



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

Prevalenca karijesa kod dece SOS Dečjeg sela u Hrvatskoj

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Abstract

Background/Aim. Oral health is an integral part of general health and an important factor in the overall quality of life. The purpose of this study was to investigate the prevalence of dental caries among the children from the SOS Children's Village in Croatia. **Methods.** The dental examinations based on the World Health Organization criteria were performed on 88 children from SOS Children's Village in Croatia. The teeth were clinically examined with standard dental instruments using the visual-tactile method under standard light. The clinical indexes of decayed, missed, and filled (dmft and DMFT, for primary and permanent teeth, respectively) and decayed, missed, and filled surfaces (DMFS), as well as the significant caries index (SiC) were recorded. **Results.** Among the children from the 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 years old children, respectively. The highest mean DMFS score of 3.85 and 3.90 was found among 11–14 years old children and among the children from the 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's place of residence in DMFT, DMFS and SiC. **Conclusion.** Prevalence of dental caries is low among the children from the SOS Children's Village in Croatia compared to the children who lived with biological families.

Key words:

dental caries; child; child, preschool; child abandoned; dmft index; prevalence; croatia.

Apstrakt

Uvod/Cilj. Oralno zdravlje je integralni deo opšteg zdravlja i predstavlja važan faktor kvaliteta života. Cilj rada bio je da se istraži prevalenca zubnog karijesa kod dece iz SOS Dečjeg sela u Hrvatskoj. **Metode.** Zubni pregledi na osnovu kriterijuma Svetske zdravstvene organizacije su sprovedeni kod 88 dece iz SOS Dečjeg sela u Hrvatskoj. Zubi su klinički ispitani standardnim stomatološkim instrumentima pomoću vizuelno-taktilnog načina pod standardnim svetlom. Zabeleženi su klinički indeksi: indeks karioznih, ekstrahovanih i plombiranih zuba (KEP) (za mlečne zube i za stalne zube), indeks površina karioznih, ekstrahovanih i plombiranih (DMFS) zuba i značajni kariozni indeks (SiC). **Rezultati.** Kod dece 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 prosečna vrednosti KEP indeksa za mlečne zube od 4,25 registrovane su u grupi dece od 7–10 godina starosti a KEP indeksa za stalne zube od 2,56 u grupi dece od 11–14 godina starosti. Najviše prosečne vrednosti DMFS indeksa registrovane su u grupi dece od 11–14 godina starosti (3,85) i kod dece iz 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 vrednostima KEP, DMFS i SiC indeksa. **Zaključak.** Prevalencija zubnog karijesa je niža kod dece iz SOS Dečjeg sela u Hrvatskoj u poređenju sa decom koja žive u biološkim porodicama.

Cljučne reči:

zub, karijes; deca; deca, predškolska; deca, napuštena; dmft indeks; prevalenca; hrvatska

Introduction

Oral health is an integral part of general health and an important factor in overall quality of life. Despite great ef-

orts to preserve oral health, not only in Croatia but also all over the world, oral cavity diseases are on the rise^{1,2}. 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 habits³⁻⁵. Dental caries is the most common chronic disease in children - five times more common than asthma and seven times more common than seasonal allergies in children. In addition, dental caries is the fourth most expensive disease to treat in the third world countries^{6,7}. One of the most important tasks of the health profession is to prevent dental caries. Due to differences in enamel structure, inadequate oral hygiene or lack of preventive measures, caries of primary teeth is more common than in permanent teeth⁸. 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 indexes⁹.

Taking care of oral health is the task of society and the family children are raised in. 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 needs¹⁰. They are especially vulnerable group that needs 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 and can result in a deficiency of cognitive, social and physical as well as medical well-being¹¹.

The SOS Children's Villages is the leading global organization in the field of alternative care for children. The first SOS Children's Village was founded in Imst, Austria. Today, The SOS-Kinderdorf International is the leading organization for 133 countries, with 533 SOS Children's Villages. A 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. The SOS Children's Villages in Croatia have been working for 20 years in two SOS Children's Villages, Ladimirevci and Lekenik. In SOS Children's Villages, the SOS mothers play a crucial role in the lives of children, providing them a home and stable family environment. The SOS mothers undergo a careful selection process and long-term training and meet all the physical and emotional needs of their children^{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 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 te-

eth/surfaces for primary and permanent teeth (dmft, DMFT, and DMFS, respectively) 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 the SOS Children's Villages in Croatia, Ladimirevci and Lekenik, where 30 SOS mothers cared 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 10 years of age, or older, if they are biological family with more brothers and sisters who come to the 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 of 7 to 14 years (the 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 to the WHO method from 1997¹⁴. 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. The 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^{15,16}. 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 the WHO criteria, and information about each tooth was recorded using the standard codes¹⁴. All examined teeth were included in the calculation of the final dmft (total number of decayed, missing or filled primary teeth), DMFT (total number of decayed, missing or filled permanent teeth), DMFS (total number of decayed (D), missing (M) or filled (F) permanent teeth surfa-

ces) and SiC (the mean DMFT for one third of the population with the highest caries scores) indexes¹⁷. 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 at 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, there were 52.27% boys and 47.73% girls whose average age was 11.45 ± 2.22 years. The 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. The carious changes were more frequent in the children from the SOS Children's Village Lekenik (63.41%) compared to the children from the SOS Children's Village Ladimirevci (53.19%) and in the children aged from 11–14 years (74.58%) compared to children aged from 7–10 years

(24.14%). The presence of caries lesions in relation to gender was equal in both groups (about 58%) (Table 1).

