

CARIES PREVALENCE IN BOSNIA AND HERZEGOVINA SCHOOLCHILDREN – FINDINGS OF FIRST NATIONAL SURVEY

UČESTALOST KARIJESA KOD ŠKOLSKE DJECE U BOSNI I HERCEGOVINI - REZULTATI PRVOG NACIONALNOG ISTRAŽIVANJA

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ABSTRACT

The World Health Organization (WHO) recommends conducting periodic national oral health surveys. Similar research was conducted in some parts of Bosnia and Herzegovina's territory.

Objective. The objective of this research was to investigate and present the oral health status of six-year and twelve-year old children in Bosnia and Herzegovina according to the WHO indicators.

Methods. The research was conducted using the model of observational, descriptive (cross-sectional) study. The examinations were carried out in the period from April to July 2004. The survey was performed in nine cities throughout Bosnia and Herzegovina, namely: Sarajevo, Banja Luka, Sanski Most, Tuzla, Visoko, Gorazde, Vitez, Siroki Brijeg and Mostar. A total of 1,120 six- and twelve year old children were examined. The dental examinations were carried out in schools according to the WHO criteria.

Results. In 12-year-olds the DMFT was 4.16 (S.D.± 2.92), out of which decayed teeth constituted the major part of the index (45.43%), followed by 42.07% of filled teeth and 12.50% of extracted teeth. In 6-year-olds the dmft was 6.71 (S.D.± 3.89), out of which decayed teeth constituted the major part of the index (88.79%), followed by extracted teeth (8.89%) and a small percentage of filled teeth (2.32%).

Conclusions. The imperative is to develop and implement a disease prevention program, based on education of parents and care providers, as well as to improve access to dental care and shift focus from curative to preventive procedures.

Key words: Oral health, schoolchildren, DMFT, dmft.

SAŽETAK

Preporuka Svjetske zdravstvene organizacije (SZO) za sve zemlje je da se vrše periodična nacionalna epidemiološka istraživanja stanja oralnog zdravlja. Slična istraživanja su provedena sporadično u pojedinim dijelovima Bosne i Hercegovine. Jedinstvenog nacionalnog istraživanja nije bilo.

Cilj. Cilj istraživanja je bio da se ispita stanje oralnog zdravlja djece uzrasta 6 i 12 godina u Bosni Hercegovini prema kriterijima koje propisuje SZO, da se utvrde i prezentiraju indikatori oralnog zdravlja za ispitivane skupine.

Metode. Istraživanje je provedeno kao opservaciona, deskriptivna, epidemiološka studija, izvedena u periodu april-juli 2004 godine. Istraživanje je provedeno u devet bosansko-hercegovačkih gradova: Sarajevo, Banja Luka, Sanski Most, Tuzla, Visoko, Gorazde, Vitez, Siroki Brijeg i Mostar. Ukupno je ispitano 1120 ispitanika uzrasta 6 i 12 godina. Ispitivanja su vršena u školama prema metodologiji SZO za ovakvu vrstu istraživanja.

Rezultati. Vrijednosti KEP indeksa za ispitanika uzrasta 12 godina iznosile su 4.16 (S.D.± 2.92), od čega je u najvećem procentu zastupljena komponenta karijesa (K) sa 45.43%, zatim slijede plombirani zubi (P) sa 42.07% i zubi ekstrahirani kao posljedica karijesa (E) sa 12.50%. Kod ispitanika uzrasta 6 godina kep indeks bio je 6.71 (S.D.± 3.89), kariozni zubi su zauzimali najveći procenat od 88.79%, zatim su slijedili ekstrahirani zubi(e) sa 8.89% i veoma mali procenat plombiranih zuba (p) od 2.32%.

Zaključak. Kreiranje i uspostavljanje preventivnih programa za spriječavanje nastanka najučestalijih dento-oralnih oboljenja u dječijem uzrastu, je imperativ u našoj zajednici. Ovi programi moraju biti bazirani na edukaciji roditelja i staratelja, na poboljšanju dostupnosti zdravstvenoj zaštiti, te na usmjeravanju cjelokupnog sistema zdravstvene zaštite sa liječenja posljedice bolesti na prevenciju nastanka oboljenja.

Ključne riječi: oralno zdravlje, školska djeca, KEP, kep.

