



ORIGINAL ARTICLE

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Periodontal status of mentally handicapped school children in Caracas, Venezuela. A cross-sectional study.

Abstract: Periodontal disease is a chronic pathology caused by many factors and characterized by the progressive destruction of tooth-supporting structures. It is initially caused by dental plaque which, together with immunological, hormonal and cellular factors, leads to a faster or aggressive development. Patients with some types of disability have a higher predisposition to develop periodontal disease. This is due to poor hygiene because of motor and psychological deficiencies and the systemic alterations which hinder the defense against periodontopathogenic microorganisms. The purpose of this study was to evaluate and compare the periodontal status of a group of children with special needs, and a control group. Forty-seven patients with mental retardation and Down syndrome from three special educational centers and 31 healthy patients ranging in ages from 6 to 15 years old were evaluated to determine their plaque and gingival index, and the presence of calculus. After gathering data and tabulating the results, a 1.08 plaque index (PI), and a gingival index (GI) of 1.03, corresponding to a mild gingivitis in the study group, was determined. On the other hand, in the control group patients, PI was 1.08 and GI was 0.96. The calculus percentage was similar in both groups. However, a large percentage of children with mild gingival inflammation was observed in the group of special patients (53.19%) compared to the control group (29%).

Keywords: *Periodontal disease, patients with special needs, gingival index, plaque index.*

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INTRODUCTION.

Periodontal disease is a chronic condition caused by many factors which leads to the destruction of the dental support system. It is usually more prevalent in the adult phase of life. However, several systemic disorders considerably increase a patient's predisposition to suffer periodontal disease, which can develop even faster and more aggressively than in earlier ages. Different authors have recently combined two important concepts: susceptibility and periodontal disease. They indicate that not all individuals develop the disease or lesions in the teeth support tissues in the same way; thus, there are many

variations at an interpersonal level^{1,2}.

One of the conditions which favor the appearance of the periodontal disease is the presence of some kind of disability or a medical condition in patients. This makes the disease progress without any apparent cause, or maintains or increases the severity of an already determined condition. The main factors involved are the alterations in the immunologic system, the hormonal system, or in the connective tissue, together with a lack of hygiene^{2,3}.

The main causing agent of the periodontal disease is the bacterial plaque which generates a progressive damage, in accordance with its presence. Whenever there

is susceptibility to periodontal disease due to systemic conditions, the role of the bacterial plaque is debatable. Some authors argue that the periodontal disease cannot be induced without the presence of plaque and calculus. They suggest that systemic predisposition is only a catalyst for the destruction caused by bacterial agents. Other authors propose that there are not solid studies to prove that non-specific bacterial plaque generates this cause-effect relationship between the typology of the bacterial plaque and the severity of the periodontal damage².

Most recent studies have reported that eating habits may have an important impact on periodontal disease. As a matter of fact, it has been stated that low calcium and vitamin C consumption is directly linked to bone loss. Thus, daily consumption of dairy products such as milk, cheese, and yogurt can favor periodontal health¹.

After the bacterial attack due to the dental plaque, an acute inflammatory process is activated. The bacterial agents act as antigens unleashing the immunological response. The first to react are the polymorphonuclears, which are then substituted by lymphocytes, plasma cells, macrophages, mast cells, eosinophils, and basophils; all of which participate in the immune response⁴.

The alterations in the immunological system could take place at cellular and/or humoral level. Lymphocytes play a very important role in immunity against infectious diseases. The absence of one or more series, congenital or acquired, results in diseases which can even be fatal. The alterations of the neutrophil can be qualitative or quantitative, and both predispose to a quick and severe periodontal destruction. Diabetes Mellitus, Chediak-Higashi syndrome, Papillon-Lefèvre syndrome, Rubinstein Taybi syndrome, and Down syndrome are some of the diseases normally associated with severe periodontitis. These immunological alterations contribute to a faster and more aggressive disease development, as these patients' defense system does not react as it should. Down syndrome, specifically, which represents one of the most common genetic disorders, is caused by

the presence of an extra chromosome on the 21st pair. Patients who suffer from this syndrome often develop severe chronic marginal periodontitis in early adulthood. These patients have higher levels of periodontal pathogens and periodontitis-associated interproximal bone loss. If left untreated, periodontal disease can lead to the destruction of periodontal supporting structures and eventual tooth loss^{2,4-8}.

Moosani *et al.*⁹ did a study to validate and assess the feasibility of using an assay of oral neutrophils to measure periodontal inflammation in 49 uncooperative adults with special needs. After the exam, a high prevalence of gingival inflammation was found at the baseline and oral neutrophil levels were positively correlated with traditional periodontal parameters. The research showed that patients with special needs have an increase prevalence to develop a periodontal disease.