The mean values of the DMFT and DMFS indices with respect to the gender did not differ significantly and amounted to 1.72 ± 1.99 and 2.61 ± 3.14 , respectively for boys and 2.10 ± 2.68 and 3.10 ± 4.23 , respectively for girls. The significant differences in the mean values of the DMFT and DMFS indices were observed among the groups of children with regard to the place of residence and amounted to 1.49 ± 2.07 and 2.09 ± 2.98 , respectively for the children from Ladimirevci and 2.37 ± 2.55 and 3.90 ± 5.07 , respectively for the children from Lekenik. Also, a significant differences were revealed between the mean values of the DMFT and DMFS indices with respect to the age group to which children belong and it amounted to 0.55 ± 1.24 and 0.72 ± 1.71 , respectively for children aged 7–10 years and 2.56 ± 2.47 and 3.85 ± 3.93 , respectively for children aged 11–14 years. The mean values of the DMFT and DMFS indices for the total sample of participants amounted to 1.90 ± 2.33 and 2.82 ± 3.66 , respectively. The largest share of the DMFT and DMFS indices made the D-component with 62.63% and 60.88%, respectively followed by teeth with fillings (33.69% and 36.53%, respectively) and extracted teeth (3.68% or 2.59%, respectively) (Tables 1 and 2).

The SiC index for the total sample of participants was 4.69 showing a significant statistical difference between the value of SiC index based on the 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 the children aged 7–10 years and 5.45 for the children aged 11–14 years) (Table 1).

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

Parameter	Number of participants n (%)	dmft (mean $\pm$ SD)	DMFT (mean $\pm$ SD)	DMFS (mean $\pm$ SD)	SiC (mean)	Without caries n (%)
Gender						
male	46 (52.27)	2.24 ± 3.33	1.72 ± 1.99	2.61 ± 3.14	–	20 (43.48)
female	42 (47.73)	1.29 ± 2.61	2.10 ± 2.68	3.10 ± 4.23	–	17 (40.48)
SOS village						
Ladimirevci	47 (53.41)	1.96 ± 3.04	1.49 ± 2.07	2.09 ± 2.98	3.63	22 (46.81)
Lekenik	41 (46.59)	1.66 ± 3.05	$2.37 \pm 2.55^*$	$3.90 \pm 5.07^*$	5.36*	15 (36.59)
Age group (years)						
7–10	29 (32.95)	4.24 ± 3.57	0.55 ± 1.24	0.72 ± 1.71	1.60	22 (75.86)
11–14	59 (67.05)	$0.63 \pm 1.79^{**}$	$2.56 \pm 2.47^{**}$	$3.85 \pm 3.93^{**}$	5.45**	15 (25.42)
Total	88 (100)	1.82 ± 3.03	1.90 ± 2.33	2.82 ± 3.66	4.69	37 (42.06)

dmft – decayed, missed and filled primary teeth; DMFT – decayed, missed and filled permanent teeth; dmfs – decayed, missed and filled surfaces of primary teeth; DMFS – decayed, missed and filled surfaces of permanent teeth; SiC – significant caries.

* – significant differences related to the place of residence ($p < 0.05$); ** – significant difference related to the age group affiliation ($p < 0.05$).

Table 2

Mean values of carious (dt/DT/DS), extracted (mt/MT/MS) teeth and teeth with fillings (ft/FT/FS) related to gender, place of residence and the age group of children from the SOS Children's Village in Croatia

Parameter	dt	mt	ft	DT	MT	FT	DS	MS	FS
Gender									
male	1.52	0.43	0.33	1.16	0	0.59	1.63	0	0.98
female	0.85	0.34	0.10	1.26	0.15	0.71	1.85	0.15	1.10
SOS village									
Ladimirevci	1.79	0.06	0.11	1.28	0	0.21	1.85	0	0.23
Lekenik	0.54	0.76	0.41	1.10	0.15	1.12	1.59	0.15	1.93
Age group									
7–10	2.69	0.90	0.66	0.38	0	0.17	0.45	0	0.28
11–14	0.47	0.14	0.05	1.59	0.10	0.86	2.36	0.10	1.39
Total	1.22	0.40	0.22	1.19	0.07	0.65	1.76	0.07	1.05

dt/DT/DS – decayed primary/decayed permanent/decayed surfaces of permanent; **mt/MT/MS** – missed primary/missed permanent/missed surface of permanent; **ft/FT/FS** – filled primary/filled permanent/filled surface of permanent.

