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Oral health in children with special needs

Stanje oralnog zdravlja dece sa posebnim potrebama

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Abstract

Background/Aim. Due to their primary medical condition, children with special needs often display lower levels of oral hygiene, larger prevalence of caries and other oral diseases. The aim of this study was to estimate the prevalence of dental caries, oral cleanliness and presence of malocclusion in children with disabilities, as well as to evaluate eruption time of the permanent molars. **Methods.** Case–control study was carried out on a group of 107 children with disabilities at the Faculty of Dental Medicine, University of Belgrade, Serbia. The control group comprised of 104 healthy school children. **Results.** Children with disabilities had statistically higher mean [decayed missing and filled teeth – dmft for primary DMF for permanent dentition (dmft DMFT)] values in both dentitions than children from the control group ($p < 0.05$). Oral cleanliness level was much lower in children with disabilities. A significantly higher percentage of Class II malocclusions and a higher tendency to have a delayed time of eruption of permanent molars were observed in the test group in permanent dentition. **Conclusion.** Considering poor oral health status and higher tendency for development of malloclusions and delayed eruption, it is necessary to develop preventive dental programmes for children with special needs, as well as improve public awareness about these issues.

Key words:
disabled persons; child; adolescent; oral health; risk assessment; tooth eruption; malocclusion.

Apstrakt

Uvod/Cilj. Deca sa posebnim potrebama često zbog svoje primarne bolesti, imaju niži nivo oralne higijene i veću prevalencu karijesa i drugih oralnih oboljenja. Cilj rada bio je da se proceni prevalenca karijesa, nivoa oralne higijene i prisustvo malokluzija kod dece sa posebnim potrebama, kao i vreme erupcije stalnih molara. **Metode.** Ispitivanjem oralnog zdravlja obuhvaćeno je 107 dece sa posebnim potrebama na Klinici za dečju i preventivnu stomatologiju Stomatološkog fakulteta u Beogradu. Kontrolnu grupu je činilo 104 zdrave školske dece. **Rezultati.** Deca sa posebnim potrebama imala su statistički značajno viši nivo indeksa karijesnih, ekstrahovanih i plombiranih zuba (KEP) u obe denticije, u odnosu na kontrolnu grupu ($p < 0.05$). Nivo oralne higijene bio je lošiji kod dece sa posebnim potrebama. Takođe, primećeno je statistički značajno povećanje malokluzija klase II, kao i kasnije vreme erupcije stalnih molara kod dece sa posebnim potrebama u odnosu na kontrolnu grupu. **Zaključak.** Zbog lošijeg stanja oralnog zdravlja i povećane verovatnoće razvoja malokluzija i odloženog nicanja zuba, neophodno je formirati preventivne stomatološke programe za decu sa posebnim potrebama, kao i poboljšati informisanost javnosti o ovom problemu.

Ključne reči:
invalidi; deca; adolesenti; usta, zdravlje; rizik, procena; zub, nicanje; malokluzija.

Introduction

Over the past decade, children with disabilities have emerged as a major public health concern in many countries, but nationwide surveys conducted in the Western Balkan region on the oral condition of these children are lacking. According to the Health Statistical Year Book of the Republic of Serbia published in 2014, there are 22,000 children with disabilities under the age of 7. There are approximately 100,000 children with disabilities in Serbia, counting for 6% of total children population in Serbia. Out of those, it is estimated that there are around 2,400 children with cerebral palsy [1]. Children with disabilities need special or intensive medical care, requiring the interest of clinicians not only in

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the prevention of the primary medical condition, but also in the prevention of the problems related to it, such as dental caries, periodontal disease and malocclusions [2, 3]. Caries experience in these children has been attributed to disability-related factors, medications, diet, inadequate oral hygiene and unavailability of dental treatment [4].

Inadequate dental care or poor dental public health measures may have negative influences on oral health status of children with disabilities. There are no recent data on the dental health status of such patients in Serbia, and most of the epidemiological data gathered on the subject in the area of Western Balkan are scarce and in need updating.

The aim of this study was to determine the prevalence of oral disorders including dental caries, oral cleanliness, eruption time of first and second permanent molar teeth and malocclusions in children with disabilities in Serbia.

