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STANJE ORALNOG ZDRAVLJA DECE SA POSEBNIM POTREBAMA

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**Oral health in children with special needs**
Stanje oralnog zdravlja dece sa posebnim potrebama
Oral health in children with special needs
Abstrakt:
Uvod: Zbog svoje primarne bolesti, dece sa posebnim potrebama često imaju niži nivo oralne higijene, i veću prevalencu karijesa i ostalih oralnih oboljenja. Cilj ove studije je bio da proceni prevalencu karijesa, nivoa oralne higijene, i prisustvo malokluzija kod dece sa posebnim potrebama, kao i vreme erupcije stalnih molara. Metod: Studija je sprovedena ispitivanjem oralnog zdravlja 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 KEP-a u obe denticije u odnosu na kontrolnu grupu (P<0.05). Nivo oralne higijene je lošiji kod dece sa posebnim potrebama. Takođe je primećeno 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: Posebne potrebe, malokluzija, odloženo nicanje, oralna higijena, karijes

Abstract:
Background: 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. 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 School of Dental Medicine, University of Belgrade. The control group comprised of 104 healthy school children. Results: Children with disabilities had statistically higher mean 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 group. 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 malocclusions 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.

Keywords: Children with disabilities, malocclusions, delayed eruption, oral cleanliness, caries
Oral health in children with special needs
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 2400 children with cerebral palsy. Children with disabilities need special or intensive medical care, requiring the interest of clinicians not
only in 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\textsuperscript{2,3}. Caries experience in these children has been attributed to disability-related factors, medications, diet and inadequate oral hygiene and availability of dental treatment\textsuperscript{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 of updating.

The aim of the present study was to investigate 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.

**Material and methods**

The study was in full accordance with ethical principles, including the World Medical Association Declaration of Helsinki\textsuperscript{5}. Approval for the study was obtained from the Ethics Committee of the School 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 between 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:

1. Children with disabilities that have demonstrated sufficient cooperation level to be examined in a dentist chair.

Exclusion factors for determining study group were:

1. Institutionalised patients,

2. Patients whose primary medical condition also includes: blood dyscrasia, congenital heart disease, diabetes, auto-immune conditions, kidney diseases, and patients undergoing chemo or radiation therapy,

3. Patients that have previously undergone dental treatment under general anaesthesia,

4. 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 examiner (JCM) who was trained and calibrated carried out all procedures and intra-examiner reliability was calculated by re-examination 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.

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.: 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's 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 at age 5-7 years old, and noting the presence of second permanent molars at ages 12-13 years old. 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. 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 with SPSS, version 14.0 for Windows (SPSS inc., Chicago, IL, USA). Following the statistical distribution of data, the following tests were used: Mann Whitney test, Fisher’s exact test, Chi-square test.

**Results**

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

Distribution of age and gender of the study and control groups are presented in **Table 1**:
The study group consisted of 107 children of whom 55 had mixed dentition (ages 6-11), and 52 children with permanent dentition (ages 12-16). Mean age of the study group was 11.19 ± 3.36.

The control group consisted of 104 non-medically compromised children of whom 51 had mixed dentition (age 6-11), and 53 had permanent dentition (age 12-16). Mean age of the control group was 10.83 ± 3.30
The medically compromised children had statistically higher mean dmft/DMFT values in both dentitions than children from the control group ($P<0.001$) \textbf{Table 2}(Mann Whitney test):

When comparing dmft/DMFT between the study groups (autism, cerebral palsy 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 sub-groups ($p < 0.006$), and in filled teeth (FT) between autism and cerebral palsy study groups ($p<0.005$), and autism and mental retardation study groups ($p<0.003$).

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 \textbf{Figure 1}(Mann Whitney test):

A tendency to have a delayed time of eruption of permanent molars was observed for all of the study groups in relation to the control group \textbf{Table 3} (Fisher’s test):

Class II malocclusions were more frequent in the study group, while for both groups incorrect molar occlusions were observed ($P=0.000$) \textbf{Table 4}(Chi square test):

We have observed a significantly higher percentage of Class II malocclusions for males in both mixed and permanent dentitions, and for females in the mixed dentition of study group ($P<0.01$) was observed.\textbf{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.\textbf{Table 6} (Chi square test):
**Discussion**

Children with disabilities included in this study exhibited a higher prevalence of oral disease in comparison to the healthy children. Other studies have 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\(^9,10,11,12\). The results of 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 a 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 of large number of children in the present study were 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 dental treatment for these individuals\(^19\).

In this study the dmfs and DMFS indices of study group, related to age, have significantly higher values than those of control group. Our results can be compared with the study of Shmarak and Bernstein who summed dmfs and DMFS in the mixed dentition and found higher caries levels in children with cerebral palsy (CP)\(^20\). Nielsen 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. Contrarily, Swallowdemonstrated 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 dos Santoset al. 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.

Choi and Yang reported that the dft, dfs and DMFT indices of medically compromised 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. 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 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 co-operate during dental treatment.

Clinical experience in Serbia shows that medically compromised children are taken to the dentist usually when experiencing 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 (AD), mental disorders and other pervasive developmental disorders may have lower learning abilities than healthy individuals. Consequently, this may affect their oral hygiene. 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 agreement with other similar studies. Most of the studies in the literature reported unsatisfactory oral hygiene in patients with disabilities. 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 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 in agreement with other studies.

Delay in the time of permanent molar eruption observed in this study is in accordance with the previously reported results of other authors. Brown and Schodel have reported that orthopaedic handicapped groups can have an increased incidence of malocclusion, which has been attributed to the lack of muscular co-
ordination with dyskinetic movement, tendency to develop increased overjet due to buccal breathing and tongue thrusting\textsuperscript{25}. 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 did not show significant differences from the norm for malocclusion in a group of physically and medically compromised children\textsuperscript{22}. Male subjects in the study group with permanent dentitions exhibited a significantly higher percentage of malocclusions than 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\textsuperscript{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\textsuperscript{26}.

In spite of longstanding efforts of clinicians to modify parental behaviour and approach to maintaining oral hygiene in children with disabilities, and other efforts to reduce caries-risk in this population, little has changed 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 socio-economic status. Even though it is considered that the best approach for treating children with disabilities is conventional dental approach\textsuperscript{27}, limited cooperation these patients may exhibit, coupled with large number of untreated caries lesions and other oral pathology, often leads us to use general anaesthesia in treating these patients\textsuperscript{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 must improve their efforts to protect the dentition of handicapped children through appropriate preventative and restorative care.

**Summary and conclusions**

The following conclusions are based on results of this study:

1. Significantly high levels of caries prevalence and low levels of oral hygiene status for permanent teeth were observed in the children with disabilities group.

2. The major component of the dental caries index is attributable to the decayed component and lack of conservative approach to the treatment has been confirmed in the study group of children with disabilities.

3. In children with disabilities there is a higher tendency for a delayed time of eruption of permanent molars compared to healthy children.

4. 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.
References:


**Table 1 :** Distribution of age and gender

<table>
<thead>
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<th>Age</th>
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<th>Cerebral Palsy</th>
<th>Mental retardation</th>
<th>Control</th>
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<td>Female</td>
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