

# Evaluation of oral hygiene status and periodontal health in Down's syndrome subjects in comparison with normal healthy individuals

C.S. Krishnan, Burnice Nalina Kumari, G. Sivakumar<sup>1</sup>, Srinivas Prasad Iyer<sup>1</sup>, P.R. Ganesh<sup>2</sup>

Departments of Periodontics, <sup>1</sup>Oral Pathology, <sup>2</sup>Prosthetics, Madha Dental College and Hospital, Kundrathur, Chennai, Tamil Nadu, India

## ABSTRACT

Aim of the study was to assess the oral hygiene status and periodontal status of Down's syndrome (DS) and normal subjects. The study was undertaken at Opportunity School at Vepery, Chennai, India. Two hundred subjects were selected. Among them 100 were DS subjects and 100 healthy normal subjects were selected (students from Madha School, Chennai, India) for comparison. All were screened for oral hygiene and periodontal status by OHI-S and Community Periodontal Index of Treatment Needs (CPITN). Statistical analysis was done by Pearson's correlation coefficient. The results showed that the DS subjects had decreased prevalence rate of periodontitis.


**Key words:** Down Syndrome, Periodontitis, CPITN Index and OHI-S

## INTRODUCTION

The major dental health problem in Down's syndrome (DS) subjects owing to their poor propensity towards maintenance of oral hygiene lead to development of periodontal disease, which may be attributed to the lack of motivation and manual dexterity for achieving the standard of oral hygiene. Epidemiological studies on comparing DS group (institutionalized) and the DS (at home), elucidated that the DS group (institutionalized) had more severity of periodontal disease. This enunciates deliberately that an environmental factor elicits the systemic factor of this syndrome to increase the susceptibility of the DS subjects to periodontal disease.<sup>[1-4]</sup>

### Address for correspondence:

Dr. C.S. Krishnan, Department of Periodontics,  
Madha Dental College and Hospital, Kundrathur,  
Chennai - 600 069, Tamil Nadu, India.  
E-mail: periokrish@gmail.com

Access this article online	
Quick Response Code:	Website: www.jiadsr.org
	DOI: 10.4103/2229-3019.148237

## Aim

To assess the oral hygiene status and periodontal status of DS patients and to compare them with normal subjects.

## MATERIALS AND METHODS

### Study design

A total of 100 DS subjects and 100 healthy individuals were included into the study. From the medical records the DS subjects (21 trisomy). Among 150 subjects, 100 were mentally retarded (MR) patients and 50 were diagnosed as DS.

Three groups of study subjects were.

Group A: 100 DS subjects.

Group B: 100 Healthy subjects (students from Madha School, Chennai, India).

### Inclusion criteria

The students of Opportunity School, Vepery, Chennai, India all of whom were mentally challenged.

### Exclusion criteria

Subjects who have undergone periodontal therapy and taken antibiotics in the past 6 months.<sup>[5]</sup>

**Armamentarium**

- Dental mouth mirror.
- Dental explorer.
- Community Periodontal Index of Treatment Needs (CPITN) probe.
- William's probe.
- Tweezer.
- Peizoelectric scalar unit with tips.

Routine oral examination was carried out by assessing oral hygiene status (Simplified Oral Hygiene Index (OHI-S)) and periodontal status (CPITN). Both the indices were recorded at baseline, and 3 and 6 months interval after phase I therapy.

**RESULTS**

- In this study, the selected patients were subjected to the clinical examination by assessing base lineoral hygiene status (OHI-S) and periodontal health (CPITN).
- After phase I therapy was completed, probing depth values were measured after 3 and 6 months interval.
- Statistical analysis was done by using Pearson's correlation coefficient and the tabulated results showed a statistical significance between all the parameters [Tables 1 and 2].
- The results revealed that the disabled children had reduced probing depth values and less prevalence of periodontitis regardless of their poor predilection perceptive.

