

ORAL HEALTH OF DOWN SYNDROME CHILDREN IN BOSNIA AND HERZEGOVINA

Selma Porovic¹, Amila Zukanovic², Hrvoje Juric³, and Senka Mesihovic Dinarevic⁴

¹Department of Preventive and Pediatric Dentistry, Public Health Center of Sarajevo Canton, Sarajevo, Bosnia and Herzegovina

²Department of Preventive and Pediatric Dentistry, Faculty of Dentistry, University of Sarajevo, Sarajevo, Bosnia and Herzegovina

³Department of Pediatric and Preventive Dentistry, School of Dental Medicine, University of Zagreb, Zagreb, Croatia

⁴Academy of Sciences and Arts of Bosnia and Herzegovina, Sarajevo, Bosnia and Herzegovina

Corresponding author: Selma Porovic, DMD. Public Health Center of Sarajevo Canton, Department of Preventive and Pediatric Dentistry, Sarajevo, Bosnia and Herzegovina. Phone +38733292500; E-mail:selma.porovic@gmail.com

ABSTRACT

Introduction: The objective of this study was to determine the oral health condition Down syndrome (DS) children in Bosnia and Herzegovina, by analyzing oral health of Down syndrome individuals in two largest regions, Sarajevo and Tuzla Canton.

Patients and Methods: Caries and oral health status of Down syndrome children aged 6-18 years were examined and assessed according WHO 1997 criteria. DS individuals were divided into four age groups: I (0-6 yrs); II (7-12 yrs); III (13-18 yrs). **Results:** The mean dmft/DMFT index for age group I is (6,40±6,05); II (2,05±2,04) and III (10,30±6,80). The analysis of oral hygiene of Down syndrome children by using the debris index, it was found that 43,9% have very good oral hygiene, 33,3% respondents have good oral hygiene, 15,8% were with poor oral hygiene, while the very poor hygiene had 7% subjects. By using Pearson's correlation to the value of DMFT, debris index and age of examinees with Down syndrome, it is established a statistically significant positive correlation between analyzed variables. Values of CPI index according to age groups were as follows: I (0,1); II (0,17) and III group (0,4).

Key words: oral health, Down syndrome, children, Bosnia and Herzegovina.

1. INTRODUCTION

Down syndrome (DS) is the most common neurodevelopmental disorder of known genetic cause, with an incidence of between 1:750 and 1:1000 live births. DS has usually been described simply as arising from an extra copy of chromosome 21 and presenting with characteristic features including facial dysmorphism, a proportionally large tongue, low muscle tone, short stature, and intellectual disability (1).

Oral disease is a major health problem for individuals with disabilities, who have a higher prevalence and severity of oral disease compared to the general population. High rates of dental caries, missing teeth, periodontal disease, prolonged retention of primary teeth, misaligned or supernumerary teeth and malocclusion are all indicators of poor oral health in adults with disabilities (2).

There is a little information on the oral health of Down's syndrome individuals. Most studies have suggested that the reduction of dental caries in Down syndrome individuals than that of normal ones may be explained by congenital

oligodontia, delayed eruption, a different salivary composition (salivary IgA, salivary pH, buffering capacity, and flow rate) or a difference in eruption times as the teeth of children with Down syndrome often erupts in 1-2 years later than that of the normal child (3). Periodontal disease is the most significant oral health problem in people with Down syndrome. The precocious nature of the condition is thought to be due to such factors as immunological deficiency, poor oral hygiene, fragile periodontal tissue, early senescence, and poor masticatory function, while it is also likely that short tooth roots lead to tooth mobility and subsequent loss (4).

There are a few reports on the oral health status of the mentally disabled population from Bosnia and Herzegovina. The objective of this study was to determine the oral health condition of Down syndrome children in Bosnia and Herzegovina, by analyzing oral health parameters in two largest regions, Sarajevo and Tuzla Canton.

