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Prevalence of dental caries among children of SOS Children's Village in Croatia

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Short running head: Prevalence of caries in SOS Children's Village Croatia
Abstract

Aim. The purpose of this study was to investigate the prevalence of dental caries among the children of SOS Children's Village in Croatia.

Methods. Dental examinations based on the World health organization criteria were performed on 88 children of SOS Children's Village in Croatia. The teeth were clinically examined with standard dental instruments using visual-tactile method under standard light. Clinical indexes of decayed, missed, and filled teeth (dmft and DMFT) and decayed, missed, and filled surfaces (DMFS), as well as the significant caries index (SiC) were recorded.

Results. Among the children of SOS Children's Village caries incidence were 57.94%. The mean dmft, DMFT and DMFS of all children was 1.82, 1.90 and 2.82, respectively. The highest mean dmft and DMFT score of 4.24 and 2.56 was found among 7-10 and 11-14 year old children, respectively. The highest mean DMFS score of 3.85 and 3.90 was found among 11-14 year old children and among children in SOS Children's Village Lekenik, respectively. Among all children the SiC index was 4.69. There was a significant difference between age groups and children place of residence in DMFT, DMFS and SiC.

Conclusion. Prevalence of dental caries is low among children of SOS Children's Village in Croatia compared mostly to children who lived in biological families.

Keywords: children; dental caries; prevalence; SOS Children's Village in Croatia
Prevalencija karijesa kod dece SOS Dečjeg sela u Hrvatskoj

Apstrakt

Cilj. Svrha ovog rada bila je istražiti prevalencu zubnog karijesa među decom SOS Dečjeg sela u Hrvatskoj.

Metode. Zubni pregledi na osnovu kriterijuma Svetske zdravstvene organizacije su sprovedeni na 88 dece iz SOS Dečjeg sela u Hrvatskoj. Zubi su klinički ispitani sa standardnim stomatološkim instrumentima pomoću vizuelno-taktilnog načina pod standardnim svetlom. Zabeleženi su klinički indeksi karioznih, ekstrahovanih i plombiranih zubi (KEP indeks za mlečne zube i KEP indeks za stalne zube) i kariozne, ekstrahovane i plombirane površine (vrednosti DMFS indeksa), kao i značajni kariozni indeks (SiC).

Rezultati. Među decom iz SOS Dečjeg sela incidencija karijesa bila je 57.94%. Prosečna vrednost KEP indeksa za mlečne zube iznosila je 1.82, KEP indeksa za stalne zube 1.90 i vrednost DMFS indeksa 2.82. Najviše prosečne vrednosti KEP indeksa za mlečne zube od 4.25 registrovana je u grupi dece 7-10 godina starosti a KEP indeksa za stalne zube od 2.56 u grupi dece 11-14 godina starosti. Najviše prosečne vrednosti DMFS indeksa registrovane su u grupi dece 11-14 godina starosti (3.85) i među decom u SOS Dečjem selu Lekenik (3.90). Prosečna vrednost SiC indeksa za svu pregledanu decu iznosila je 4.69. Postoji značajna razlika između starosnih grupa dece i dece s obzirom na mesto prebivališta u KEP, DMFS i SiC vrednostima indeksa.

Zaključak. Prevalencija zubnog karijesa je niža kod dece iz SOS Dečjeg sela u Hrvatskoj u poređenju sa decom koja žive u biološkim porodicama.

Ključne reči: dece; zubni karijes; prevalencija; SOS Dečje selo u Hrvatskoj
Introduction

Oral health is an integral part of general health and an important factor in the overall quality of life. Despite great efforts to preserve oral health, not only in Croatia, but all over the world, oral cavity diseases are on the rise. Dental caries is the most common infectious disease of the oral cavity. Numerous factors have an effect on the appearance of caries: gender, age, socioeconomic status, cultural and religious factors, environmental factors as well as diet and oral hygiene habits. Dental caries is the most common chronic disease in children: five times more common than asthma, and seven times more common than the appearance of seasonal allergies in children. In addition, dental caries is the fourth most expensive disease to treat in the third world countries. One of the most important tasks of the health profession is to prevent dental caries. Due to differences in the structure of enamel, inadequate oral hygiene or lack of preventive measures, caries of primary teeth is more common than in permanent teeth. Measures of caries prevalence are indexes of decayed (D), missed (M), and filled (F) permanent teeth (T) or surfaces (S), i.e., DMFT and DMFS indexes, and decayed (d), missed (m), and filled (f) primary teeth (t) or surfaces (s), i.e., dmft and dmfs indexes.