Introduction

Oral health is an essential element of general health. It encompasses the integrity and health of specific parts of the oral cavity - teeth, oral mucosa, masticatory muscles, tongue, TMJ and salivary glands - which are used jointly to perform the functions of chewing, speaking and swallowing. The World Health Organization (WHO) recommends conducting periodic national oral health surveys including monitoring of ten oral health parameters by precisely defined age groups [1]. Most European countries conduct the above surveys. Thereby, obtained data enables planning of measures on improving oral health of the population of relevant countries. Similar research was conducted only in some parts of Bosnia and Herzegovina's territory. Ivankovic in 1997 carried out research in several cantons of the Federation of BH, in the West Herzegovina Canton, Herzegovina-Mostar Canton and the Posavina Canton pointed average DMFT (\pm SD) to 6.2 ± 4.0 in twelve-year-olds while in six-year-olds it was 4.8 ± 3.9 [2]. The above research conducted in BH indicates a poor state of oral health in our country, especially among children. Epidemiological data about the oral health status missing in our country are prerequisite for developing a program and measures for the improvement of oral health. Because of the above, it was necessary to conduct a study to gather epidemiological data about the oral health in Bosnia and Herzegovina.

Objective

The objective of this research was to investigate and present the oral health status of six-year and twelve-year old children in Bosnia and Herzegovina according to the WHO indicators and to discuss oral health care system approaches in different locations of examination.

Methods

The research was done using the model of observational, descriptive (cross-sectional) study. The examinations were carried out in the period from April to July 2004. Methodology was based on the WHO recommendations for this type of surveys [1]. Two

age groups, six and twelve year olds, were included by the research. Six-year-olds were targeted in order to determine the status of primary teeth, which is proven to be an important predictor of the permanent teeth health. Twelve years age is of extreme importance and has been recommended by WHO as the age of the earliest permanent dentition, when all teeth other than third molars are present in the oral cavity. The condition of twelve-year-olds' permanent teeth determines their future oral health, being the reason for this group to be selected for international comparisons and observation of disease trends. The survey was performed in ten cities throughout Bosnia and Herzegovina, namely: Sarajevo, Banja Luka, Sanski Most, Tuzla, Visoko, Gorazde, Vitez, Siroki Brijeg and Mostar. A total of 1,120 children were examined (560 twelve-year-olds and 560 six-year-olds). Selection of locations and dental examinations were done according to the WHO criteria for countries with high caries prevalence. The dental examinations were carried out in schools according to WHO criteria under natural light using dental mirrors and the periodontal probe. Clinical examinations to record dental caries were carried out in schools by one examiner. The examiner had been previously trained on 25 twelve-year-olds to use DMFT index. Kappa statistics was used to present intra-examiner reliability [1]. The kappa values estimated from repeated examination for the intra-consistency of the fieldwork examiner were $k=0.91$. Obtained results were recorded on special oral health assessment form, prescribed by the WHO for this type of research.

The Statistical Package for Social Science, version 13.0 (SPSS Inc., Chicago, IL, SAD) was used. Research results were analyzed by means of descriptive statistic

(Frequencies, percentages, arithmetic mean value, standard deviation) following the WHO guidelines for presenting results of survey for this population groups [1].

Results

The study of caries prevalence has shown that the disease is wide-spread among twelve and six year old children in Bosnia and Herzegovina. Gender based differences were not analyzed in this survey. In 12-year-olds the DMFT was 4.16 (S.D. \pm 2.92) out of which the D-component constituted the major part of

the index (45.43%), followed by 42.07% of filled teeth and 12.50% of extracted teeth (**Figure 1.**). Percentage of children without active decay was 36.54%. In different locations recorded DMFT was ranging from 2.70 (S.D.± 2.25) in Sanski Most to 5.38 (S.D.± 2.76) in Siroki Brijeg, but average value for DT component of index was the lowest in Široki Brijeg (0.88±0.80) while the FT component was highest (4.33±2.34) for the same location. In Sanski Most with the average values for component DT were 1.53 ±1.57 and FT 0.68 ±1.44. The highest percent of children without active caries lesions (DT=0) was recorded in Široki Brijeg (60%), followed by Mostar (41.46%), Sarajevo (41.24%) Sanski Most (37.50%), Tuzla and Goražde (32.50 %), Banja Luka (31.25%) , Vitez (30 %) and Visoko with only 17.50% were DT component was 65.73 % of DMFT, FT component was 14.04% and ET with 20.22%. This kind of distribution reveals the fact that in this cities both preventive and curative dental care is insufficient. There were 60% children without active caries in Široki with FT component of index 80.47% followed by DT component with 16.28% and ET only 3.26%. This distribution revealed that curative dental care is developed in Široki Brijeg but there is a lack of preventive care. Results for all examined locations are presented in **Table 1.**

Different values of DMFT and its components were registered in different survey locations (**Table 1. Figure 2.**).