**DISCUSSION**

In this study, the disabled comprising of DS and MR subjects of opportunity school at Vepery, Chennai, India were chosen

**Table 1: Simplified oralhygiene index (OHI-S)**

Scorez OHI-S	Subjects					
	MR (Group A)		DS (Group B)		Normal (Group C)	
	Number of subjects (n = 100)	%	Number of subjects (n = 50)	%	Number of subjects (n = 50)	%
Good	20	20	25	50	27	54.0
Fair	61	61	17	8.5	22	44.0
Poor	19	19	8	16	1	2.0

MR: Mentally retarded; DS: Down's syndrome

**Table 2: Community periodontal index of treatment needs (CPITN)**

Score	CPITN: Allsextants involved					
	Subjects					
	MR (Group A)		DS (Group B)		Normal (GroupC)	
	n = 100	%	n = 50	%	n = 50	%
0	6	6	15	30	13	26
1	34	34	23	46	35	70
2	50	50	7	14	2	4
3	7	7	3	6	0	—
4	3	3	2	4	0	—

MR: Mentally retarded; DS: Down's syndrome

as study group. Whereas, the normal subjects were chosen among students of Madha School, Chennai, India.

Periodontal disease was found to be common among DS and MR subjects due to their incapacity to understand to grasp and follow the methods of maintenance of oral hygiene advocated by the professionals along with lowered host immune response.

In previous studies by Johnson and Young, 1963<sup>[6]</sup> found the high prevalence rate of periodontitis among the DS subjects, but the oral hygiene status was not examined. Only the periodontal status was examined using probing depths and CPITN was not used. In our study, CPITN has been used as it gave more accurate prevalence regarding gingivitis and periodontitis in a community study rather than using only probing depth as criteria.

Another study by Orner, 1972<sup>[7]</sup> found high incidence of periodontitis among the DS subjects. Here, the periodontal status was examined using Russel's periodontal index and oral hygiene status was not examined. Russell's index might not have given an appropriate value towards a community study over a period of time. Hence in the present study, CPITN index was used for the enhanced version of the results.

In previous studies, only the DS subjects have been analyzed and MR children have not been considered. Similarly, the oral hygiene status has not been considered and no oral health education program was conducted to improve the oral hygiene maintenance.<sup>[8-10]</sup>

In the present study MR DS patients were examined and compared with normal subjects by using CPITN and OHI-S. First the baseline value is recorded by using CPITN. Phase I periodontal therapy was done for MR and DS subjects. Then repeated oral hygiene instructions were reinforced to the MR and DS subjects. Then the probing depth was measured using CPITN probe and oral hygiene status was measured using OHI-S in 3 and 6 months interval after phase I periodontal therapy. The results obtained show a less prevalence rate of periodontitis among the MR and DS subjects and an improved oral hygiene status despite their poor propensity towards oral hygiene maintenance. The normal children were given oral hygiene instructions only and for them also OHI-S and CPITN recorded at 3 and 6 months interval. In that group also there was a reduction in the prevalence of gingivitis rather improvement in oral health. This was similar to the studies done by Johnson and Young, Modder *et al.*, and Orner.<sup>[6,7,9]</sup>

Other immune defects associated with periodontitis in DS like lymphocyte dysfunction and altered antibody production can also be determined. Inflammatory mediators (prostaglandin E2 and leukotriene B4) and degrading enzymes (matrixmetalloproteinase-9) were increased in

gingival crevicular fluid from patients with DS. The role of the interleukin (IL)-1 family of proinflammatory cytokines in the pathogenesis of periodontitis is well documented.<sup>[11-13]</sup>

IL-1a and IL-1b are involved in initiating and propagating immune and inflammatory reactions. DS is associated with immune deficiencies and host response impairment chromosome 21. Several proteins like superoxide dismutase (SOD), carbonyl reductase (NADPH), and integrin beta-2 (CD18).<sup>[2,14,15]</sup> Increased SOD and NADPH production is associated with increased oxidative stress and tissue injury in DS individuals. This leads to virulent periodontopathic microbial species to colonize their subgingival plaque. The end result of these inflammatory induced changes would be the loss and destruction of the periodontium and eventually tooth loss.

But in our study the microbial analysis and the immunological profile were not considered. Yet future studies with large sample size can be carried out along with microbiological studies like culturing, polymerase chain reaction (PCR) and checkerboard DNA-DNA hybridization that revealed the important periodontopathic bacteria like *Porphyromonas gingivalis* and *Tannerella forsythensis* in DS individuals.<sup>[2,16-18]</sup> Neutrophil function studies mainly focused on neutrophil chemotaxis measured by the Boyden chamber method showed the reduced chemotactic activity in the DS individuals.<sup>[14,19,20]</sup>

## SUMMARY AND CONCLUSION

The individuals with DS have an increased prevalence of periodontal disease compared with otherwise normal and MR patients. In this study it was found that the disabled children have good awareness of maintaining oral hygiene and periodontal health despite their poor capability of understanding.

