

## Delayed Eruption of Primary Teeth Among Children with Down Syndrome

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### Abstract

The purpose of this study was to show the delayed eruption of primary teeth among children with Down Syndrome.

The study was descriptive analytic research. A total of 25 Down Syndrome (DS) and 40 normal subjects between 6-48 months were enrolled in this study. Primary teeth eruption was measured by the number of primary teeth present in the mouth, from the white spot until fully erupted in the mouth. Mann-Whitney test was utilized to analyze the data.

The mean number of erupted primary teeth in DS children was 9 while for normal children was 13.275. There was significantly delayed eruption of primary teeth among DS children compared to normal children ( $p < 0.05$ ).

The eruption of primary teeth among children with DS showed significant delay when compared to normal children.

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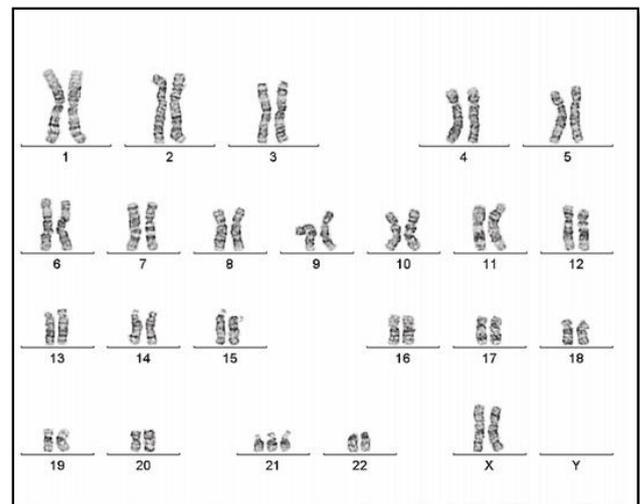
### Introduction

Down Syndrome (DS) is first described as a disorder by Dr. John Langdon Down in 1866.<sup>1</sup> It is a chromosomal defect characterized by having three copies of chromosome 21 rather than the normal two copies.<sup>2,3</sup> DS affects people regardless of ethnicity, social or economic status.

Nowadays the increasing trend of late marriages and delayed motherhood due to various reasons such as career concerns raises the risk of having a child affected by DS. A woman who becomes pregnant above the age of 35 has a greater risk of having a baby with DS. It is estimated that DS occurs approximately 1 in every 700 live births as published by several studies.<sup>5,6</sup>

Down Syndrome (DS) is a genetic disorder which is characterized by mental retardation and growth disturbances in which their physical development is retarded.<sup>7</sup> Several typical orofacial features that seen in DS are a broad skull, round head, slightly flattened face,

short neck, slanting eyes and smallmouth. The small oral cavity and low muscle tone usually cause their tongues to appear larger and sticking out. Their underdeveloped midfacial region will affect their appearance as well.<sup>8,9</sup>



**Figure 1.** Genetic Analysis For Trisomy 21 Diagnosis<sup>4</sup>.

This genetic disorder is said to be the cause of the developmental delays and other health problems as well as some dental issues often associated with DS. Anomalies in shape, size and eruptive pattern of teeth are frequently

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seen in DS. It is very common for DS children to experience developmental delay including delayed eruption of teeth.<sup>10,11</sup>

The delayed eruption can affect both primary and permanent dentitions.<sup>12</sup> Often the eruption of primary and permanent teeth in DS children are delayed when compared to normal children and often follows an unusual sequence. For example, normal babies get their first tooth during 6 months but DS babies may get their first primary tooth as late as 12-14 months but could be delayed up to 24 months. Full set of primary teeth may be completely erupted up to 5 years old.<sup>13</sup> The average number of teeth erupted in DS is very often lesser than that in healthy children of same age due to the delayed eruption in DS individuals.<sup>14</sup>

Previous researchers that were conducted in India and Chilean, have shown the delayed eruption in both primary and permanent teeth among children with DS.<sup>14,15</sup>

Those children with DS mostly to have unmet dental needs. The diagnosis and management of delayed eruption play an important role in pediatric dentistry to determine the treatment plan.<sup>16</sup> Due to the higher rate of missing teeth and delay eruption of permanent teeth, it's better and advisable that the primary dentition of DS patients are maintained as long as possible.

one of the main reasons doctors care about patients in terms of investigation, accurate diagnosis and careful care planning, namely the success of functional and esthetic treatment, implant oral rehabilitation that emerges as one of the most successful and predictable treatment approaches in meeting both.<sup>17</sup>

It is very important for a dentist to have a clear understanding of the condition of the patient who requires special care. A knowledge of the delayed eruption of a special population such as children with DS can be very useful in providing dental treatments. The purpose of the research is to show the delayed eruption of primary teeth among children with Down Syndrome.

