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Occurrence of hypodontia, supernumerary teeth and dental anomalies in Brazilian individuals with Down syndrome

Talitha de Siqueira Mellara DDS MSc[1], Luiz Carlos Pardini PhD[2], Paulo Nelson-Filho DDS PhD[3], Raquel Assed Bezerra da Silva PhD[4], Lea Assed da Silva PhD[3] and Alexandra Mussolino de Queiroz PhD[4]

[1]Student, Department of Pediatric Clinic, Preventive and Community Dentistry; [2]Professor, Department of Morphology, Stomatology and Physiology; [3]Chairman Professor, Department of Pediatric Clinic; [4]Professor, Department of Pediatric Clinic: School of Dentistry of Ribeirão Preto, University of São Paulo, Ribeirão Preto, SP, Brazil

Abstract

Aim and objectives: Oral manifestations of Down syndrome include large and fissured tongue, arched palate, micrognathia, open bite, angular cheilitis, malocclusion, bruxism, low incidence of caries, spacing of teeth, delayed eruption, periodontal disease and dental anomalies.

Design: This study evaluated the occurrence of hypodontia, supernumerary teeth and dental anomalies in 96 Brazilian individuals with Down syndrome by using clinical and radiographic examinations.

Results: Hypodontia was the most prevalent condition (35.4%), followed by microdontia (9.4%) and conical teeth (7.3%). Taurodontic teeth and tooth transpositions were observed in 3.1% of the patients, while invagination, hypomineralisation of enamel, and tooth fusion occurred in 1.1% of the cases. Among the individuals presenting dental anomalies of size, shape or position, the majority of them (23.9%) exhibited only one affected tooth.

Conclusions: The occurrence of hypodontia, supernumerary teeth and dental anomalies in individuals with Down syndrome is high, and early detection of these conditions allows for dental treatment to be adequately planned. Also, a comprehensive radiographic examination should be indicated for all children with Down syndrome.

Key words: *Down syndrome, dental anomalies, supernumerary teeth, hypodontia, taurodontic teeth*

Introduction

Down syndrome (DS), the most frequent form of learning difficulties caused by a microscopically demonstrable chromosomal aberration, is characterised by well-defined and distinctive phenotypic features and natural history. It is caused by triplicate state (trisomy) of all or a critical portion of chromosome 21 (OMIM #190685).

The oral manifestations of DS reported in the literature include protrusive and unusually large tongue, fissuring and hypertrophy of the dorsum of the tongue, arched palate, micrognathia, maxillary asymmetry, open bite, mouth breathing, angular cheilitis, malocclusion, bruxism, poor oral hygiene, low incidence of caries, spacing of teeth, delayed eruption, high prevalence of periodontal disease, malformation of teeth, microdontia, conical shape, hypodontia, supernumerary teeth, taurodontism and enamel hypoplasia or hypocalcification,(Cohen *et al*., 1970; Chow and O' Donnell,1997; Desai,1997; Asokan *et al.*, 2008).

Authors have been concerned with the evaluation of prevalence of hypodontia, supernumerary teeth and dental anomalies of size, shape and position in individuals with DS from different populations worldwide (Bell *et al.*, 1989; Mestrović *et al*., 1998; Shapira *et al*., 2000; Lomhlt *et al.*, 2003; Moraes *et al.*, 2007; Asokan *et al*., 2008). However, according to Moraes *et al*. (2007), this kind of study is very uncommon in Brazil. Therefore, the objective of the present study was to determine the occurrence of hypodontia, supernumerary teeth and dental anomalies of size, shape and position in Brazilian individuals with Down syndrome by means of clinical and radiographic examinations.

Material and method

The study population was composed of 96 individuals diagnosed with Down syndrome (57 males and 39 females) aged between 5 and 36 years (median = 20 years; Q1= 15 years; Q3= 27 years) attending the Centre for Formation of Human Resources Specialized in Dental Care to Special Needs Patients of Ribeirão Preto Dental School, University of São Paulo, for dental treatment. Before the beginning of the treatment, the individuals were evaluated clinically and radiographically for the presence of hypodontia, supernumerary teeth and dental anomalies of size, shape and position in the deciduous and permanent dentitions. Individuals who had been subjected to previous dental procedures, such as tooth extraction, were excluded from the study because this could interfere with the diagnosis.