Caring for oral health is the task of society and the family in which children are growing up. Considering the 132 million children without parents around the world, there is a need for various forms of care, which along with the basic needs of children meet their economic, psychosocial and health needs. They are especially vulnerable group that need particular attention. The life of children growing up in institutional care is usually devoided of an enabling environment, which often leads to a complex mixture of physical, perceptual, social, intellectual and emotional deficits, which result in a deficiency to cognitive, social and physical as well as medical well-being.

SOS Children's Village is the leading global organization in the field of alternative care for children. The first SOS Children's Village was founded in 1949 in Imst, Austria. Today, SOS-Kinderdorf International is the leading organization for 133 countries, with 533 SOS Children's Villages. Typical SOS Children's Village has 15 houses, a kindergarten and a community center that is accessible to the local community. SOS Children's Villages operate under the United Nations Convention on the Rights of the Child, promoting this...
right around the world. Child development in a caring family environment is supported through realization of the following rights: welfare, education, health (preventive and active health care) and psychosocial support. SOS Children's Village in Croatia has been working for twenty years in two SOS Children's Villages, Ladimirevci and Lekenik. In SOS Children's Villages, SOS mothers play a crucial role in the lives of children, providing them a home and a stable family environment. SOS mothers undergo a careful selection process and long-term training and meet all the physical and emotional needs of their children\textsuperscript{12,13}. One of the elements of a healthy psychological and physical development of children is care of oral health, nevertheless specific conditions of life in this environment (child - SOS mother) can, at an early age, affect not only the physical and mental growth and development, but also the state of oral health. In published literature, there is very little data about oral health of children in this population and there is generally a lack of data on the oral health of children in SOS Children's Villages in Croatia.

The aim of this study was to determine the incidence of dental caries among primary school children in the SOS Children's Villages in Croatia, Ladimirevci and Lekenik, using the indexes for decayed, missed, and filled teeth/surfaces for primary and permanent teeth (dmft, DMFT, DMFS) and significant caries index (SiC). This research will contribute to new knowledge about oral health of this population of children who will eventually be used as a starting point in planning the necessary preventive and educational measures in the future.

**Methods**

**Participants**

The study was conducted during 2015 in SOS Children's Villages in Croatia, Ladimirevci and Lekenik, where 30 SOS mothers care for about 250 children of early, primary and secondary school age. According to the regulation of admission in the SOS Children's Village, the SOS families receive children without major developmental difficulties, up to ten years of age, or older if they are biological family with more brothers and sisters who come to SOS Children's Village together. In this study 88 primary school children were included (46 boys and 42 girls), from both SOS Children's Villages, at the age 7 to 14 (average age was 11.45 (±2.22) years) for whom a signed consent of their biological parents was obtained. To conduct this research, the license of the Ethical Committee of the
Faculty of Medicine at University of Osijek was obtained (Class: 602-04/13-08/09, No. 2158-61-07-13-45, Date: 16 December 2013).

**Procedure**

The children were examined in dental practice under standardized conditions of the World health organization (WHO), in terms of controlled hygiene with appropriate lighting. The medical examinations were conducted by a single experienced examiner with the help of an assistant who recorded the data of the oral status in prepared forms made according with the WHO method from 1997. Calibration of the examiner was done in a way that she examined 30 children of different age two months before and immediately before the study in which the kappa value was 0.95. Clinical research approach was the same for all children and it included a visual and tactile inspection of oral cavity with a probe, mirrors and syringe. Prior to the clinical examination and evaluation of oral status teeth were cleaned of soft and hard deposition and plaque using a rotating brush and prophylactic paste without fluoride. Then teeth were rinsed with water and air, dried, and a dry working field was secured using the saliva ejector and cotton rolls to isolate teeth from buccal/labial mucosa and tongue. Every tooth (or surface) which by probing and visual inspection showed signs of lesions in pits, fissures or walls (cavities, undermined enamel, finding of soft walls) was recorded as carious. The evaluation was determined according to WHO criteria, and information about each tooth was recorded using standard codes. All examined teeth were included in the calculation of the final dmft (total number of decayed (d), missing (m) or filled (f) primary teeth), DMFT (total number of decayed (D), missing (M) or filled (F) permanent teeth), DMFS (total number of decayed (D), missing (M) or filled (F) permanent teeth surfaces) and SiC (the mean DMFT for one third of the population with the highest caries scores) indexes. The indexes were compared between the male and female participants, place of residence, and age groups.