The aim of this study was to determinate the gingival and plaque index, and presence of calculus in a group of patients with special needs and a control group. This is because handicapped patients comprise between 10 and 15% of the population and are susceptible to periodontal problems due to insufficient oral care.

MATERIAL AND METHODS.

Study participants:

A cross-sectional study was performed. Forty seven patients aged between 6 and 15 years old with a diagnosis of Moderate Mental Retardation were selected from three educational institutions for special patients. Also, 31 healthy patients of the same age range were selected from regular schools to be subjected to general dental evaluations, and to measure their plaque and gingival index, and the presence of calculus. Among the selection criteria, the following data were considered:

- 1) acceptance from legal guardians via informed consent,
- 2) the possibility of adapting the special patient to the consultation, as their full collaboration is required for measuring the indexes;

3) none of the patients should had received periodontal treatment during the last one-year period;

4) none should had been subjected to antibiotic therapy during a period of at least six months; and

5) the presence of no other systemic condition which could alter periodontal health, such as diabetes mellitus. Periodontal evaluations were performed by three previously trained and calibrated evaluators. Based on the Kappa coefficient, agreement between evaluators ranged from 0.76 to 0.81. The study protocol and informed consents were approved by the Center for Dental Research of Santa Maria University.

Protocol:

Plaque index (PI) evaluates the presence of dental plaque in the gingival area of the tooth. It was measured with a mirror and a probe, with values ranging from 0: absence of plaque in the gingival area, 1: a film of plaque was attached to the gingival margin but it was only visible with the use of a periodontal probe, 2: the presence of plaque was visible to the naked eye and it was adhered to the gingival margin and pocket, or the adjacent areas to the tooth, and 3: there were large amounts of plaque in all the areas of the tooth.

Gingival index (GI) allows detecting the intensity of gingivitis, and its presence in four areas: mesio-vestibular papilla, vestibular margin, disto-vestibular papilla, and the lingual margin. It was measured with a mirror and a periodontal probe by introducing 1mm to determine the presence of hemorrhage. Results obtained were numbered as 0: gums were normal, 1: presence of a mild swelling, with slight color and volume changes; 2: swelling was moderate, and there was hemorrhage; and 3: there was serious swelling, presence of ulcers, and spontaneous hemorrhage.

Results were then tabulated and analyzed with the statistics software SPSS, version 20.0.

RESULTS.

In the study group, this research revealed a plaque index of 1.08, which corresponds to the presence of plaque at gingival level, and a gingival index of 1.06. In the con-

Table 1. Gingival Index and Plaque Index.

GROUP	GINGIVAL INDEX	PLAQUE INDEX
Handicapped	1.06	1.08
Control	0.94	0.98

Table 2. Presence of Plaque.

GROUP	MILD	MODERATE	SEVERE
Handicapped	51.61%	41.94%	6.45%
Control	51.6%	45.16%	0%

Table 3. Presence of Gingivitis.

GROUP	MILD	MODERATE
Handicapped	45.16%	54.84%
Control	67.74%	29.03%

trol group, PI was 0.98, and GI was 0.94. A 51.61% of special patients showed mild plaque levels, 41.94% moderate levels, and 6.45% abundant levels. In the group of healthy patients, just as in the previous group, 51.61% showed mild plaque levels; 48.39% moderate; and no child showed abundant plaque. In terms of gingivitis, 45.16% of the study group was diagnosed with mild gingivitis, and 54.84% with moderate; unlike the control group, in which most patients suffered from mild gingivitis (67.74%), and only 29.03% had moderate gingivitis. On the presence of calculus, the results were similar for both groups, with 48.94% in the study group, and 45.16% in the control group. However, a high percentage of children presented moderate gingival swelling in the group of special patients (53.19%), compared to the control group (29%). There were not statistically significant differences in the mean values of PI and GI between the special population and the control group (1.08 and 0.96; 1.03 and 0.96 respectively) ($p>0.05$).

DISCUSSION.

The oral health of the handicapped may be neglec-

ted because of their disability, a demanding disease or their limited access to oral health care¹⁰. Oral health may have a low priority in the context of these pressures and other disabilities, which are more life-threatening. Hence, it requires a change in the attitude and practice for parents/care takers to include oral health in their routine. Evidence confirms that people with learning disabilities have a lower uptake of screening services poorer oral health when compared with the general population. Poor oral health may be an additional burden, whereas good oral health has holistic benefits which can improve general health, dignity and self-esteem, social integration and quality of life¹¹.

Ozgul *et al.*¹² studied one hundred and five patients with mental retardation (MR). They were divided into three groups according to their mental retardation severity diagnoses. Clinical periodontal indices showed an increasing trend which was statistically significant for the severity of MR. For that reason, they concluded that MR patients' deprived periodontal health may be most likely caused by their poor oral hygiene and it may be worsened by MR severity.

