

# THE INCIDENCE OF TOOTH ABNORMALITIES IN DOWN'S SYNDROME PATIENTS BY DIGITAL RADIOGRAPHIC EVALUATION

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## ABSTRACT

The objective of this study was to analyze the incidence of development tooth abnormalities in a sample of patients with Down's syndrome through digital panoramic radiographs. Sixty two patients aged 6-35 years had their panoramic radiographs obtained in Clínica de Radiologia Odontológica DOC CENTER, and analyzed for the presence of tooth abnormalities. Collected data were analyzed in crosstabs using the chi-square test, with a significance level of 5%. The results showed no significance at the intersection of data related to location in hemiarcade, sex and age of patients with tooth abnormalities ( $p>0.05$ ). Among all patients, 82.3% of the cases had some tooth abnormality, and the Tooth Agenesis was the most frequent (51.3%). Next, Impacted Teeth and Taurodontia corresponded to 15.4% each, and Microdontia to 9% of cases. The Delay in Eruption accounted to only 3.8% of cases and other abnormalities (Macrodonia, Supernumerary Teeth, Dental Transposition and Fusion) accounted for 1% of cases, each. Within the limitations of this study it was concluded that digital panoramic radiographies allowed the identification of tooth abnormalities in patients with Down's syndrome, without preference of gender or age, but location at hemiarch was dependent on the analyzed abnormality.

**KEYWORDS:** Tooth abnormalities, down's syndrome, panoramic radiographs.

## 1. INTRODUCTION

Tooth abnormalities can manifest local conditions that arise as inherent hereditary tendency, may be manifestations of systemic disorders or syndromes from part of a general nature. The Down's syndrome (DS) is one of the most common and easily recognizable syndromes<sup>1</sup> characterized by an autosomal chromosomal abnormality that results from trisomy of all or part of chromosome 21<sup>2</sup>. It is the most common genetic cause of mental retardation that affects approximately 1 in 700 live births<sup>2</sup>.

Its incidence in the Brazilian city of Ribeirão Preto-SP was 1.66 cases in 1972<sup>3</sup> although it is known that it affects on average 1.13 births per 1000 in Brazil<sup>4</sup>.

Several oral events are associated with DS, such as: taurodontism<sup>5,6</sup>, tooth agenesis, impacted teeth, peg-shaped teeth<sup>7,8</sup>, class III malocclusion, posterior crossbites<sup>8-10</sup>, retained primary teeth<sup>11</sup>, the chronology of dental maturation and frequently high caries rate<sup>8,11</sup>. Thus, it is important for the dentist to know patient's medical history and take precautions, because these patients can be treated routinely in a dental Office<sup>1,10,12,13</sup>.

Digital radiographs have been used commonly in medicine but only after the 80's its use in dentistry has gained strength<sup>14</sup>. The use of digital panoramic radiography has grown in dentistry due to the simplicity of the technique, wide coverage area to be examined, ability to design anatomical structures, decrease in exposure time and little financial cost to the patient or the health service. Digital Radiography has the advantage of exposing the patient to lower the amount of radiation<sup>14,15</sup>, allow improved images by software manipulation<sup>14,16</sup>, and the technique is faster, cheaper and easier than conventional<sup>14,16</sup>.

Since there is a great possibility of detection of dental anomalies in patients with radiographic examinations, this study hypothesize that the analysis of digital panoramic radiographs can help to determine the incidence of tooth abnormalities in patients with DS. Then, the aim of this study was to analyze the incidence of tooth abnormalities in a sample of patients with Down's syndrome, through panoramic radiographs, in relation to the affected hemiarch, gender and age of patients.

## 2. METHODS

This study can be characterized as a descriptive and

retrospective study to determine the incidence of tooth abnormalities through panoramic radiographs in 62 DS patients, male and female. All this survey was conducted through the database of digital panoramic radiographs of Clínica de Radiologia Dental DOC CENTER, at Campo Grande, MS, Brazil. This research was conducted within the principles of the Research Ethics Committee of Federal University of Mato Grosso do Sul, and it is registered under the number CAAE: 11639112.4.0000.0021.

All patients were radiographed during 2012 and the images have undergone careful analysis. Radiographs with absence of viewing patterns and diagnosis were excluded from the study, as well as those that caused doubts in the interpretation of images.