**Data analysis**

The Microsoft Office Excel 2007 for Windows (Microsoft Corporation, USA) was used for the entry of data on oral health status and for creating the tables. The data were statistically
processed using the statistical package Statistica 12 (StatSoft, Inc., USA). The level of significance was set to 5%.

**Results**

The study included a total of 88 participants from two SOS Children's Villages in Croatia, Ladimirevci (53.41%) and Lekenik (46.59%), among them were 52.27% boys and 47.73% girls whose average age was 11.45 (±2.22). Age group of 7-10 year-olds accounted for 32.95%, and the age group of 11-14 year-olds accounted for 67.05% of participants (Table 1). Mixed dentition was present in 52.27%, permanent in 47.73% of children, whereas there were none with primary dentition.

From the total number of children included in the study, 57.94% of them had carious changes on examined teeth. Carious changes were more frequent in children from SOS Children's Village Lekenik (63.41%) compared to the SOS Children's Village Ladimirevci (53.19%) and in children aged from 11-14 (74.58%) compared to children aged from 7-10 (24.14%). The presence of caries lesions in relation to gender was equal in both groups (about 58%) (Table 1).

Mean (± SD)dmft index in the group of boys and girls was 2.24 (±3.33) and 1.29 (±2.61). Children from SOS Children's Village Ladimirevci and Lekenik had dmft index of 1.96 (±3.4) and 1.66 (±5.3) respectively that wasn’t statistically significantly different. Student’s t-test (p<0.05) revealed significant statistical difference in mean values of dmft index among children aged 7-10 and 11-14 and it was 4.24 (±3.57) and 0.63(±1.79) respectively. The mean dmft index for the total sample of participants was 1.82 (±3.03) in which d-component constituted the largest share of dmft index with 67.03%, followed by the extracted teeth (21.98%) and then the teeth with fillings (10.99%) (Table 1 and Table 2).

The mean values of DMFT and DMFS index with respect to the gender did not differ significantly and amounted 1.72 (±1.99) and 2.61 (±3.14) for boys and 2.10 (±2.68) and 3.10 (±4.23) for girls. Significant differences in the mean values of DMFT and DMFS index were observed between the groups of children with regard to the place of residence and amounted to 1.49 (±7.2) and 2.09 (±2.98) for children from Ladimirevci and 2.37 (±2.55) and 3.90 (±7.5) for children from Lekenik. Also, significant differences were revealed between the mean values of DMFT and DMFS index with respect to the age group.
in which children belong to and it amounted to 0.55 (±1.24) and 0.72 (±1.71) for children aged 7-10, and 2.56 (±2.47) and 3.85 (±3.93) for children aged 11-14. The mean values of DMFT and DMFS index for the total sample of participants amounted to 1.90 (±2.33) and 2.82 (±3.66). The largest share of DMFT and DMFS index made the D-component with 62.63% and 60.88%, followed by teeth with fillings (33.69% and 36.53%) and extracted teeth (3.68% or 2.59%) (Table 1 and Table 2).

SiC index for the total sample of participants was 4.69 showing significant statistical difference between the value of SiC index based on place of residence, 3.63 for Ladimirevci and 5.36 for Lekenik, as well as with regard to a certain age group, 1.60 for children aged 7-10 and 5.45 for children aged 11-14 (Table 1).

**Discussion**

With this study we got an insight into the incidence of dental caries, values of dmft, DMFT, DMFS and SiC index among the population of primary school children (7-14 years old) in the SOS Children's Village in Croatia. As data on the above indices for other SOS Children's Villages in the world are missing, with the exception of the research conducted in the SOS Children's Village Bhopal in India, our results can be compared with the results of the monitored parameters only among the general population of children and children living with biological parents. The prevalence of caries in the survey conducted among the children of SOS Children's Villages in Croatia amounted to 57.94%, which is lower value compared to the value recorded in study conducted among the twelve-year old children in Montenegro (88.35%) and in relation to the value recorded in Romania among children population aged 10-17 (75%)\(^\text{18}\) as well as in group of children aged 11-13 (83.1%)\(^\text{19}\). Higher values of the prevalence of dental caries have been recorded among twelve-year olds in Greece as well (63%)\(^\text{20}\). Lower values of the prevalence of dental caries in relation to our population were recorded among twelve-year old children from Cyprus (32.6%) and Germany (31%)\(^\text{21}\).

