

## Clinical and Radiographic Evaluation of Periodontitis in Down's Syndrome Children in South Indian Population

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<http://dx.doi.org/10.13005/bpj/1185>

(Received: April 24, 2017; accepted: May 06, 2017)

### ABSTRACT

Down's syndrome (DS) is the most common chromosomal disorder in which an extra copy of chromosome will be present i.e. chromosome 21. Periodontal diseases are inflammatory diseases of the supporting structures of the teeth. They are initiated by periodontopathic bacteria and result in progressive destruction and loss of the periodontium. Gingivitis and periodontitis start early in life in DS individuals and their severity increases with age. To identify the early disease activity in these children should undergo diagnosis and treatment intervention at the early stage itself. In our study twenty DS patients were chosen from South India and these children underwent diagnosis of early periodontal disease activity with the help of Clinical parameters and Radiographic evaluation. The study results confirm the presence of early disease activity in these children.

**Keywords:** Downs syndrome.

### INTRODUCTION

Down syndrome (DS), also known as trisomy 21, is one of the most common chromosomal abnormalities, caused by the presence of all or part of a third copy of chromosome 21. The extra chromosome occurs by chance<sup>1</sup>. It is characterized by the whole chromosomal aneuploidy in about 95% of cases. The remaining 5% is in the form of translocations and mosaics<sup>2</sup>.

DS is one of the most common genetic birth defect, affecting approximately one in 700 live births<sup>3,4,5</sup>. According to National Down Syndrome Society (NDSS)<sup>6</sup>, more than 400,000 individuals with DS are living in the United States. Moreover, in the recent decades, their life expectancy has increased dramatically from 25years in 1983 to 60years till date<sup>6</sup>.

DS individuals present anatomical abnormalities, mental and Orofacial problems that has a large impact in quality of life<sup>7</sup>. They typically have poor immune function and generally reach developmental milestones at a later age. They also have an increased risk of infections. Individuals with Down syndrome tend to be more susceptible to gingivitis as well as early, severe periodontal disease, and early tooth loss that occur frequently under the age of 30years<sup>8</sup>. They are classified by the American Academy of Periodontology as a manifestation of systemic diseases associated with genetic disorders<sup>9</sup>. While plaque and poor oral hygiene are contributing factors, the severity of periodontal disease in Down's syndrome patients, cannot be explained solely by microbial factors. It is suggested that the severity of periodontal breakdown is likely a result of a weakened immune system<sup>10-14</sup>. DS individuals present mild to moderate reduction

in T and B cell counts, lack of normal lymphocyte expansion in infancy, suboptimal antibody responses to immunizations, decreased immunoglobulin A in saliva and impaired neutrophil chemotaxis<sup>13</sup>. Tanaka in 2012 shows a high level of IFN- $\alpha$  and IFN- $\gamma$  in children with DS, indicating its importance in the modulation of the inflammatory process in periodontal disease<sup>15</sup>. These inflammatory cytokines presents biological effects in the body and important regulatory roles in immune responses<sup>12</sup>. Zampieri *et.al* demonstrated the study of altered expression of immune related genes in children with DS, highlighting molecular mechanisms involved in pathology<sup>16</sup>. Periodontal disease in these patients is generalized, severe, with rapid progression and bone loss in addition to periodontal treatment, DS patients must receive attention and management of dental caries<sup>17,18</sup>, malocclusion<sup>19</sup> and obstructive sleep apnea<sup>20</sup>.

Preventive approaches and treatment modalities of gingivitis and periodontitis include removal of dental biofilm, surgical and nonsurgical therapy. Preventive reactions involve supervised brushing or stimulation of oral hygiene habits and periodic clinical and radiographic evaluations. Periodontal treatment includes scaling and root planing (surgical or non-surgical), associated with or without local and/or systemic antibiotics<sup>21-23</sup>. Furthermore, participation of parents, caregivers and possibly institutional attendants are fundamental for the maintenance of outcomes.

Both clinical and radiographic data are essential for diagnosing the presence and extent of periodontal disease. Clinical findings include gingival architecture, bleeding indices, probing depths, etc. Radiographs are essential in evaluation of amount of bone present, condition of the alveolar crests, bone loss in the furcation areas, width of the PDL space.

Local factors such as calculus which can cause or intensify periodontal diseases, poorly contoured or overhanging restorations, caries, root length and morphology, crown to root ratio, anatomic issues like maxillary sinus, missing, supernumerary and impacted teeth, other pathologies and its contributing factors, apical inflammatory lesions, root resorption etc.

This study focuses on one of the preventive measures and a diagnostic tool (Ortho pantamograph) which helps in detection of early periodontitis considering the higher prevalence of adult periodontal disease. This evidence is necessary for prevention of periodontal disease in DS population.

The Aim of our present study was to evaluate the Clinical and Radiographic status of Periodontal Disease in Down's syndrome children.

## MATERIALS AND METHODS

20 Down's Syndrome individuals with chronic periodontitis were included for clinical parameters group and OPG (Figure 1, 2). The ethical clearance was obtained for the study from our institution and informed consent was obtained from the head of the Balavihar school of special children. DS individuals from Balavihar School of special children, kilpauk Chennai, Tamil Nadu, were brought to Thai Moogambigai Dental College and hospital, Maduravoyal, Chennai for OPG (Sirona dental xray inc. corporation) and Case sheet were obtained and all the clinical parameters were recorded. CPITN C probe (Hufriedy) was used to record CPITN index.