2. PATIENTS AND METHODS

This cross-sectional study included 90 individuals with DS, aged 6–45 years, from Sarajevo and Tuzla Canton, Bosnia and Herzegovina. At the time, this study was carried out (January, 2014), there were 50 DS individuals attending three centers for mentally handicapped in Sarajevo Canton, and 40 DS individuals were examined at six centers for mentally handicapped in Tuzla Canton. Written consent for the participation of DS individuals were obtained from Ministry of Science, Education and Youth of Sarajevo and Tuzla Canton, principals of schools, directors of centers and parents of participants. The examinations were performed in the school chair; the examiner sat in front of them. Calibrated dentist performed the clinical examination under adequate natural light using a plane mirror and CPI ball-ended probe. Data were recorded into modified WHO form for this kind of research (5). Caries was measured using the DMFT/dmft index according to WHO criteria. In period of mixed dentition (7-12 years), only DMFT of first permanent molars was used for recording. It was detected at the cavitation level only (detectable softened floor, undermined enamel or softened wall). Criteria of „catching“ or „retention“ of the explorer was not used to detect caries (6). The mouth was divided into sextants and six index teeth were utilized (the first molar of each quadrant, the right maxillary central incisor and the left mandibular central incisor) to evaluate oral hygiene and periodontal health. Oral hygiene status was assessed using the Simplified Debris Index (DI-S), as described by Greene–Vermillion. When (debris index) is $DI < 0,4$ (very good oral hygiene): score 0; $DI = 0,4-1,0$ (good oral hygiene): score 1; $DI = 1,1-2,0$ (poor oral hygiene): score 2; $DI > 2,0$ (very poor oral hygiene): score 3. CPI (Community Periodontal Index) evaluates three periodontal indicators: bleeding gums, periodontal calculus and periodontal pockets. When examining children or adolescents under the age of 15, only bleeding gums and calculus should be considered. The CPI was coded by as: 0 = healthy; 1 = bleeding; 2 = calculus; 3 = pocket 4-5 mm; 4 = pocket >6mm; X = sextant excluded; 9 – not registred (7, 8). Participants were also divided into four groups according to their age, as follows: 1. Age 6 years ($n=10$); 2. Age 7-12 years ($n=17$); 3. Age 13-18 years ($n=30$) 4.

Statistical analysis was carried out using the SPSS software program. The sample has been described using descriptive statistics (mean, standard deviation). Chi-square test was used to determine significant differences in data ($P < 0,05$). Correlation between oral hygiene, dental caries and subjects age was tested using Pearson correlation.

3. RESULTS

Of the 57 participants in the study, 59,6% were males, and 40,35% were female. The examinees were divided into four three age groups: I group: age 0-6 years ($n=10$); II group: age 7-12 years ($n=17$); III group: age 13-18 years ($n=30$).

The greatest value of DMFT has age group of 13-18 years (10,30). Respondents age group of 7-12 years had the value of DMFT of first permanent molars (2,05). The analysis of DMFT index (respondents 0-6 years), showed the value 6,40 (-d: 6,40; -e: 0,00; -p: 0,00) (Table 1).

X±SD	0- 6 years*	7-12 years**	13-18 years***	P
------	-------------	--------------	----------------	---

Decayed	6.40±6.05	1.47±1.04	7.46±6.12	0.001
Missing	0.00±0.00	0.58±0.12	1.83±1.35	0.001
Filled	0.00±0.00	0.00±0.00	1.00±0.95	0.001
DMFT(dmft)	6.40±6.05	2.05±2.04	10.30±6.80	0.001

Table 1. Values of DMFT/dmft Down syndrome individuals according to age groups. *DMFT: D- decayed; M- missing, F-filling; T-teeth of primary detition, **first permanent molars (DMFT index) was calculated in period of mixed dentition, ***DMFT: D- decayed; M- missing, F-filling; T-teeth of permanent detition

The analysis of oral hygiene of Down syndrome individuals by using the debris index, it was found that 43,9% have very good oral hygiene, 33,3% respondents have good oral hygiene, 15,8% were with poor oral hygiene, while the very poor hygiene had 7,01% subjects (Table 2). By using Pearson's correlation to the value of DMFT and age of examinees with Down syndrome, it is established a statistically significant positive correlation between analyzed variables. DMFT is in a statistically significant high positive correlation with age of subjects ($r = 0,670$; $p = 0,001$).

	N	%
Very good oral hygiene	25	43,9
Good oral hygiene	19	33,3
Poor oral hygiene	9	15,8
Very poor oral hygiene	4	7,01
Total	57	100.0
$\chi^2 = 19.000$; $p = 0,001$		

Table 2. Values of Debris index (DI) Down syndrome individuals

There were no statistically significant difference in Debris index subjects with Down syndrome in relation to the age group. The highest percentage of all age groups have very good oral hygiene, and good oral hygiene (Table 3).