The mean values of dmft, DMFT and SiC index recorded in the conducted research was in range of recommended values of the WHO in relation to oral health of twelve-year old children. In European countries, the average dmft index for children aged 5-7 ranges from 0.9 to 8.5. In this study which involves group of children aged 7-10 dmft index was 4.24. The lowest values of dmft index were recorded in Spain (1.0) and Denmark (1.3). Children
in Finland, Netherland and Norway also have the mean values of dmft index below 2.0. The lowest value of dmft index of 0.9 was recorded in Ireland. Data of the incidence of dental caries in children’s population of other SOS Children's Villages in the world are insufficient. The only known research results are related to SOS Children's Village Bhopal in India, where children from infancy to the age of 20 were included. Results of that study shows that the value of DMFT index was observed within the age group of 11-15 year-olds amounted to 2.9, whereas in our study among the same age group of children DMFT index was 2.56. Among the age group of children from 6-10 from the SOS Children's Village Bhopal, DMFT index was 0.17 as a lower value with respect to registered DMFT index within the same age group of children in our study (0.55). The values of dmft/DMFT index for the whole tested population of children in SOS Children's Village Bhopal was 0.31/1.03 which is slightly lower value compared to the dmft/DMFT referring to the population of children in the SOS Children's Village in Croatia.

Results of the study, which was conducted among the population of children aged 7-14 who live in families of urban centers (Zagreb, Croatia) show value of DMFT index 4.1, which is a higher value in relation to the population of children of the same age group from SOS Children’s Village in Croatia. Furthermore, the value of DMFT index within children aged 11-14, who live in families of urban centers (Zagreb, Croatia), was 5.9, which is also a higher value in relation to the same age group of children from the SOS Children's Village in Croatia. SiC value index for the population of children living in biological families of urban centers (Zagreb, Croatia) amounted to 7.4, whereas it is lower among the population of children from the SOS Children's Village in Croatia (4.69). Results of a study conducted among population of children aged 3-14 in rural and sub rural areas of central Croatia showed a higher value of dmft/DMFT (7.7/6.7) and SiC index (10.89) when compared to children from the SOS Children's Village in Croatia.

Comparing the results of dmft/DMFT index (4.24/2.56) from our study with the results of neighboring Bosnia and Herzegovina, it is visible that six-year old children in Bosnia and Herzegovina have higher values of dmft index (6.71) as well as the values of DMFT index (4.16) for twelve-year olds. In contrast to the above studies, a survey conducted among primary school children aged 6-11.5 in Slovenia shows a similar value of DMFT index (0.66) with children from the SOS Children's Village in Croatia (0.55). The value of dmft index in the before mentioned Slovenian research is 2.83 which is a smaller value.
compared to the value of dmft index (4.24) recorded among the children from SOS Children's Village in Croatia26.

The mean values of DMFT index in most countries is below 3.0, and in the countries of north-western Europe and the United States is even below 2.027. However, other European population of children, especially those children who live in the Mediterranean region show different values of DMFT index. Twelve-year old Sicilian children have a mean DMFT index of 2.88 and their peers in Sardinia 2.428,29. Twelve-year old children in Greece have DMFT index of 2.77 to 6.7430. Among twelve-year old children in Spain mean DMFT index was 1.33, with the aim to reduce it below 1.0 by the end of 201531,32. Almerich-Silla and Montiel-Co33 in their study recorded the mean DMFT index of 2.43 for twelve-year old immigrant children and 0.99 in the domicile Spanish children. The mean value of DMFT index among eight and a nine-year olds in Germany is 0.7, and in Hungary 0.434. On the other hand, twelve-year old children in many countries have a mean value of DMFT index greater than 3.0, as is the case in Latvia (7.7), Poland (5.1), Ukraine (4.4), Hungary (4.3), Lithuania and Belarus (3.8), Russia (3.7)22. Also, values of DMFT index for children from Montenegro and Kosovo amounted to over 3.035,36. The results of this research among children in the age group of 7-14 years show lower values of DMFT index (1.90) compared to the previously mentioned studies.

Conclusion

The relatively low total value of DMFT index in this study is likely the result of the care of SOS mothers and caring family environment and continuous education about the importance of oral health. Continuing education about the importance of oral health and welfare institutions in which children live, as well as the high awareness of the importance of oral health that these children have, might be a possible reasons for relatively low values of DMFT index. The specificity of life of children in the absence of biological parents but in a caring family environment (child - SOS mother) results in better individual approach and commitment to oral health of each individual child. A high level of awareness of oral health is present in children and SOS mothers in the SOS Children's Villages in Croatia should be a model and a starting point in the planning and implementation of further preventive and educational measures among the population of children who grow up with biological parents.
REFERENCES