### Materials and methods

The current study was a descriptive analytic study. A total of 25 DS and 40 normal subjects who between 6-48 months old were selected by using purposive sampling technique. The criteria population for DS were individuals

diagnosed with DS registered in POTADS (Association with Down Syndrome Parents) Bandung branch. The DS subjects were children diagnosed with DS by a pediatrician. For normal subjects, a total number of 40 children who visited RSGM UNPAD (Rumah Sakit Gigi dan Mulut UNPAD) were selected in this study. The eruption of primary teeth was measured by the number of primary teeth present in the mouth, beginning with a visible white spot until the whole tooth crown is visible and occludes with its antagonist.

### Results

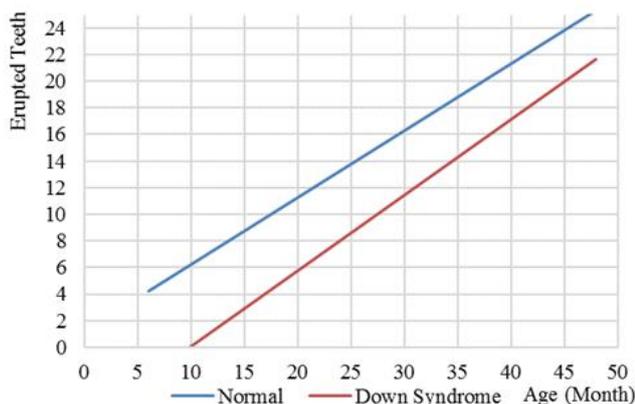
The data of the number of primary teeth erupted in 25 DS subjects and 40 normal control subjects were collected and recorded in examination forms. The normal children as the control group. The data was calculated and statistically analyzed in order to show how the difference in tooth number of primary teeth among children with DS by comparing with the normal control subjects.

Age (Months)	Down Syndrome Children			Normal Children		
	N	Mean number of erupted teeth	Std. Deviation	N	Mean number of erupted teeth	Std. Deviation
6	1	0	0	2	0.5	0.5
7	1	0	0	1	1.0	0
8	-	-	-	3	1.7	0.5
9	-	-	-	1	4.0	0
10	-	-	-	-	-	-
11	1	0	0	2	4.5	0.5
12	1	0	0	1	6.0	0
13	-	-	-	-	-	-
14	-	-	-	-	-	-
15	1	2.0	0	1	8.0	0
16	2	1.0	1.0	1	9.0	0
17	2	2.0	2.0	2	10.0	1.0
18	2	2.0	2.0	1	12.0	0
19	1	8.0	0	1	14.0	0
20	1	5.0	0	2	15.0	1.0
21	-	-	-	1	12.0	0
22	-	-	-	1	12.0	0
23	1	9.0	0	2	16.0	0
24	1	14.0	0	1	16.0	0
25	-	-	-	-	-	-
26	1	15.0	0	2	20.0	0
27	-	-	-	-	-	-
28	-	-	-	-	-	-
29	1	9.0	0	2	20.0	0
30	-	-	-	-	-	-
31	1	16.0	0	2	20.0	0
32	1	17.0	0	1	20.0	0
33	-	-	-	-	-	-
34	1	20.0	0	2	20.0	0
35	-	-	-	-	-	-
36	-	-	-	-	-	-
37	-	-	-	1	20.0	0
38	-	-	-	-	-	-
39	-	-	-	-	-	-
40	1	20.0	0	2	20.0	0
41	1	20.0	0	1	20.0	0
42	1	20.0	0	1	20.0	0
43	-	-	-	-	-	-
44	-	-	-	-	-	-
45	-	-	-	-	-	-
46	1	20.0	0	1	20.0	0
47	-	-	-	-	-	-
48	1	20.0	0	2	20.0	0

**Table 1.** Mean Numbers of Erupted Primary Teeth Between DS Children and Normal Children Present at Each Age (Months).

The mean number of erupted primary teeth between DS children and normal children present at each age has shown in Table 1. The mean number of erupted primary teeth was higher in normal children than DS children when compared with same age level. The youngest DS subject in whom a tooth had erupted was aged 15 months while the youngest normal subject in whom a tooth had erupted was 6 months. All 20 primary teeth fully erupted in DS subjects who were above 34 months old, whereas for normal control subjects it was above 26 months old.

From graph 1, the line drawn for the number of erupted primary teeth for normal children is higher than that of DS. It means that normal children had their teeth erupted faster compared to DS children, shows delayed eruption in DS children.



**Graph 1.** A number of Erupted Primary Teeth with Age (Month) Between DS Children and Normal Children.

Mann-Whitney test was selected for data analysis in this research. Table 2 showing the mean numbers of erupted primary teeth between DS children and normal children. There was a statistically significant result. The mean number of erupted primary teeth among children with DS was 9 while for normal children was 13.275. The p-value was 0.028, proves that there was a significant difference between the two groups of subjects, meaning DS children have significantly delayed eruption of primary teeth.