### Radiographic Technique

The x-ray beam must be perpendicular to the long axis of the teeth and the plane of the image receptor. The image receptor must be parallel to the long axis of the teeth

Exposure factors also play a role in increasing the diagnostic yield from the radiographs, By using a higher kVp setting (90kVp), instead of the customary 70 kVp, and reducing the mAs, a radiograph with a wider gray scale will be produced. This allows subtle changes in bone density, as well as soft tissue outlines, to be discerned

## RESULTS

The current study was performed to correlate clinical and radiographic parameters in Down's Syndrome individuals with Chronic Periodontitis between age group of 12 to 30 years; however in the Downs syndrome group, the patients

were younger, with a mean age of 18.65.  $p < 0.001$ , by means of One Way ANOVA indicating that the Down's Syndrome group developed periodontal breakdown, leading to chronic periodontitis at an earlier age. (Table 1)

**Plaque Index**

To Assess with Plaque index score in DS with chronic periodontitis subjects who have more significant  $p$  value  $<0.001$  (Table 2)

To further assess the presence of local factors that contribute to periodontal destruction the Oral Hygiene Index – Simplified was examined. Of the 20 patients , 12 of them (57.1%) fell in to the poor oral hygiene categories which was statistically significant according to Chi Square Test. (Table 3)

To understand the periodontal health of the patients, the Community Periodontal Index of Treatment Needs (CPITN) was performed. Nine Ds, children had a score of (TN 3) which means colored area of probe remains partly visible in the deepest probing depth in the sextant suggesting chronic periodontitis, which was statistically significant. (Table 4)

**Radiographic Assessment**

All 20 patients were asked to take digital OPG. All 20 patients were having horizontal bone loss. Of the 20 patients, 8 patients had angular bone loss and, out of these, 9 patients showed arch shape bone loss which is a classical sign of Localized aggressive periodontitis. Some of those teeth also showed bone loss extending to the apical third and 3 of the patients had pulpo periodontal lesion. It was also noted that three patients had furcation involvement in multiple teeth, two patients exhibited root stumps and two of the patients had retained deciduous teeth. It was also noted that 2 of the patients had bilateral pneumatization of sinus this may be due to early loss of teeth.

**DISCUSSION**

Down syndrome (DS) is one of the most common genetic abnormalities, and has a highly variable prognosis. Individuals with DS have specific orofacial characteristics associated with the syndrome. The most common oral disorders include periodontal disease, malocclusion, mouth breathing, macroglossia, delayed teeth eruption, missing and malformed teeth, microdontia, diastema and bruxism

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**Table 1: Comparison of mean Age between the three groups using oneway ANOVA**

Groups	N	Mean	Std. Deviation	95% Confidence Interval for Mean		Minimum	Maximum	P value
				Lower Bound	Upper Bound			
DS+CP	20	18.65	6.99	15.37	21.92	12.00	35.00	<0.001*

\* $P < 0.05$  is considered statistically significant

**Table 2: Oneway ANOVA**

Groups	N	Mean	Std. Deviation	95% Confidence Interval for Mean		Minimum	Maximum	F	P value
				Lower Bound	Upper Bound				
DS+CP	20	2.2520	0.65043	1.9476	2.5564	1.00	3.00	42.8	<0.001
Total	20	1.7132	0.94433	1.4692	1.9571	.00	3.00		

Literature on Down syndrome has exaggerated the homogeneity of this population. There has been enduring belief that people with Down syndrome reach a plateau in adolescence, beyond which further developmental change is not possible<sup>23</sup>.

It is well documented that individuals with Down syndrome are also at increased risk for developing destructive forms of periodontal disease<sup>25, 26</sup>, with the majority affected early in life with extensive gingival tissue inflammation, bleeding on probing, increased probing depths, loss of periodontal attachment, and alveolar bone loss<sup>25,26</sup>. In our study, the clinical and radiographic findings demonstrated periodontitis in Down's syndrome

subjects, exhibiting greater periodontal pathology. These results have concordance with study done by Hennequin M

In our study demographic data was analyzed the Down's syndrome group, the patients were younger, with a mean age of 18.65.  $p < 0.001$ , by means of One Way ANOVA indicating that the Down's Syndrome group developed periodontal breakdown, leading to chronic periodontitis at an earlier age.

Further Plaque index score and CPITN score confirmed highly significant value in Down's syndrome with periodontitis  $p < 0.001$ . These results were compared with our previous study<sup>28</sup> where

**Table 3: OHI-S among all three groups compared using Chisquare test**

			DS	P value
OHI_S	GOOD	Count	5	<0.001*
		% within OHI_S	100.0%	
	FAIR	Count	3	
		% within OHI_S	8.8%	
	POOR	Count	12	
		% within OHI_S	57.1%	
Total	Count		20	
	% within OHI_S		33.3%	

\*P<0.05 is considered statistically significant

**Table 4: CPITN in all three groups compared using Chisquare test**

			DS	P value
CPITN	No Rx	0	<0.001*	
		.0%		
	TN 1	3		
		17.6%		
	TN 2A/B	8		
		38.1%		
	TN 3	9		
		64.3%		
Total	20			
	33.3%			

\*P<0.05 is considered statistically significant

only plaque score and OHI, CPITN was taken and concluded that most of the patients had chronic periodontitis. No radiographic evidence was provided in that study ,to overcome that shortcoming in this study we have taken OPG for all the patients. We have found that most of the patients have evidence of bone loss.

Radiographic evaluation also confirms that these patients are prone for periodontitis at the younger age itself. This could be due to the

lack of awareness and lack of maintenance of the caretakers of these children.

## CONCLUSION

Down's syndrome subjects are very brilliant in learning new skills. Either caretakers should be motivated to teach these children or they can help these children in maintaining their oral hygiene status which will prevent the future periodontal breakdown.

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