Methods

The study was in full accordance with ethical principles, including the World Medical Association Declaration of Helsinki [5]. Approval for the study was obtained from the Ethics Committee of the Faculty of Dental Medicine, University of Belgrade and prior to data collection, written informed consent was obtained from all parents of the children that participated in the study.

The study group comprised 107 children with disabilities aged betweeen 6–16 years who were referred to the Clinic of Paediatric and Preventive Dentistry in the period of one year. They were examined for dental caries, oral cleanliness, time of molar eruption and presence of malocclusions. Information about the medical conditions of the children was obtained from the referring paediatricians. Treatment included both preventive and prophylactic measures (dental and oral hygiene examinations, mechanical removal of plaque and calculus, pit and fissure sealants, topical fluoride applications, parental motivation and oral health education), and dental treatment (treatment planning, restorations and extractions).

Inclusion factors for determining the study group were: children with disabilities that have demonstrated sufficient cooperation level to be examined in a dentist chair.

Exclusion factors for determining study group were: institutionalised patients; patients whose primary medical condition also includes: blood dyscrasia, congenital heart disease, diabetes, autoimmune conditions, kidney diseases, and patients undergoing chemo- or radiation therapy; patients that previously had undergone dental treatment under general anaesthesia; patients originating from the areas where endemic fluorosis was present.

A group of 104 non-medically compromised children who attended regular schools in Belgrade and were matched for age, gender, and type of dentition (mixed or permanent) served as the control group. They were examined in the order they appeared at the Clinic for Paediatric and Preventive Dentistry. Control participants did not use any medication that could affect oral health.

A single, trained and calibrated examiner carried out all procedures and intraexaminer reliability was calculated by reexamination of 10% of children from the control group at two different visits.

Caries diagnosis at the cavity level was performed according to standard World Health Organisation (WHO) methodology, and decayed, missing and filled teeth (dmft for primary dentition; DMFT for permanent dentition) were recorded [6].

Oral cleanliness was assessed by visually evaluating the presence of plaque on the buccal and lingual surfaces of upper and lower incisors and canines using the oral hygiene index proposed by James et al. [7]: score 0 = no evidence of plaque (good oral cleanliness), score 1 = some plaque at retention sites and/ or food accumulation (fair oral cleanliness) and score 2 = marked presence of plaque and/or food accumulation on most examined surfaces (poor oral cleanliness). The children teeth were not brushed nor professionally cleaned prior to the examination.

For the presence of permanent teeth the following criteria were applied: noting the presence of first permanent molars in 5–7 years old children and noting the presence of second permanent molars in 12–13 years old children. Code 0 was used for non-erupted teeth and code 1 was used if any part of the molar crown was visible in the oral cavity [8]. Occlusion was recorded according to the Angle Classification system, and if patients had only primary dentition, it was recorded according to the terminal plane of the primary molars.

Statistical significance levels was set at $p < 0.05$. Statistical calculations were performed by SPSS, version 14.0 for Windows (SPSS inc., Chicago, IL, USA). To establish the statistical distribution of data, the following tests were used: Mann Whitney test, Fisher's exact test, and Chi-square test.

Results

Intra-examiner reliability calculated by Cohen Kappa score was 0.91.

Distribution of age and gender of the study and the control groups is presented in Table 1.

The study group consisted of 107 children of whom 55 had mixed dentition (ages 6–11 years), and 52 children with permanent dentition (ages 12–16 years). Mean age of the study group was 11.19 ± 3.36 years.

The control group consisted of 104 non-medically compromised children out of whom 51 had mixed dentition (age 6–11 years), and 53 had permanent dentition (age 12–16 years). Mean age of the control group was 10.83 ± 3.30 years.

The medically compromised children had statistically higher mean dmft/DMFTvalues in both dentitions than children from the control group ($p < 0.001$) [Table 2 (Mann Whitney test)].

When comparing dmft/DMFT among the study subgroups [autism, cerebral palsy (CP) and mental retardation], no statistical significance was observed in the dmft. In the DMFT range, statistical significance was only observed in decayed teeth (DT) between autism and mental retardation study subgroups ($p < 0.006$), and in filled teeth (FT) between autism and cerebral palsy study subgroups ($p < 0.005$), and autism and mental retardation study subgroups ($p < 0.003$).