Group	N	Mean	Standard Deviation	P-value
DS	25	9	8.25	0.028
Normal	40	13.275	7.25	

**Table 2.** Mean Numbers of Erupted Primary Teeth between DS Children and Normal Children.

From Table 3, among the 18 DS children with erupted primary teeth, 12 of which had their first primary teeth erupted after 12 months. For normal children, there were 39 whom primary teeth have already erupted, 37 of which had their first tooth erupt below the age of 12 months, only 2 children had their first tooth erupted more than 12 months old.

	N	First Primary Tooth Eruption	
		≤12 months	>12 months
DS	18	6	12
Normal	39	37	2

**Table 3.** First Primary Tooth Eruption Time.

### Discussion

Tooth eruption is a complex process that is defined as the movements that the tooth makes from its development place until it reaches its functional position in the oral cavity.<sup>18</sup> The eruption of primary teeth, their exfoliation then followed by the eruption of permanent teeth. The eruption process can vary greatly as it can be influenced by two major factors which include genetic and environmental factor such as socioeconomic status, local disturbances, nutritional factors, systemic diseases and gender.<sup>19,20</sup>

From the results of this current study, the eruption of primary teeth in DS was shown to be delayed significantly when compared with normal children of the same age (Table 2). The number of erupted primary teeth of DS children is lesser when compared with age-matched normal children. A normal child by the age of one-year-old has had 6 teeth erupted, while a DS child of the same age had none. The number of teeth was 20 at the age of 26 months in normal children but only 15 teeth in DS subjects. There was a great difference at the age of 29 months which the DS subject only had 9 teeth erupted while normal children had the full set of primary teeth (Table 1).

According to Nelson and Ash (2010)<sup>14</sup>, at the age of 12 months, the mean number of primary teeth present among the general population was 6 but in current research, DS subject had none tooth erupted. At the age of 18 months, the mean number of teeth present in the general population state has 12 teeth but in the

current research, the results obtained was 2 among DS individuals. At the age of 24 months, the mean number of primary teeth present stated was 16 while DS subject in this research had 14 teeth (Table 1). The number of primary teeth presents between DS children and normal children with same age had shown differences.

DS children mostly had their first tooth erupted after 12 months whereas normal children had their first tooth erupted before 12 months (Table 3). According to Logan and Kronfeld and McCall and Schour<sup>21</sup>, the first primary tooth which is mandibular incisor erupts at about 6 -10 months of age. The present study has shown that up to 12 out of 18 DS subjects had their first tooth erupted above 1-year-old. For normal children, only 2 out of 39 subjects begins their primary teeth eruption above 1-year-old, the other 37 subjects start to erupt their first tooth below 1-year-old (Table 3).

Sjarif Willyanti (2005)<sup>22</sup> reported that 11 out of 23 full trisomy DS children had their first primary tooth eruption occur during 13-18 months. This finding was similar to current research which the first tooth among children with DS mostly erupts above one-year-old. Among DS subjects examined during current study, the first teeth erupted was later than the results reported by Ondarza et al. (1997).<sup>14</sup> Ondarza et al. (1997)'s study had shown that the process of eruption in DS population begins around 7.5 months.

The primary dentition is usually completed by the age of 2 years old. Dean et al. (2011)<sup>10</sup> state that the dentition of DS may not be completed until 5 years of age. In Ondarza et al. (1997)'s study, primary teeth completed in DS between 28 to 32 months old. In the current research, 6 DS subjects above 34 months old have all 20 teeth erupted (Table 1).

It is very useful to know how delayed eruption was caused by any diseases that associated with the delayed eruption of teeth. The knowledge concerning the causes of delayed eruption in DS is said to be related to the trisomic state, which means that the extra 21 chromosome causes DS children to have growth and development delays, including tooth development. According to Sjarif Willyanti (2005), full trisomy 21 had primary teeth erupted later than the mosaic type of DS. 10 mosaic type DS subjects (100%) had their primary teeth erupted between 8-12 months while 11 out of 23 full trisomies 21 children (47.83%) started between

13-18 months. This is due to the presence of more cells 47 chromosomes in trisomy 21 than mosaic type. Mosaicism means that some cells in the body contain 47 chromosomes and some have the typical number of chromosomes which is 46. Full trisomy 21 has more trisomic cells that cause higher chances to have delayed eruption of teeth.<sup>22</sup>

Several theories have explained the phenomenon of delayed eruption of teeth in DS. There was a suggestive evidence proposed that the rate of eruption is affected by the vascularity of the periarticular connective tissue. Poor peripheral circulation was found in DS individuals. It can be one of the factors that lead to the delayed eruption that observed in DS. Some have correlated the low birth weight can cause delay in tooth eruption.<sup>23</sup> The growth and development in DS are delayed; delay in growth of both maxilla and mandible might be responsible for delayed eruption as well so that initiation, proliferation, morph differentiation, opposition and calcification stages of tooth development will experience a delay. Due to the formation of teeth in DS delayed; therefore, the eruption of teeth will delay as well.<sup>12</sup>

## Conclusions

The conclusion of this study is that the delayed eruption of primary teeth among children with Down Syndrome shows significantly delayed in primary teeth eruption when compared to normal children of the same age.

## Declaration of Interest

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