Discussion

With this study we got an insight into the incidence of dental caries, values of dmft, the DMFT, DMFS and SiC indices 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 the SOS Children's Villages in Croatia amounted to 57.94%, which is the lower value compared to the value recorded in the 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 years (75%)¹⁸ as well as in a group of children aged 11–13 years (83.1%)¹⁹. The higher values of the prevalence of dental caries were recorded among 12 year olds in Greece as well (63%)²⁰. The lower values of the prevalence of dental caries in relation to our population were recorded among 12 years old children from Cyprus (32.6%) and Germany (31%)²¹.

The mean values of the dmft, DMFT and SiC indices recorded in the conducted research was in the range of recommended values of the WHO regarding oral health of 12 years old children. In European countries, the average dmft index for children aged 5–7 years ranges from 0.9 to 8.5. In this study, which involved group of children aged 7–10 years, the dmft index was 4.24. The lowest values of the dmft index were recorded in Spain (1.0) and Denmark (1.3). Children in Finland, Netherland and Norway also had the mean values of dmft index below 2.0. The lowest value of the dmft index of 0.9 was recorded in Ireland²².

The data of the incidence of dental caries in the children population of other SOS Children's Villages in the world are insufficient. The only known research results are related to the SOS Children's Village Bhopal in India, where children from infancy to the age of 20 years were included. The results of that study showed that the value of the DMFT index was observed within the age group of 11–15 year olds amounted to 2.9²³, whereas in our study, among the same age group of children, the DMFT index was 2.56. Among the age group of children from 6–10 years from the SOS Children's Village Bhopal, the DMFT index was 0.17 as a lower value with respect to the registered DMFT index within the same age group of children in our study (0.55). The values of the dmft/DMFT index for the whole tested population of children in the 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 Croatia²³.

The results of the study conducted among the population of children aged 7–14 years who lived in families of urban centers (Zagreb, Croatia) show value of the DMFT index 4.1, which is a higher value in relation to the population of children of the same age group from the SOS Children's Village in Croatia. Furthermore, the value of DMFT index within children aged 11–14 years, 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. The SiC value index for the population of children living in biological families of urban centers (Zagreb, Croatia) amounted to 7.4², whereas it was 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 years in rural and sub rural areas of central Croatia showed a higher value of dmft/DMFT (7.7/6.7) and the SiC index (10.89) when

compared to the children from the SOS Children's Village in Croatia²⁴.

Comparing the results of the dmft/DMFT index (4.24/2.56) from our study with the results of neighboring Bosnia and Herzegovina, it is visible that 6 years old children in Bosnia and Herzegovina had the higher values of the dmft index (6.71) as well as the values of DMFT index (4.16) for 12 years olds²⁵. In contrast to the above studies, a survey conducted among primary school children aged 6–11.5 years in Slovenia showed a similar value of the DMFT index (0.66) to the children from the SOS Children's Village in Croatia (0.55). The value of the dmft index in the above-mentioned Slovenian research was 2.83 which is a smaller value compared to the value of the dmft index (4.24) recorded among the children from the SOS Children's Village in Croatia²⁶.

The mean values of DMFT index in most countries is below 3, and in the countries of north-western Europe and the United States is even below 2²⁷. However, other European population of children, especially those children who lived in the Mediterranean region showed different values of the DMFT index. Twelve-year old Sicilian children had a mean DMFT index of 2.88 and their peers in Sardinia 2.4^{28,29}. Twelve-year old children in Greece had the DMFT index of 2.77 to 6.74³⁰. Among 12 years old children in Spain, the mean DMFT index was 1.33, with the tendency to fall below 1 by the end of 2015^{31,32}. In their study, Almerich-Silla and Montiel-Company³³ recorded the mean DMFT index of 2.43 for 12 years old immigrant children and 0.99 in the domicile Spanish children. The mean value of the DMFT index among 8 and a 9 years olds in Germany was 0.7, and

in Hungary 0.4³⁴. On the other hand, 12 years old children in many countries had a mean value of the DMFT index greater than 3, as was 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, the values of the DMFT index for children from Montenegro and Kosovo amounted to over 3^{35,36}. The results of this research among children in the age group of 7–14 years showed lower values of the DMFT index (1.90) comparing to the previously mentioned studies.

Conclusion

The relatively low total value of the DMFT index in this study is likely to be a result of the care of the 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 the children live, as well as the high awareness of the importance of oral health that these children have, might be a possible reason for relatively low values of the DMFT index. The specificity of life of the 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 the awareness of oral health is present in the children and SOS mothers in the SOS Children's Villages in Croatia should be a model and a starting point in planning and implementation of further preventive and educational measures for the population of children who grow up with biological parents.

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Received on January 17, 2017.

Revised on April 12, 2017.

Accepted on April 19, 2017.

Online First April, 2017.