$) was detected among six pairs of anomalies (second pre-molar agenesis x first pre-molar ectopic eruption; second pre-molar agenesis x lower first molar infra-ochlesis; second pre-molar agenesis x upper side incisive reduced in size; supra numerous teeth x reduced size upper side incisive; first pre-molar ectopic eruption x enamel hypoplasia; lower first molar infra-ochlesis x upper side incisive reduced in size) suggesting a common genetic origin for these conditions. The association was not significant in only one case where there was anomaly sharing by the patients. The existence of an anomaly is clinically relevant for early diagnosis of a possible association and an anomaly can indicate an increased risk of other anomalies.

KEY WORDS: Dental anomalies; Genetics etiology; Brazilian Population.

INTRODUCTION

There are more than 500 anomalies caused by simple genetic factors and perhaps an equal number of others derived from multifactorial causes or chromosome aberrations where there are orofacial alterations. The frequency of symptom-less carriers of heredity anomalies that affect the teeth can be calculated from genetic data that is often essential to advise on the probability of affected offspring (Salzano, 1982). The specter of a possible association among dental anomalies was reported by Hoffmeister between 1975 and 1985 (Hoffmeister, 1975; 1977; 1985). The following manifestations were found in three consecutive generations of one family: multiple tooth loss, upper side incisive agenesis, ectopic eruption of the permanent maxillary first molar and intra-bone displacement of the upper canines. The objective of the present investigation was to prove the existence of significant association among seven different types of anomalies: second pre-molar agenesis, upper side incisive reduced in size, lower

first molar infra-ochlesis, enamel hypoplasia, first pre-molar ectopic eruption, supra numerous teeth and upper canine ectopic eruption in a sample of the Brazilian population without dental treatment consisting of individuals aged 7 to 14 years to identify the etiological and clinical relevance of these associations.

MATERIAL AND METHOD

The sample was obtained from a total of 172 patients aged 7 to 14 who were attended at the Clínica Infantil da Fundação Educacional de Barretos. Radiographic material was obtained from eleven patients who presented one of the anomalies on first diagnosis. Individuals were excluded from this sample who had craniofacial malformation, cleft palate and/or lips, after effects of traumatic accidents to the teeth

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or multiple and/or advanced cavities. Other individuals were excluded due to incomplete or inadequate registration, ethnic diversity (only Caucasian individuals were included in the study) or family correlation (twins or siblings were excluded from the study).

The frequency of each of the seven anomalies studied was estimated from the samples of 172 individuals and analyzed. To ascertain whether the occurrence of a determined anomaly was independent from the occurrence of another, or whether there was association among them, the Fisher exact test was applied to the sample that is indicated mainly for situations where the expected total in at least one of the categories is less than five. For this, 2 x 2 contingency tables were constructed, stating the presence or absence of the 'A' anomaly with the presence or absence of anomaly 'B', always fixing the general total at 172.

This study was approved by the Research Ethics Committee of the Fundação Educacional de Barretos (nr. 02/2001).

RESULTS AND DISCUSSION

Table I shows the occurrence frequency of each one of the seven anomalies. A total of eleven individuals (6.4%) presented at least one of the anomalies investigated. Of these, only three (27.3%) presented two or more of these anomalies simultaneously. The most frequent anomaly was enamel hypoplasia, which was detected in 3.5% of the individuals. The least frequent was the palate displacement of the maxillar canine, that was not observed at all.

There are few studies that report the frequency of such anomalies so that comparison with other populations is difficult. Among these, the frequency of supra numerous teeth was the most explored.

A study analyzed a population in the United States consisting of 1.100 patients of whom seven presented supra numerous teeth with a frequency of 0.64% (Baccetti, 1993). In a study that analyzed 2.264 black American children, the rate of supra numerous teeth was 1.49% (Kotsomitis & Freer, 1997), much higher than the frequency detected in a Nigerian population (0.098%) consisting of 13 patients (Baccetti, 1998a).

The frequency of supra numerous teeth detected in our study (2.3%) was higher than that reported in the literature that differentiates the Brazilian population and therefore further studies are needed to refine these comparisons.

A single study that analyzed a second anomaly (reduced size of the lateral maxillar incisive) presented a 29.4% frequency in a Nigerian population (Baccetti, 1998b), much higher than that detected in our study (1.2%).

Eighty individuals in a study carried out on a family analyzing three generations presented several anomalies associated with infra-ochlesis of the first molar. More recently, taurodontism of the first lower molar was detected in 24.8% of patients with congenital tooth loss, and first molar infra-ochlesis was detected in 65.7% of the same samples (Rubenstein *et al.*, 1991; Bruce *et al.*, 1994). The association among four anomalies (first molar ectopic eruption, lower first molar infra-ochlesis, upper canine ectopic eruption and pre-molar agenesis) was investigated by Bjerklin *et al.* in 1992 (Umweni & Osunbor, 2002). The findings indicated the presence of a reciprocal association among pre-molar agenesis and infra ochlesis of the lower first molar. This association was also confirmed by a subsequent study using a large sample (Umweni & Ojo, 1997). Upper canine ectopic eruption increased significantly when any one of the other three conditions mentioned above was detected, while lower first molar ectopic eruption increased the prevalence of first molar infra-ochlesis. These results were interpreted to sustain the hypothesis of a common, presumably hereditary, etiology for

Table I. Occurrence frequency of seven dental anomalies in 172 individuals analyzed.