		Age groups Total			
		0- 6 yrs	7-12 yrs	13-18 yrs	
0-Very good oral hygiene	Broj	4	9	12	25
	%	40.0%	52.9%	40.0%	43,9%
1-Good oral hygiene	Broj	5	4	10	19
	%	50.0%	23.5%	33.3%	33,3%
2-Poor oral hygiene	Broj	1	3	5	9
	%	10.0%	17.6%	16.7%	15,8%
3-Very poor oral hygiene	Broj	0	1	3	4
	%	0.0%	5.9%	10.0%	7%
Total	Broj	10	17	30	57
	%	100.0%	100.0%	100.0%	100.0%
$\chi^2 = 8.851$; $p = 0,198$					

Table 3. Values of Debris index of Down syndrome individuals according to age groups

	N	Mean	Std. Error	95% CI for Mean	
				Lower	Upper
0- 6 years	10	0.10	0.10	-.1262	.3262
7-12 years	17	0.17	0.09	-.0256	.3785
13-18 years	30	0.40	0.10	.1796	.6184

Table 4. Values of CPI index according to age groups

By using Pearson's correlation to the value of DMFT, Debris index and age of examinees with Down syndrome, it is established a statistically significant positive correlation between analyzed variables. Debris index was in poor

positive statistically significant correlation with the DMFT ($r = 0,255$; $p = 0,015$) and age of subjects ($r = 0,215$; $p = 0,043$). DMFT is also in a statistically significant high positive correlation with age of subjects ($r = 0,670$; $p = 0,001$). Values of CPI index according to age group are as in (Table 4).

4. DISCUSSION

There is a general agreement that the population with mentally challenged children has higher rates than the general population, for poor oral hygiene, gingivitis and periodontitis (2). Moderate or severe gingivitis has been found almost universally, with degree and extent increasing with age and degree of mental retardation, especially for those individuals with Down's syndrome (9). Values of dmft in persons with Down syndrome and healthy children in Bosnia and Herzegovina are similar, while among older respondents is much greater value of DMFT in individuals with Down syndrome, although even for the healthy population values of DMFT in Bosnia and Herzegovina are very high. That is explained as low awareness of oral health among the population, lack of preventive programs, as well as poor promotion of importance oral health (6, 10-12). Unlike other studies that showed that Down syndrome individuals have lower values of DMFT index (3, 13-17), values of DMFT index obtained in our study correlate with the values obtained in the survey conducted in neighbour country Croatia (18), India (16), Nigeria (15), Argentina (19) and Yemen (20). In agreement with previous reports, the present study revealed that caries experience is associated with age. This is due to the fact that dental caries is irreversible and accumulative. By increasing the age of examinees, increases DMFT index value, so the positive correlation is noted, as well as in survey performed in Yemen (20) and Turkey (21).

It is very interesting that the majority of respondents in this survey noted very good and good oral hygiene, while the balance of the DMFT was really bad. The reason for this discrepancy in the results is likely that all exams of DS individuals in institutions were announced about dental examination, so that parents added extra attention for tooth brushing their children. Similar results were obtained in Nigeria (15), while results conducted in this survey differ from surveys provided in Brasil (22) and India (23). The values of the CPI of Down syndrome examinees are better in comparison to results in healthy subjects and those with allergic asthma in Bosnia and Herzegovina (27), and better related to results (9, 22, 23).

Lack of knowledge about good oral hygiene practices among parents and care takers, lack of motivation, low priority given to dental care in society, lack of facility for early and regular oral health check-up may be the reason for accumulated treatment needs.

5. CONCLUSION

This study shows that DS children in Bosnia and Herzegovina have a high prevalence of caries, and extraction as a treatment option. It is necessary to create oral health preventive programs and introduce them with special care schools with parental education as an integral component of such programs, and it is necessary to educate dental practitioners to work with this population.

• Conflict of interest: none declared.