The radiographs were divided by gender and after that, the age and tooth abnormalities (TA) were recorded both for maxilla and mandible. All four quadrants were analyzed in relation to: agenesis, impaction, macrodontia, microdontia, delayed eruption, supernumerary, taurodontia, dental transposition and fusion.

The data were organized in frequency tables and crosstables and analyzed by the Chi-Square test at a significance level of 5%.

### 3. RESULTS

A Most patients belonged to male gender (67.7%), with female corresponding only 32.3% of patients, and 82.3% of the patients had some TA, with only 17.7% of cases without any abnormality. Table 1 shows the frequencies of TA. Tooth Agenesia was the most common TA (51.3%), followed Impacted Teeth and Taurodontia, which corresponded to 15.4% each, and Microdontia (9% of cases). The delay in eruption accounted to only 3.8% of cases and the other TAs (Macrodonia, Supernumerary Teeth, Dental Transposition and Fusion) accounted for 1% of cases, each.

**Table 1.** Frequency of tooth abnormalities.

Type of abnormality	Frequency	(%)
Agenesia	40	51,3
Impacted teeth	12	15,4
Macrodonia	1	1,3
Microdontia	7	9,0
Delayed eruption	3	3,8
Supernumerary teeth	1	1,3
Taurodontia	12	15,4
Transposition	1	1,3
Fusion	1	1,3
TOTAL	78	100,0

The analysis by chi-square test for the relationship between sex and presence of abnormality didn't show a statistical significant result, with  $p > 0.05$  (Table 2).

**Table 2.** Crosstab for Gender x Abnormality. Data in %.

Gender/abnormality	Yes	No	Total
Male	83,3%	16,7%	100%
Female	80,0%	20,0%	100%

\*Not significant, with  $\chi^2 = 0,10$ ,  $df = 1$ ,  $1-p = 25,19\%$ .

It could be seen that 83.3% of male patients had anomalies, while 80% of women had some TA. Also, the relationship between gender and kind of anomaly was not significant, with  $p > 0.05$  (Table 3).

**Table 3.** Crosstab for Gender x Type of Abnormality. Data in %.

Gender/ Abnormality	Agen.	Imp.	Macro	Micro	Delay	Super	Tauro.	Transp.	Fusion
Male	61.9	19.0	2.4	9.5	7.1	2.4	23.8	2.4	2.4
Female	70.0	20.0	0.0	15.0	0.0	0.0	10.0	0.0	0.0

\*Not Significant, with  $\chi^2 = 4,35$ ,  $gl = 8$ ,  $1-p = 17,60\%$ . Agen.: agenesia; Imp.: impacted teeth; Macro.: macrodontia; Micro.: microdontia; Delay: delayed eruption; Super.: supernumerary; Tauro.: taurodontic teeth; Transp.: transposition.

Most of TA were seen in ages 10 until 25 years but there was no correlation between age and the type of TA, with  $p > 0.05$  (Table 4).

**Table 4.** Crosstab for Age x Type of Abnormality. Data in %.

Age/ abnormality.	Agen.	Impact.	Macro.	Micro.	Delay.	Super.	Tauro.	Transp.	Fusion
< 10 years	83,3	0,0	0,0	0,0	16,7	0,0	0,0	0,0	0,0
10 a 15 years	57,1	14,3	0,0	0,0	7,1	0,0	14,3	0,0	7,1
15 a 20 years	45,8	20,8	0,0	12,5	4,2	0,0	16,7	0,0	0,0
20 a 25 years	52,6	15,8	5,3	10,5	0,0	0,0	10,5	5,3	0,0
25 a 30 years	28,6	28,6	0,0	0,0	0,0	14,3	28,6	0,0	0,0
30 a 35 years	66,7	0,0	0,0	16,7	0,0	0,0	16,7	0,0	0,0

\*Not Significant, with  $\chi^2 = 35,39$ ,  $gl = 40$ ,  $1-p = 32,25\%$ . Agen.: agenesia; Imp.: impacted teeth; Macro.: macrodontia; Micro.: microdontia; Delay: delayed eruption; Super.: supernumerary; Tauro.: taurodontic teeth; Transp.: transposition.