Table 1

Distribution of age and gender in children with special needs

Age (years)	Autism		Cerebral palsy		Mental retardation		Control	
	male	female	male	female	male	female	male	female
6–11	10	9	7	4	14	10	23	28
12–16	9	4	4	6	7	11	28	25

***All values are expressed as number of subjects.**

Table 2

Comparison of decayed, missing and filled surfaces in primary and permanent dentitions in the 6-11-year and 12-16-year age range in the study and control group of patients

Index	n (6–11 years)	n (12–16 years)	mean ± SD	*p*
dt	55		8.1 ± 4.5	0.000*
S	51		3.7 ± 4.4	
C				
DT				
S	55		4.0 ± 3.0	0.000*
C	51		0.6 ± 1.1	
S		52	13.7 ± 6.3	0.000*
C		53	4.9 ± 3.6	
Mt				
S	55		4.0 ± 3.7	0.000*
C	51		1.6 ± 2.4	
MT				
S	55		1.3 ± 1.5	0.000*
C	51		0.1 ± 0.3	
S		52	5.9 ± 4.2	0.000*
C		53	1.2 ± 1.5	
ft				
S	55		0.3 ± 0.8	0.024*
C	51		0.7 ± 1.3	
FT				
S	55		0.1 ± 0.3	0.073
C	51		0.4 ± 0.9	
S		52	1.2 ± 2.0	0.082
C		53	1.5 ± 1.7	
sound				
S	55		2.9 ± 2.7	0.000*
C	51		10.0 ± 5.6	
SOUND				
S	55		5.9 ± 3.0	0.025*
C	51		8.5 ± 5.5	
S		52	11.0 ± 5.6	0.000*
C		53	19.3 ± 5.0	
dmft				
S	55		12.4 ± 7.7	0.000*
C	51		5.7 ± 6.9	
DMFT				
S	55		5.4 ± 4.4	0.000*
C	51		1.0 ± 1.7	
S		52	20.9 ± 9.6	0.000*
C		53	7.7 ± 5.3	

***statistically significant (Mann Whitney test), SD – standard deviation; n – number of subjects; S – study group; C – control group; dt – decayed teeth; mt – missing teeth; ft – filled teeth (for primary dentition); DT – decayed teeth; MT – missing teeth; FT– filled teeth (for permanent dentition); sound – sound for primary dentition; SOUND – sound for permanent dentition.**

†decayed, missing and filled teeth (dmft for primary dentition, DMFT for permanent dentition).

There was a statistically significant difference between the study and control groups regarding plaque accumulations on the buccal and lingual surfaces of the upper and lower anterior teeth ($p < 0.01$), while there was no difference in oral cleanliness among medically compromised children with different handicaps in the study group [Figure 1 (Mann Whitney test)].

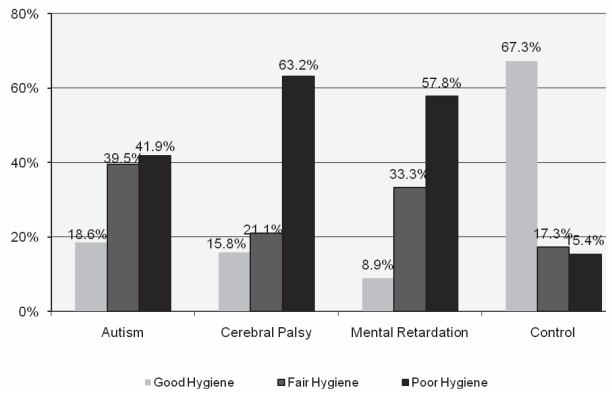

Fig. 1 – Oral cleanliness in the study and control group of subjects.

A tendency to have a delayed time of eruption of permanent molars was observed for all study subgroups in relation to the control group [Table 3 (Fisher's test)].

Class II malocclusions were more frequent in the study group while for both groups incorrect molar occlusions were observed ($p = 0.000$) [Table 4 (Chi-square test)].

Significantly higher percentage of Class II malocclusions for males in both mixed and permanent dentitions and for females in the mixed dentition of the study group ($p < 0.01$) was observed [Table 5 (Chi-square test)].

A higher percentage of class II malocclusions was observed in patients with cerebral palsy in relation to patients with autism and mental retardation, but without statistical significance [Table 6 (Chi square-test)].