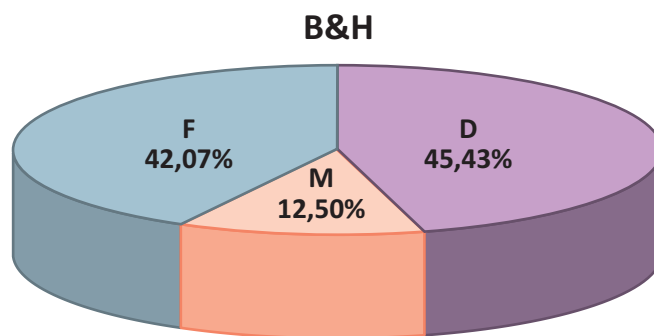


Figure 1. Percentages of DMFT components for twelve-year-olds BH children.

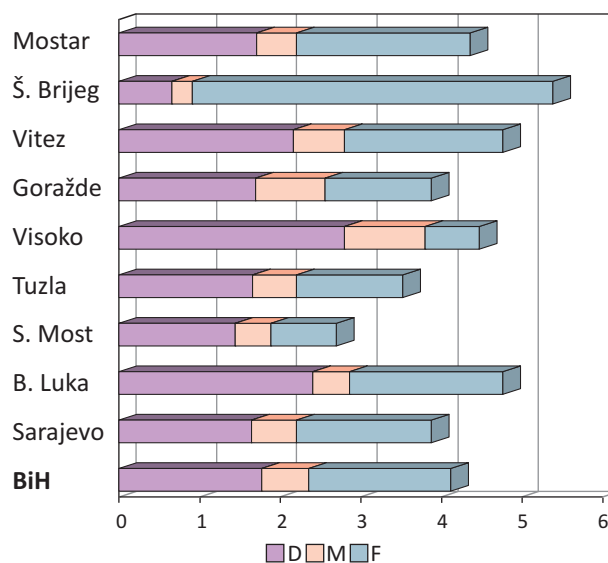


Figure 2. DMFT index of twelve-year-olds in Bosnia and Herzegovina and by cities.

	dmft index	d (%) X±SD		m (%) X±SD		f (%) X±SD	
Sarajevo	3.90 ±2.88	43,91	1.71±2.21	12,66	0.49±0.84	43,43	1.69±2.11
B. Luka	4.79 ± 2.87	50,91	2.44±2.72	10,44	0.50±0.95	38,64	1.85±1.99
S. Most	2.70 ± 2.25	56,48	1.53±1.57	18,52	0.50±0.87	25,00	0.68±1.44
Tuzla	3.51 ± 2.63	46,26	1.63±1.71	16,37	0.58±0.88	37,37	1.31±1.89
Visoko	4.45 ± 2.65	65,73	2.93±2.48	20,22	0.90±1.09	14,04	0.63±1.22
Goražde	4.03 ± 3.13	45,96	1.85±2.10	16,77	0.68±0.96	37,27	1.50±2.27
Vitez	4.85 ± 2.99	45,36	2.20±2.54	11,34	0.55±0.71	43,30	2.10±1.83
Š. Brijeg	5.38 ± 2.76	16,28	0.88±1.54	3,26	0.18±0.38	80,47	4.33±2.34
Mostar	4.32 ± 2.96	42,37	1.83±2.83	9,04	0.39±0.82	48,59	2.10±1.88

Table 1. DMFT index and its components of twelve-year-olds in Bosnia and Herzegovina in different survey locations.

In 6-year-olds the dmft was 6.71 (S.D.± 3.89) out of which the dt-component constituted the major part of the index (88.79%), followed by extracted teeth (8.89%) and a small percentage of filled teeth (2.32%) (Figure 3). Percentage of caries free participants aged six was 6.8% The highest mean value of dmft was recorded in Goražde 8.58 ±3.20, followed by Banja Luka 7.06 ±4.02, Visoko 6.9 ±3.27, and the lowest was in Mostar with 5.05 ±2.95. Mean values of dmft for other locations were in between this range. The highest mean value of component dt was in Goražde 7.90 ±3.38, and the lowest was in Mostar 3.95 ±2.75. Mean values of components et and ft were less than 1 for all locations revealing that dental care is insufficient in primary dentition. When analyzing descriptive statistics for this group of examinees, it was obvious that dt component was dominant, making more than 80% of dmft in all examined locations. Percentage of ft was very low with the highest value in Mostar (11,35%), but with no filled primary teeth registered in Gorazde and Široki Brijeg. Values for registered extracted teeth (et) ranged from 6.73% in Banja Luka to 15% in Široki Brijeg, meaning that in all locations primary teeth were rather extracted than filled if they had been treated at all.