All patients were first subjected to professional pumice/rubber cup prophylaxis, and clinical examination was performed by using a dental mirror under flood-light reflector. Following clinical examination, panoramic radiographs were taken using a Veraviewpocs digital imaging device (J. Morita MFG Corp, model X-55, Kyoto, Japan, 2003). The clinical and radiographic examinations were performed by two examiners (dentists) who had been previously trained and calibrated (kappa = 0.9). The presence of hypodontia, supernumerary teeth and dental anomalies was recorded and the occurrences were expressed in percentage.

This study was previously approved by the Ribeirão Preto Dental School Research Ethics Committee (Process number 2007.1.445.58.2).

Results

The cases of hypodontia, supernumerary teeth and dental anomalies are listed in *Table 1*.

Hypodontia had the most common occurrence (35.4%), affecting maxillary lateral incisors (44.1%), mandibular lateral incisors (38.2%) and mandibular second premolars (35.3%) (*Table 2*). Cases of missing third molar were not considered as hypodontia because such a condition is very common in the general population, and several patients lacked this tooth germ.

Among the dental anomalies, microdontia was the most frequently observed (9.4%), affecting mainly the maxillary second molar (77.8%) (*Table 3*). Conical teeth were the second most common dental anomaly (7.3%), affecting only the maxillary lateral incisor. Six of the seven individuals presenting this dental anomaly had only one conical-shaped tooth, and in one individual, both maxillary lateral incisors had a conical shape.

Taurodontism was observed in three individuals (3.1%), always affecting the maxillary and mandibular permanent first molars. It was also observed the presence of supernumerary teeth in three individuals (3.1%), located in the maxillary canine region. Tooth transposition was observed in 3.1% of the individuals involving teeth maxillary right and left canines and first premolars. Among the individuals presenting dental anomalies of size, shape or position, the majority of them (23.9%) exhibited only one affected tooth (*Table 4*).

Table 1 Distribution of cases of hypodontia, supernumerary teeth and dental anomalies of size, shape and position in the 96 individuals with Down syndrome

	Number of affected patients	%
Hypodontia	34	35.4%
Supernumerary teeth	3	3.1%
Microdontia	9	9.4%
Conic teeth	7	7.3%
Taurodontism	3	3.1%
Tooth transposition	3	3.1%
Dental invagination	1	1.1%
Enamel hypomineralisation	1	1.1%
Fusion teeth	1	1.1%

Discussion

Alterations in the number, size and morphology of teeth are among the several inherited disorders that have been reported in individuals with DS (Shapira *et al*., 2000). In the present study, hypodontia was the most common condition observed (35.4%), affecting mainly the maxillary lateral incisors (44.1%), followed by the mandibular lateral incisors (38.2%), and the mandibular second premolars (35.3%), often bilaterally. Our results are in agreement with those by Acerbi et al. (2001) and Kumasaka *et al*. (1997), who also identified hypodontia as the most frequent occurrence among patients with DS. According to Acerbi *et al*. (2001) the maxillary lateral incisor was the most frequently missing tooth, often bilaterally, which was also a finding of our study. However, Kumasaka *et al*. (1997) reported that hypodontia affected the mandibular lateral incisors more predominantly, followed by mandibular second premolars, maxillary second premolars, and maxillary lateral incisors. Moraes *et al*. (2007) found that hypodontia was the second most common anomaly of the dentition (34.69%), but the frequency of occurrence of this condition was very similar to that found in the present study. According to Kumasaka *et al*. (1997), the high prevalence of hypodontia in cross-sectional studies on individuals with DS may be due to the delayed formation of tooth germs. Orner (1973) observed that the germs of permanent teeth can be identified in 5-year-old individuals without DS, which is not always possible in patients with DS. In the present study, 95 individuals were over 5 years of age, corresponding to 98.9% of the total sample. Therefore, we believe that this fact had no influence on our results.

Supernumerary teeth were observed in our study only in 3.1% of the individuals. This finding is in accordance with

the results of Ranta (1988), who reported a prevalence of supernumerary teeth in individuals with syndromes ranging from 0.1 to 3.8%.

The concomitant occurrence of hypodontia and supernumerary teeth in the general population is rare (Chow and O'Donnell, 1997; Acerbi, 2001). Chow and O'Donnell (1997) described a clinical case of a patient with DS, whereas Acerbi et al. (2001) noted this condition in only one case in their sample (1.43%). In the present study, two individuals (2.1%) were observed with both hypodontia and supernumerary teeth, suggesting that the concomitant presence of these conditions may be more prevalent in individuals with DS.