REFERENCES

1. Karmiloff-Smith A, Al-Janabi T, D'Souza H, Groet J, Massand E, Mok K. et al. The importance of understanding individual differences in Down syndrome. *F1000Research*. 2016; 5: 389. <http://doi.org/10.12688/f1000research.7506.1>
2. Altun C, Guven G, Akgun OM, Akkurt MD, Basak F, Akbulut E. Oral Health Status of Disabled Individuals Attending Special Schools. *Eur J Dent*. 2010; 4(4): 361-6.
3. Singh V, Arora R, Bhayya D, Singh D, Sarvaiya B, Mehta D. Comparison of relationship between salivary electrolyte levels and dental caries in children with Down syndrome. *Journal of Natural Science, Biology, and Medicine*. 2015; 6(1): 144-8.
4. Atsuo A, Jumpei M, Shigehisa A, Morisaki I. Etiologic factors of early-onset in Down syndrome. *Japanese Dental Science Review*. 2008; 44: 118-27. <http://dx.doi.org/10.1016/j.jdsr.2008.07.001>
5. WHO. *Oral Health Surveys. Basic methods*, 4th ed. Geneva, 1997.
6. Porović S, Koradžić-Zuban S, Spahić-Dždarević M, Brkanić B, Branković B, Cilović-Lagarija Š. Evaluation of oral health in 12-year-old children in the Vogošća municipality, the Sarajevo Canton. *Stomatološki vjesnik*. 2014; 3(2): 97-101.
7. Carneiro VL, Calixto FF, Morais FF, P Pegoretto PT, Borges OAC, Silva BMC. The influence of glycemic control on the oral health of children and adolescents with diabetes mellitus type 1. *Arch Endocrinol Metab*. 2015; 59(6): 535-40.
8. Porović S. Assessment of the oral health of Down syndrome individuals, correlated with the knowledge, attitude and practice of their parents/guardians. Master thesis, Sarajevo: Faculty of dentistry, Sarajevo, 2014.
9. Rahul VK, Mathew C, Jose S, Thomas G, Noushad MC, Feroz TPM. Oral Manifestation in Mentally Challenged Children. *Journal of International Oral Health : JIOH*. 2015; 7(2): 37-41.
10. Marković N, Arslanagić-Muratbegović A, Kobašlija S, Bajrić E, Selimović-Dragaš M, Huseinbegović A. Caries prevalence of children and adolescents in Bosnia and Herzegovina. *Acta Medica Academica*. 2013; 42(2):108-16. <http://dx.doi.org/10.5644/ama2006-124.79>.
11. Arslanagić-Muratbegović A, Marković N, Zukanović A, Kobašlija S, Selimović-Dragaš M, Jurić H. Oral Health Related to Demographic Features in Bosnian Children Aged Six. *Coll Antropol*. 2010; 34(3): 1027-33.
12. Zukanović A, Bešlić E, Dedić A, Ganićbegović M. Evaluation efficacy of risk-factors in caries risk assessment in 12-year-olds. *Stomatološki vjesnik* 2012.
13. Asokan S, MS Muthu, N Sivakumar, Dental caries prevalence and treatment needs of Down syndrome children Chennai, India. *Indian J Dent Res*. 2008; 19(3):224-9.
14. Castilho AR, Marta SN. Evaluation of the incidence of dental caries in patients with Down syndrome after insertion in a preventive program. *Cien Saude Colet*. 2010; 32(2): 3249-53. <http://dx.doi.org/10.1590/S1413-81232010000800030>.
15. Oredugba FA. Oral Health condition and treatment needs of a Nigerian individuals with Down syndrome. *Down Syndrome Research and Practice*. 2007; 12(1): 72-6.
16. Manish J, Anmol M, Sawla L, Choudhary G, Kabra K, Duraiswamy P, et al. Oral health status of mentally disabled subjects in India. *Journal of Oral Science*. 2009; 51(3): 333-40. <http://doi.org/10.2334/josnurd.51.333>
17. Areias CM. et al. Caries in Portuguese children with Down syndrome. *Clinics*. 2011; 66(7): 1183-6.
18. Bagić I, Škrinjarčić I. Prevalencija zubnog karijesa kod Downovog sindroma. *Acta Stomatologica Croatica*. 1993; 27: 273-9.
19. Cornejo LS, Zak GA, Dorronsoro de Cattoni ST, Calamari SE, Azcurra AI, Battellino LJ. Bucodental health condition in patients with Down syndrome of Cordoba City, Argentina. *Acta Odontol Latinoam*. 1996; 9: 65-79.
20. Al-Maweri S, Al-Sufyani G. Dental caries and treatment needs of Yemeni children with down syndrome Sadeq Al-Maweri and Ghadah Al-Sufyani. *Dent Res J (Isfahan)*. 2014; 11(6): 631-5.
21. Altun C, Guven G, Akgun OM, Akkurt MD, Basak F, Akbulut E. Oral Health Status of Disabled Individuals Attending Special Schools. *European Journal of Dentistry*. 2010; 4(4): 361-6.
22. Loureiro ACA, Costa FO, da Costa JE. The impact of periodontal disease on the quality of life of individuals with Down syndrome. *Down Syndrome Research and Practice*. 2007; 12(1): 50-4.
23. Kumar S, Sharma J, Duraiswamy P, Kulkarny S. Determinants for oral hygiene and periodontal status among mentally disabled children and adolescents. *J Indian Soc Pedod Prev Dent*. 2009; 27: 151-7.