Patients with special needs or systemic disorders constitute a risk group for periodontal diseases. Immunological factors can affect the etiopathogeny of these periodontal disorders. Dental hygiene is usually poor, with higher occurrence of plaque and calculus². Clinical findings proved that the plaque index in patients with special needs was 1.08 and the gingival index was 1.06 in this study. Gerreth *et al.*¹³ performed a study to evaluate the gingival and oral status of intellectually disabled children and adolescent in Polonia and determined a plaque index of 1.33 and a gingival index of 1.67. These results confirmed findings of other studies concerning the poor level of oral hygiene and a high prevalence of periodontal disease among individuals with disabilities. Shanbhog *et al.*¹⁴ evaluated 488 children between 12-14 years old living in five different orphanage houses in Mysore district, India. The GI showed 36.1% of children with mild gingival inflammation and 27.9% with

moderate gingival inflammation.

A total of 750 teenagers in the group of 14-17-year-olds were examined in five different educational institutions and five care homes in and around Nalgonda district, in Andhra Pradesh. One hundred and fifty visually impaired, 150 intellectually disabled, 150 deaf and dumb and 150 physically handicapped were examined together with 150 healthy teenagers as the control group. The intellectually disabled group studied showed the highest mean plaque index scores and poor oral hygiene. Forty-eight percent among them used their fingers as an oral hygiene aid¹¹. It is known mentally handicapped children have poor periodontal health.

But previous studies lack conformity due to authors using different indices. Twenty-five institutionalized mentally handicapped school children in Ibadan, Nigeria, were studied with the aim of assessing their periodontal health and treatment needs. Results showed that none of the children had a healthy periodontium and all of them needed oral hygiene and care¹⁵. Garcés *et al.*¹⁶ did a study to determine the oral health status of intellectually disabled (ID) children and adolescents from state schools in Valdivia, Chile. The Simplified Oral Hygiene Index in 75.9% of the participants was moderate, with poorer oral hygiene found in participants with a moderate disability. Only 2.6% showed code 0 for GI, reflecting poor oral hygiene.

In this study, the presence of calculus was diagnosed in 48.94% of patients with disabilities and in 45.16% of the control group. These were lower than the rates found by Simon *et al.*¹⁷, who diagnosed calculus in 82.8% of the students evaluated. Donell *et al.*¹⁸ performed a study in a center for disabled patients in Hong Kong and concluded that calculus was not observed in 4-year old patients, but 20.2% of 14-year olds had calculus as did 56.3% of the 25 to 35-year olds. Jain *et al.*¹⁹, who evaluated 225 mentally retarded subjects aged between 12-30 years old attending a special school in Udaipur, India, concluded that 25.3% of the patients had calculus.

CONCLUSION.

This study revealed handicapped patients have a higher plaque and gingival index than the control group. Also, the presence of calculus is higher in special chil-

dren because of a neglected oral hygiene. There is a need for an educational program for patients themselves as well as for their parents or caregivers to improve the quality of life of this population.

Estado periodontal en escolares con déficit mental en Caracas, Venezuela. Estudio de corte transversal.

Resumen: La enfermedad periodontal es una patología crónica y multifactorial donde ocurre una progresiva destrucción de los tejidos de soporte de las estructuras dentales. El desarrollo de la enfermedad periodontal está dado inicialmente por la presencia de placa dental que aunado a factores inmunológicos, hormonales y celulares conllevan a un desarrollo más rápido o agresivo. Los pacientes que presentan algún tipo de discapacidad, tienen una predisposición mayor a desarrollar enfermedad periodontal debido a la mala higiene por sus deficiencias motoras y psíquicas y a sus alteraciones sistémicas que dificultan la defensa ante los microorganismos periodontopatógenos. El propósito de este estudio fue evaluar y comparar el estatus periodontal de un grupo de niños con necesidades especiales y un grupo control. 47 pacientes con Retardo

mental y Síndrome de Down pertenecientes a tres centros de educación especial y 31 pacientes sanos con edades comprendidas entre 6 y 15 años fueron evaluados, determinándose el índice de placa, el índice gingival y la presencia de cálculo. Posterior a la obtención y tabulación de los resultados, se determinó un índice de placa de 1.08 que se corresponde con la presencia de una placa adherida leve y un índice gingival de 1.03 que se corresponde con una gingivitis leve en el grupo de estudio. Por el contrario, en el grupo de pacientes regulares se obtuvo 1.08 de IP y 0.96 de IG. El porcentaje de cálculo fue similar en ambos grupos, 48.94% en el grupo de estudio y 45.16% en el grupo sano. Sin embargo, se observó un alto porcentaje de niños con inflamación gingival moderada en el grupo de pacientes especiales (53.19%) comparado con el grupo control (29%).