Dental anomalies	Affected patients (from a total 172 individuals)											Freq.
	1	2	3	4	5	6	7	8	9	10	11	
Second pre-molar agenesis					X	X						0.012
Supra numerous teeth	X	X	X	X								0.023
Upper canine ectopic eruption												0.000
First molar ectopic eruption						X						0.006
Lower first molar infra-ochlesis					X							0.006
Enamel hypoplasia						X	X	X	X	X	X	0.035
Reduced size upper side incisive				X	X							0.012

the study of dental disturbance and it is known that each disturbance has incomplete penetration. Finally, a high prevalence of associated dental anomalies (76.02%) was calculated from a sample of 169 inherited syndromes with dental disturbances, strongly suggesting the possibility of genetic correlation among tooth number, size, form and structural characteristics (Lai & Seow, 1989). Concrete evidence suggests that genes perform a preponderant function in the etiology of dental anomalies. Some type of genetically controlled interrelation may exist for some of these anomalies shown by their association frequencies. It has also been speculated that a

“common genetic defect” may lead to different phenotypic manifestations, including tooth loss, malformation, ectopic eruption and bad positioning. Thus dental anomalies may be caused by a disturbance inherited in the tooth structure development. Knowing that these dental anomalies can be inherited, a family history and early clinical diagnosis or radiographic detection can alert parents and clinics to the high probability of detecting others in the same individuals and similar anomalies in other members of the family (Seow & Lai, 1989). In 1998, Baccetti studied association patterns among seven types of dental anomalies (second pre-molar agenesis, reduced size of the upper side incisive, lower first molar infra-ochlesis, enamel hypoplasia, first molar ectopic eruption, supra numerous teeth and upper canine ectopic eruption) (Bjerklin *et al.*, 1992).

A reciprocal association ($p < 0.005$) was found among five of the anomalies (second pre-molar agenesis, reduced size of the upper side incisive, lower first molar infra-ochlesis, enamel hypoplasia and upper canine ectopic eruption) suggesting a common genetic origin for these conditions. Further in 1998, Baccetti studied the association pattern among five types of dental anomalies (second pre-molar agenesis, reduced size of the upper side incisive, lower first molar infra-ochlesis, first molar ectopic eruption, upper canine ectopic eruption) (Baccetti & Tollaro, 1995).

Significant reciprocal association ($p < 0.008$) was detected among four types of dental anomalies (second pre-molar agenesis, reduced size of the upper side incisive, upper first molar infra-ochlesis, upper canine ectopic eruption).

First molar ectopic eruption seems to be a separate pathological entity compared with all the other dental anomalies examined (Baccetti & Tollaro).

Table II shows the probability of independence among the anomalies studied in this study, obtained by the Fisher exact test. Assuming a 5% significance level ($\alpha = 0.05$), there was

Table II. Probability of association among the pairs of anomalies analyzed, obtained by the Fisher exact test. The significant values are in bold. a- second pre-molar agenesis; b- supra numerous teeth; c- upper canine ectopic eruption; d- first molar ectopic eruption; e- lower first molar infra-ochlesis; f- enamel hypoplasia; g- reduced size upper side incisive.

	^a SPA	^b SNT	^c UCEE	^d FMEE	^e LFMI	^f EH
SNT	0,954					
UCEE	1,000	1,000				
FMEE	0,012	0,977	1,000			
LFMI	0,012	0,977	1,000	0,994		
EH	0,069	0,866	1,000	0,034	0,965	
^g RSUSI	0,023	0,046	1,000	0,988	0,012	0,931

significant association among six pairs of anomalies. There was anomaly sharing by the patients in only in one case (second pre-molar aplasia and enamel hypoplasia) and there was no probability of significant association among the anomalies (Table 2). These results strongly indicate that the studied anomalies are related but a wider sample is still necessary to obtain stronger conclusion about the association pattern of such anomalies in the Brazilian population.

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RESUMEN: El objetivo de este estudio fue mostrar los patrones asociación entre siete tipos de anomalías dentales (agenesia del segundo premolar, incisivo lateral superior en tamaño reducido, infra-oclesis del primer molar inferior, hipoplasia del esmalte, erupción ectópica del primer molar, dientes supernumerarios y erupción ectópica de caninos superiores) en una muestra de población sin tratamiento dental, de edades comprendidas entre los 7 a 14 años. Un total de 172 pacientes fueron atendidos y se les realizó el examen clínico en la Clínica Infantil da Fundação Educacional de Barretos. Once pacientes de el total fueron seleccionados de acuerdo con un primer diagnóstico de anomalías dentales y presentado en la radiografía panorámica. Se observó una asociación significativa ($p < 0,05$) entre los seis pares de anomalías (agenesia de segundo premolar x erupción ectópica del primer molar; agenesia del segundo premolar x infra-oclesis del primer molar inferior; agenesia del segundo premolar x incisivo lateral superior en tamaño reducido; dientes supernumerarios x incisivo lateral superior en tamaño reducido; erupción ectópica del primer molar x hipoplasia de esmalte; infra-oclesis del primer molar inferior x incisivo lateral superior en tamaño reducido), sugiriendo un origen genético común para estas condiciones. La asociación no fue significativa en un sólo caso donde hubo anomalías compartidas por los pacientes. La existencia de una anomalía es clínicamente relevante para el diagnóstico precoz de una posible asociación y una anomalía puede indicar un mayor riesgo de otras anomalías.

PALABRAS CLAVE: Anomalías dentales; Etiología genética; Población Brasileña.

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