The prevalence of tooth transposition in the general population is less than 0.1%. In fact, there has been little research on this condition in individuals with DS. Shapira et al. (2000) evaluated 34 individuals with DS and observed the presence of tooth transposition involving canines and first premolars in 15% of the cases. In the present study, tooth transposition occurred in 3.1% of the individuals. Studies on conical teeth in individuals with DS are also scarce in the literature. In the present study, conical teeth were present in 7.3% of the patients, affecting only the maxillary lateral incisor. However, Morais *et al*. (2007) observed occurrence of 14.28% of conical teeth in individuals with DS.

In the present study, microdontia was observed in less than 10% of the patients, mainly involving maxillary second molars. In the study by Stark (1982), 35-55% of the individuals with DS exhibited microdontia in both dentitions, whereas Moraes et al. (2007) reported occurrence of microdontia in only 2.04% of the cases. Therefore, the occurrence of this microdontia is quite variable among the studies.

With regard to taurodontism, 3.1% of the sample exhibited such a condition. This finding is in accordance with the results of Jaspers (1981) who observed a prevalence ranging from 0.54 to 5.6%. On the other hand, Bell *et al*. (1989) reported a prevalence of 36.4% of taurodontism in 12 extracted lower molars in a sample of 33 individuals with DS. The authors suggest that this high prevalence is associated with both delayed ingrowth and fusion of the epithelial flaps of the developing root sheath. Moreover, taurodontism represents one of the several morphological dental features that are typically found in Down syndrome, resulting from the decreased mitotic activity of cells in developing tooth germs. In the study by Moraes *et al*. (2007) a much higher prevalence of taurodontism was observed (85.71%).

A prevalence of 1.1% was found for each of the following conditions: enamel hypomineralisation, tooth fusion and dental invagination. Moraes *et al*. (2007) have also observed a low prevalence of tooth fusion (2.04%). In the present study, 23.9% of the individuals with DS exhibited only one dental anomaly (size, shape or position) and 1% had two associated anomalies. Our results, however, differ from those of Moraes *et al*. (2007), who observed that 40.8% of the individuals with DS exhibited only one dental anomaly, 42.85% had two associated anomalies, 8.16% had three associated anomalies, and 4.08% had four associated anomalies. Only 2% of the sample did not present any dental anomaly. These differences in the results of the two studies might be attributed to two factors: Firstly, the different sample size - 96 subjects in our study versus 49 subjects evaluated by Moraes *et al*. (2007) and secondly the fact that Moraes *et al*. (2007) considered hypodontia as a dental anomaly. However, the current literature (ICD, 2007) considers hypodontia as a developmental disturbance of dental development and eruption, not including it in the group of dental anomalies.

Table 2 Distribution of hypodontia according to unilateral or bilateral presentation (n=34)

Hypodontia	Unilateral	Bilateral	Total (%)
Maxillary lateral incisor	5	10	15 (44.1%)
Mandibular lateral incisor	5	8	13 (38.2%)
Maxillary first premolar	3	1	4 (11.8%)
Maxillary second premolars	1	4	5 (14.7%)
Mandibular second premolars	3	9	12 (35.3%)
Maxillary canine	3	1	4 (11.8%)
Mandibular first premolar	1	1	2 (5.9%)
Maxillary second molars	2	0	2 (5.9%)
Mandibular second molars	2	1	3 (8.2%)

Table 3 Distribution of microdontia according to unilateral or bilateral presentation (n=9)

Microdontia	Unilateral	Bilateral	Total (%)
Maxillary permanent first molars	1	1	2(22.2%)
Mandibular permanent first molars	1	0	1(11.1%)
Maxillary second molars	2	6	7 (77.8%)

Table 4 Occurrence of associated dental anomalies of size, shape and position in the 96 individuals with Down syndrome

Prevalence	Total	%
One anomaly	21	23.9%
Two associated anomalies	2	1%
Subtotal	23	25%

Conclusions

Among the clinical conditions evaluated in this study, hypodontia was by far the most frequently observed. Approximately a quarter of individuals with DS exhibited at least one dental anomaly. Early identification of these clinical conditions allows dental treatment to be adequately planned before being executed. Therefore, we believe that all children with DS should be submitted to radiographic examination for early diagnosis of hypodontia, supernumerary teeth and dental anomaly.

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Address for correspondence:

Profa. Dra. Alexandra Mussolino de Queiroz
Departamento de Clínica Infantil, Odontologia Preventiva e Social.
Faculdade de Odontologia de Ribeirão Preto-USP
Avenida do Café, S/N, 14.040-904 Ribeirão Preto, SP, Brasil
E-mail: amqueiroz@forp.usp.br