Table 1
Mean values and standard deviations of dmft, DMFT, DMFS and SiC index considering to gender, place of residence and belonging to the age group of children from the SOS Children's Village in Croatia

<table>
<thead>
<tr>
<th>Number of participants</th>
<th>dmft</th>
<th>DMFT</th>
<th>DMFS</th>
<th>SiC</th>
<th>Without caries</th>
</tr>
</thead>
<tbody>
<tr>
<td>No (%)</td>
<td>(M±SD)</td>
<td>(M±SD)</td>
<td>(M±SD)</td>
<td>(M)</td>
<td>No (%)</td>
</tr>
<tr>
<td>Gender:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>46 (52.27)</td>
<td>2.24±3.33</td>
<td>1.72±1.99</td>
<td>2.61±3.14</td>
<td>-</td>
<td>20 (43.48)</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42 (47.73)</td>
<td>1.29±2.61</td>
<td>2.10±2.68</td>
<td>3.10±4.23</td>
<td>-</td>
<td>17 (40.48)</td>
</tr>
<tr>
<td>SOS village:</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ladimirevci</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47 (53.41)</td>
<td>1.96±3.04</td>
<td>1.49±2.07</td>
<td>2.09±2.98</td>
<td>3.63</td>
<td>22 (46.81)</td>
</tr>
<tr>
<td>Lekenik</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41 (46.59)</td>
<td>1.66±3.05</td>
<td>2.37±2.55*</td>
<td>3.90±5.07*</td>
<td>5.36*</td>
<td>15 (36.59)</td>
</tr>
<tr>
<td>Age group:</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>7-10</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>29 (32.95)</td>
<td>4.24±3.57</td>
<td>0.55±1.24</td>
<td>0.72±1.71</td>
<td>1.60</td>
<td>22 (75.86)</td>
</tr>
<tr>
<td>11-14</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>59 (67.05)</td>
<td>0.63±1.79**</td>
<td>2.56±2.47**</td>
<td>3.85±3.93**</td>
<td>5.45**</td>
<td>15 (25.42)</td>
</tr>
<tr>
<td>Total:</td>
<td>88 (100)</td>
<td>1.82±3.03</td>
<td>1.90±2.33</td>
<td>2.82±3.66</td>
<td>4.69</td>
</tr>
</tbody>
</table>

* - significant differences considering to the place of residence (p<0.05); ** - significant difference considering to the age group affiliation (p<0.05); M - mean value; SD - standard deviation; No - number.
Table 2
Mean values of carious (dt/DT/DS), extracted (mt/MT/ST) teeth and teeth with fillings (ft/FT/FS) considering to gender, place of residence and belonging to the age group of children from the SOS Children's Village in Croatia

<table>
<thead>
<tr>
<th>Gender:</th>
<th>dt</th>
<th>mt</th>
<th>ft</th>
<th>DT</th>
<th>MT</th>
<th>FT</th>
<th>DS</th>
<th>MS</th>
<th>FS</th>
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<tr>
<td>Male</td>
<td>1.52</td>
<td>0.43</td>
<td>0.33</td>
<td>1.16</td>
<td>0</td>
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<td>1.63</td>
<td>0</td>
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<tr>
<td>Female</td>
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<td>0.34</td>
<td>0.10</td>
<td>1.26</td>
<td>0.15</td>
<td>0.71</td>
<td>1.85</td>
<td>0.15</td>
<td>1.10</td>
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<td>SOS village:</td>
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<tr>
<td>Ladimirevci</td>
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<td>0.06</td>
<td>0.11</td>
<td>1.28</td>
<td>0</td>
<td>0.21</td>
<td>1.85</td>
<td>0</td>
<td>0.23</td>
</tr>
<tr>
<td>Lekenik</td>
<td>0.54</td>
<td>0.76</td>
<td>0.41</td>
<td>1.10</td>
<td>0.15</td>
<td>1.12</td>
<td>1.59</td>
<td>0.15</td>
<td>1.93</td>
</tr>
<tr>
<td>Age group:</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7-10</td>
<td>2.69</td>
<td>0.90</td>
<td>0.66</td>
<td>0.38</td>
<td>0</td>
<td>0.17</td>
<td>0.45</td>
<td>0</td>
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<tr>
<td>11-14</td>
<td>0.47</td>
<td>0.14</td>
<td>0.05</td>
<td>1.59</td>
<td>0.10</td>
<td>0.86</td>
<td>2.36</td>
<td>0.10</td>
<td>1.39</td>
</tr>
<tr>
<td>Total:</td>
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</table>

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