Table 3

Comparison of the presence of the first permanent molar in the mixed dentition and of the second permanent molar in the permanent dentition in the study and control group

Age (years)	Autism		Cer. palsy		Ment. retardation		Control		*p*
	erupted	non erupted	erupted	non erupted	erupted	non erupted	erupted	non erupted	
5–7	0	10	3	1	5	5	19	12	
12–13	2	7	2	3	2	5	22	4	
Total	2	17	5	4	7	10	41	16	0.000*

***statistically significant (Fisher's test).**

Table 4

Comparison of the presence of the first permanent molar in the mixed dentition and of the second permanent molar in the permanent dentition in the study and control groups

Molar occlusion	Control group	Study group	Total
	n (%)	n (%)	n (%)
Class I	55 (53)	20 (18)	75 (35)
Class II	43 (41)	83 (78)*	126 (60)
Class III	6 (6)	4 (4)	10 (5)
Total	104 (100)	107 (100)	211 (100)

***$p = 0.000$ (χ^2-test).**

Table 5

Comparison of the presence of malocclusions (Class II Division 1) in mixed and permanent dentition in the study (S) and control (C) group

Age (years)	Gender	Group	n	Malocclusion (%)	*p*
6–11	male	S	28	60.71	0.005*
6–11	male	C	23	21.73	
6–11	female	S	27	70.37	0.001*
6–11	female	C	28	28.57	
12–16	male	S	24	79.17	0.008*
12–16	male	C	28	42.86	
12–16	female	S	28	64.29	0.077
12–16	female	C	25	40.00	

***statistically significant (χ^2-test).**

Table 6

Types of molar occlusion in relation to the patients condition

Molar Occlusion	Autism	Cerebral Palsy	Mental retardition	Total
	n (%)	n (%)	n (%)	n (%)
Class I	9 (45)	2 (10)	9 (45)	20 (100)
Class II	35 (42)	18 (22)	30 (36)	83 (100)
Class III	1 (25)	0 (0)	3 (75)	4 (100)

χ2-test – no significance.

Discussion

Children with disabilities included in this study exhibited a higher prevalence of oral disease in comparison to the healthy children. Other studies reported that the prevalence of dental caries was higher in medically compromised patients when compared with healthy children. Oral hygiene, diet, living conditions, water fluoridation, social factors and institutionalisation were recognised as important contributing factors to the prevalence of oral diseases in medically compromised patients [9–12]. The results of the present study support the findings of reports that demonstrated a high caries prevalence, alongside with a higher proportion of untreated lesions [10, 11, 13] as well as higher prevalence of malocclusion in children with disabilities when compared to non-medically compromised patients [14, 15]. However, there are other studies that reported comparable or no appreciable difference, or even lower oral disease levels in children with disabilities [16]. There are also studies that show that children with severe disabilities can demonstrate lower levels of DMFT in comparison to the children with mild or moderate disabilities [17, 18], indicating that further research is needed in this field. The preventive and restorative treatment needs a large number of children in the present study, where unmet and high priority in public dental funding should be given to the prevention and treatment needs of these patients. There is an opinion that because of their complex treatment needs, children with disabilities require specialist care and general anaesthesia which could improve quality of their dental treatment [19].

In this study the dmfs and DMFS indices of the study group, related to age, have significantly higher values than those of the control group. Our results can be compared with the study of Shmarak and Bernstein [20] who summed dmfs and DMF calculated per tooth surface (DMFS) in the mixed dentition and found higher caries levels in children with cerebral palsy. Nielsen [21] found that motor alterations in handicapped persons were the best caries predictors and that the presence of residual food was the result of the inability of the tongue, cheeks and lips to perform normal deglutition [21]. Contrarily, Swallow [22] demonstrated a trend of a lower caries incidence in the primary teeth of children with a wide range of physical and medical handicaps. When comparing dmfs and DMFS in the children with mixed dentitions Rodrigues dos Santos et al. [2] did not find any difference between the children with CP and healthy children. However, in the permanent dentition the children with CP had significantly higher values of DMFS compared to the healthy controls [2, 11, 21].