In general, the occurrence of TAs by hemiarch was dependent on the type of TA. The third molars were the teeth most affected by agenesia, corresponding to 38.7% of cases, followed by all other teeth randomly. The maxillary canines were the ones that showed the greatest number of impaction (56.3%), followed by maxillary premolars (31.4%), mandibular canine (6.3%) and mandibular second premolar (6.3%). The number of teeth with Taurodontism was higher for mandibular second molars (58.4%), and almost all remaining cases were found in mandibular posterior teeth (37.4%) except by one maxillary first premolar (4.2%). Macrodonia was detected only in the upper teeth (4 teeth), 50% in the right upper quadrant and 50% in the upper left. The microdontia was also detected only in the upper teeth (8

teeth), but the upper right quadrant accounted for 62.5% and 37.5% for the upper left quadrant. The remaining TAs were irrelevant to location categorization.

#### 4. DISCUSSION

The present study established the hypothesis that the analysis of digital panoramic radiographs could help the detection of TAs in patients with Down's syndrome, which could be confirmed with the detection of abnormalities in over than 80% of analyzed patients. It was possible to verify that the anomalies were not linked to any specific age or gender, as confirmed by the statistical analyzes performed using the chi-square test, with  $p > 0.05$ , although its preferential localization was dependent on each detected TA.

Studies have shown different occurrence of TAs, depending on population, local, gender, age and health conditions. In one study, a prevalence of 11.4% was observed among normal children, 08-11 years old<sup>17</sup>, but 36.7% of patients were diagnosed with some dental anomaly, in another one<sup>18</sup>. Syndromic patients may have different number of tooth abnormalities when compared to normal patients. The agenesis tends to occur at rates between 3,2% to 7,6% in a non-syndromic population in most of the world<sup>19,20</sup>, but in DS patients this rate rises to 20-30% of cases<sup>7</sup>. In the present study, dental agenesis was the most frequent abnormality, reaching 51.3% of cases, which is a high percentage compared to the previous study. De Moraes *et al.*<sup>7</sup>, showed a high incidence of abnormalities among syndromic patients: taurodontism (50%), probable agenesis (20.2%), suspected agenesis (10.7%), conoid teeth (8.3%), and impacted teeth (5.9%), concluding that patients with Down syndrome have a high incidence of dental anomalies, and in most cases, individuals presented more than one type of TA.

The Taurodontism is common in DS patients affecting 36.4%<sup>5</sup> or 55.8%<sup>21</sup> of subjects, but Alpoz and Eronat<sup>6</sup>, found 66% of occurrence, attributing this high rate to a widespread instability development. In the present study, Taurodontism was found in 15.4% of cases reaching the same frequency of Impacted Teeth.

In this research it was observed that 51.3% of cases had agenesis, followed by Impacted Teeth and Taurodontia with 15.4% of cases, each one, and microdontia with 9% of cases. The delay in eruption amounted to only 3.8% of cases and the other TAs (Macrodonia, Supernumerary Teeth, Dental Transposition and Fusion) accounted for 1% of cases each (Table 1). The acceleration in transient mitotic activity during developing of enamel organ around the early stage of pregnancy, which persists during the initial stages of mineralization of primary teeth may be the reason for the high number of TAs in DS patients<sup>22</sup>. The initial acceleration would then be followed by the widely recognized retardation in growth, which is reflected in the permanent teeth<sup>5,22,23</sup>.

Although few studies on the observation of TAs in patients with DS are available<sup>24</sup>, it was possible to notice that their occurrence is increased in these patients and the distribution and types vary with the location and population surveyed. Then, a multidisciplinary effort must be taken<sup>24,25</sup> for both data collection and for detection of conditions that could be better treated in these patients.

From the obtained results and considering all the limitations of this study it can be concluded that digital panoramic radiographs allowed the identification of dental anomalies in patients with Down syndrome, affecting 82.3% of patients without preference of gender or age, but location at hemiarchs was dependent on the abnormality; The agenesis was the most common dental anomaly in the analyzed patients (51.3% of cases) followed by Impacted Teeth and Taurodontia (15.4% of cases, each one), and Microdontia (9% of cases); The Delay in Eruption accounted for only 3.8% of cases and other abnormalities (Macrodonia, Supernumerary Teeth, Dental Transposition and Fusion) accounted for 1% of cases each.

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