Palabras clave: *Enfermedad Periodontal, Pacientes con necesidades especiales, Índice Gingival, Índice de Placa.*

REFERENCES.

1. Shimazaki Y, Shiota T, Uchida K, Yonemoto K, Kiyohara Y, Iida M, Saito T, Yamashita Y. Intake of dairy products and periodontal disease: the Hisayama Study. *J Periodontol.* 2008; 79(1): 131-7.
2. Nualart-Grollmus ZC, Morales-Chávez MC, Silvestre Donat FJ. Periodontal disease associates to systemic genetic disorders. *Med Oral Pat Oral Cir Oral* 2007; 12: e211-5.
3. Sollecito TP, Sullivan KE, Pinto A, Stewart J, Korostoff J. Systemic conditions associated with periodontitis in childhood and adolescence. A review of diagnostic possibilities. *Med Oral Patol Oral Cir Bucal* 2005; 10: 142-50.
4. Martinez-Martinez RE, Loyola-Rodríguez JP, Bonilla-Garro SE, Patiño-Marin N, Haubek D, Amano A, Poulsen K. Characterization of Periodontal Biofilm in Down Syndrome Patients: A Comparative Study. *J Clin Pediatr Dent.* 2013; 37(3): 289-96.
5. Frydman A, Nowzari H. Down syndrome-associated periodontitis: a critical review of the literature. *Compend Contin Educ Dent.* 2012; 33(5): 356-61.
6. Nagaveni NB, Suma R, Suma R, Shashikiran ND, Subba Reddy VV. Papillon-Lefevre syndrome: Report of two cases in the same family. *J Indian Soc Pedod Prevent Dent.* 2008; 26(2): 78-81.
7. Singla A, Sheikh S, Jindal SK, Brar R. Papillon Lefevre syndrome: Bridge between Dermatologist and Dentist. *J Clin Exp Dent.* 2010; 2(1): e43-6.
8. Morales-Chávez MC. Dental management of a patient with Rubinstein-Taybi syndrome. *Spec Care Dentist.* 2010; 30(3): 124-6.
9. Moosani A, Sigal MJ, Glogauer M, Lawrence HP, Goldberg M, Tenenbaum HC. Evaluation of periodontal disease and oral inflammatory load in adults with special needs using oral neutrophil quantification. *Spec Care Dentist.* In press.
10. Kumar S, Sharma J, Duraiswamy P, Kulkarni S. Determinants for oral hygiene and periodontal status among mentally disabled children and adolescents. *J Indian Soc Pedod Prev Dent.* 2009; 27(3): 151-7.

11. Ameer N, Palaparthi R, Neerudu M, Palakuru SK, Singam HR, Durvasula S. Oral hygiene and periodontal status of teenagers with special needs in the district of Nalgonda. India J Indian Soc Periodontol. 2012; 16(3): 421-5.
12. Ozgul O, Dursun E, Ozgul BM, Kartal Y., Coskunes FM, Kocyigit ID, Tözüm TF. The impact of handicap severity on oral and periodontal status of patients with mental retardation. J Contemp Dent Pract. 2014; 15(2): 218-22.
13. Gerreth K, Borysewicz-Lewicka M. Epidemiological evaluation of gingivitis in special-care schoolchildren. Med Wieku Rozwoj. 2009; 13(4): 283-91.
14. Shanbhog R, Raju V, Nandlal B. Correlation of oral health status of socially handicapped children with their oral health knowledge, attitude, and practices from India. J Nat Sci Biol Med. 2014; 5(1): 101-7.
15. Denloye OO. Periodontal status and treatment needs of 12-15 year old institutionalized mentally handicapped school children in Ibadan, Nigeria. Odontostomatol Trop. 1999; 22(86): 38-40.
16. Garcés CP, Barrera ML, Ortiz ME, Rosas CF. Estado de Salud Oral de niños y adolescentes con Discapacidad Intelectual en una población chilena, 2012. J Oral Res. 2013. 2(2):59-63.
17. Simon EN, Matee MI, Scheutz F. Oral health status of handicapped primary school pupils in Dar es Salaam, Tanzania. East Afr Med J. 2008; 85(3): 113-7.
18. Donnell DO, Sheiham A, Wai YK. Dental findings in 4-, 14-, and 25-to 35-year-old Hong Kong residents with mental and physical disabilities. Spec Care Dentist. 2002; 22(6): 231-4.
19. Jain M, Mathur A, Sawla L, Choudhary G, Kabra K, Duraiswamy P, Kulkarni S. Oral health status of mentally disabled subjects in India. J Oral Sci. 2009; 51(3):333-40.