Choi and Yang [14] reported that the dft, dfs and DMFT indices of the medically compromised subjects were significantly lower than those for healthy individuals and that DMF, DMFS and DMFT indices increased with age in both of the examined groups. The results in the present study showed significantly higher dmft and DMFT indices in children with disabilities. It was observed that the decay component (dt; DT) of the mean dmft and DMFT index was the largest component of the index for both groups. Children with disabilities have had low levels of restorative care as demonstrated through the low number of filled teeth. The restorative component was lower in children with disabilities, which is attributed to the lack of conservative approach to the treatment of dental caries and is in agreement with other studies [10, 16]. The explanation for this might be found in the greater difficulty of treating children with disabilities. The majority of children with special care needs spend most of their time at home, and only a few hours daily at specialist daycare centres and other support institutions. Therefore these children receive their daily dental oral care from their parents with little emphasis placed on prevention and therefore they have poor dental attendance record. The severity of the handicap should also be taken into account since it is a determining factor, not only for oral hygiene status, but also for dental therapy which can be further hampered by the inability of those children to fully communicate and cooperate during dental treatment.

Clinical experience in Serbia shows that medically compromised children are taken to the dentist usually when they experience symptoms of acute pain, and that the higher incidence of caries could be due to the lack of awareness about the importance of regular dental visits and preventive and prophylactic care.

It is shown that individuals with autistic disorder, mental disorders and other pervasive developmental disorders may have lower learning abilities than healthy individuals [23]. Consequently, this may affect their oral hygiene [24]. In our study oral hygiene level was shown to be rather poor in the study group compared to their healthy counterparts, and these findings are in agreement with other similar studies [14]. Most of the studies in the literature reported unsatisfactory oral hygiene in patients with disabilities [10, 14]. Difficulties in maintaining satisfactory oral hygiene and effective brushing were obvious in the children with disabilities group. The presence of mental disorders, motor alterations and dyskinetic movements coupled together with pathological oral reflexes, such as biting and vomiting, may also be considered important factors for the difficulties in mechanical removal of plaque, and may hamper dental hygiene. Dental cleanliness values observed in the test group of our study were significantly lower in the children in the permanent dentition. Increasing discrepancy of oral hygiene related with age between medically compromised and non-medically compromised children was also noticed and it was in agreement with other studies [25].

Delay in the time of permanent molar eruption observed in this study is in accordance with the previously reported results of other authors [2, 11, 14, 21].

Brown and Schodel [25] reported that orthopaedic handicapped groups could have an increased incidence of malocclusion, which was attributed to a lack of muscular co-ordination with dyskinetic movement, tendency to develop increased overjet due to buccal breathing and tongue thrusting. This is in accordance with our results where children with disabilities had malocclusions in 82% of the cases, of which 95% were Class II malocclusions. Swallow [22] did not show significant differences from the norm for malocclusion in a group of physically and medically compromised children.

The male subjects in the study group with permanent dentitions exhibited a significantly higher percentage of malocclusions than in the control group. The presence of malocclusion can further complicate the child's disability, as seen in children with cerebral palsy or epilepsy who are predisposed to trauma because of large overjets. As reported previously, periodontal disease, functional problems, speech impairment and temporomandibular joint dysfunction can develop [11]. Oral health status of patients with disabilities can be further complicated and worsened if they exhibit signs of psychiatric disorders or are on antidepressant therapy [26].

In spite of longstanding efforts of clinicians to modify parental behaviour and approach to maintaining oral hygene in children with disabilities and other efforts to reduce caries-risk in this population, little has been changed so far in the caries rates for medically compromised children.

Eastern European countries are facing problems in the treatment of this group of patients due to their low socioeconomic status. It is considered that the best approach for treating children with disabilities is conventional dental approach [27], but, limited cooperation with these patients as well as a large number of untreated caries lesions and other oral pathology may be exhibited, which often leads us to use general anaesthesia in their treatment [19]. Future efforts must be directed at finding effective national preventive strategies for the children with disabilities who continue to be afflicted with extensive caries. Until these strategies become available, clinicians need to improve their efforts to protect the dentition of handicapped children through appropriate preventative and restorative care.

Conclusion

Significantly high levels of caries prevalence and low levels of oral hygiene status for permanent teeth were observed in the children with disabilities group. The major component of the dental caries index was attributable to the decayed component and lack of conservative approach to the treatment was confirmed in the study group of children with disabilities. In children with disabilities there was a higher tendency for a delayed time of eruption of permanent molars comparing to healthy children. Class II division 1 malocclusions were significantly higher in a group of medically compromised children with permanent dentitions.

Conflict of interests

The authors declare that there is no conflict of interest.

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