Further controlled studies including large number of disabled are needed to assess the effectiveness of different preventive dental programs in preventing the progression of periodontitis in DS and MR to bring them on par with normal individuals.

## REFERENCES

1. Adiwoso AS, Pilot T. Results of oral health and hygiene education in an institution for multiple handicapped children in Indonesia. *Int Dent J* 1999;49:82-9.
2. Amano A, Kishima T, Akiyama S, Nakagawa I, Hamada S, Morisaki

- I. Relationship of periodontopathic bacteria with early-onset periodontitis in down's syndrome. *J Periodontol* 2001;72:368-73.
3. Cohen MM, Winer RA. Dental and facial characteristics in Down's syndrome (Mongolism). *J Dent Res* 1965;44:197-208.
4. Cohen MM, Winer RA, Shklar G. Periodontal disease in a group of mentally subnormal children. *J Dent Res* 1960;39:745.
5. McDevitt MJ, Wang HY, Knobelman C, Newman MG, di Giovine FS, Timms J, et al. Interleukin-1 genetic association with periodontitis in clinical practice. *J Periodontol* 2000;71:156-63.
6. Johnson NP, Young MA. Periodontal disease in Mongols. *J Periodontol* 1963;34:41-7.
7. Orner G. Periodontal disease among children with Down's syndrome and their siblings. *J Dent Res* 1976;55:778-82.
8. McGuire MK, Nunn ME. Prognosis versus actual outcome. IV. The effectiveness of clinical parameters and IL-1 genotype in accurately predicting prognoses and tooth survival. *J Periodontol* 1999;70:49-56.
9. Modder T, Barr M, Dahllof G. Periodontal disease in children with Down's syndrome. *Scand J Dent Res* 1990;98:228-34.
10. Nunn JH. Childhood disability. In: Welbury RR, editor. *Paediatric Dentistry*. Oxford University Press; 1999. p. 375-94.
11. Cutando-Soriano A, Gómez-Moreno G, Bravo M. Free interleukin-2 receptors in children with trisomy 21 (Down's syndrome) and different levels of periodontal disease. *Int J Paediatr Dent* 1998;8:177-80.
12. Gregory L, Williams R, Thompson E. Leucocyte function in Down's syndrome and acute leukemia. *Lancet* 1972;1:1359-61.
13. Khocht A, Janal M, Turner B. Periodontal health in Down syndrome: Contributions of mental disability, personal, and professional dental care. *Spec Care Dentist* 2010;30:118-23.
14. Barkin RM, Weston WL, Humbert JR, Maire F. Phagocytic function in Down's syndrome-I Chemotaxis. *J Ment Defic Res* 1980;24:243-9.
15. Chambrone L, Chambrone D, Lima LA, Chambrone LA. Predictors of tooth loss during long-term periodontal maintenance: A systematic review of observational studies. *J Clin Periodontol* 2010;37:675-84.
16. Barr-Agholme M, Dahllof G, Linder L, Modeer T. *Actinobacillus actinomycetemcomitans*, *Capnocytophaga* and *Porphyromonas gingivalis* in subgingival plaque of adolescents with Down's syndrome. *Oral Microbiol Immunol* 1992;7:244-8.
17. Figueiredo LC, Toledo BE, Salvador SL. The relationship between BANA reactivity and clinical parameters in subjects with mental disabilities. *Spec Care Dentist* 2000;20:195-8.
18. Gullikson JS. Oral findings in children with Down's syndrome. *ASDC J Dent Child* 1973;40:293-7.
19. Barkin RM, Weston WL, Humbert JR, Sunada K. Phagocytic function in Down's syndrome-II. Bactericidal activity and phagocytosis. *J Ment Defic Res* 1980;24:251-6.
20. Izumi Y, Sugiyama S, Shinozuka O, Yamazaki T, Ohyama T, Ishikawa I. Defective neutrophil chemotaxis in Down's syndrome patients and its relationship to periodontal destruction. *J Periodontol* 1989;60:238-42.

**How to cite this article:** Krishnan CS, Kumari BN, Sivakumar G, Iyer SP, Ganesh PR. Evaluation of oral hygiene status and periodontal health in Down's syndrome subjects in comparison with normal healthy individuals. *J Indian Acad Dent Spec Res* 2014;1:47-9.

**Source of Support:** Nil, **Conflict of Interest:** None declared