In the group of 6 -year-olds first permanent molars were analyzed as well. In this group 81.7 % of examinees (N=455, mean 3.63 ±0.95) had all four FPM erupted in the time of dental status recording.

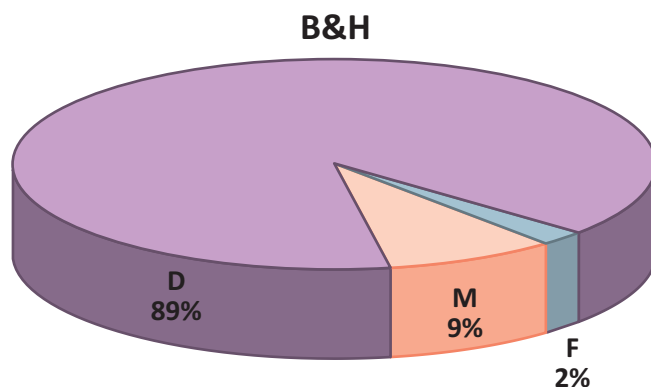


Figure 1. Percentages of DMFT components for twelve-year-olds BH children.

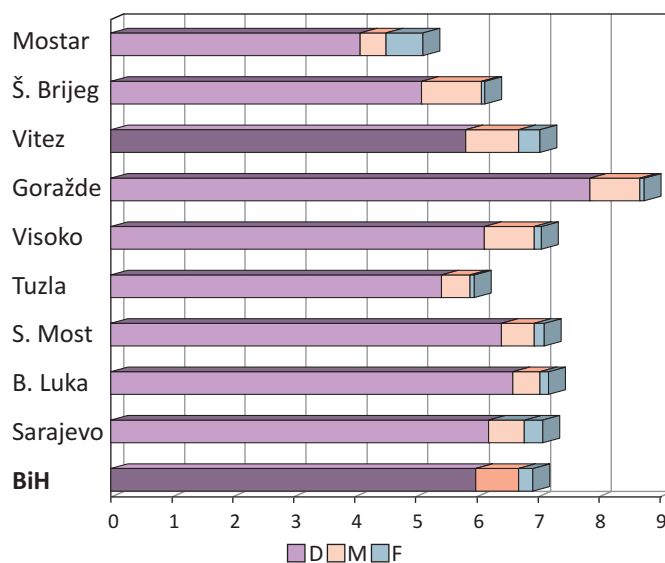


Figure 4. dmft index and its components in Bosnia and Herzegovina and by cities

	dmft index	d (%) X±SD		m (%) X±SD		f (%) X±SD	
Sarajevo	6,90 ± 4.17	89,31	6.17±4.20	7,16	0.48 ± 1.40	3,55	0.73 ± 0.50
B. Luka	7,06 ± 4.02	91,86	6.49±3.98	6,73	0.48 ± 0.90	1,42	0.40 ± 0.40
S. Most	6,87 ± 4.12	91,94	6.33±4.22	7,33	0.49 ± 1.21	0,73	0.32 ± 0.50
Tuzla	5,88 ± 3.92	90,21	5.30±3.91	9,15	0.54 ± 1.36	0,64	0.19 ± 0.21
Visoko	6,88 ± 3.27	88,00	6.15±3.07	11,64	0.78 ± 0.90	0,36	0.15 ± 0.24
Goražde	8,63 ± 3.20	92,17	7.90±3.38	7,83	0.69 ± 1.52	0,00	0,00
Vitez	7,00 ± 3.81	82,50	5.64±3.59	13,57	0.98 ± 1.47	3,93	1.69 ± 0.26
Š. Brijeg	6,08 ± 3.34	84,36	5.36±3.09	15,64	0.90 ± 1.56	0,00	0,00
Mostar	5,05 ± 2.95	79,21	3.95±2.75	9,41	0.50 ± 1.33	11,39	2.18 ± 0.35

Table 2. dmft index and its components of six-year-olds in Bosnia and Herzegovina in different survey locations.

Mean value of DMFT for FPM was 0.61 ± 1.08 with highest value recorded in Goražde 1.33 ± 1.30 , and the lowest value was in Banja Luka 0.31 ± 0.73 . Mean values for other locations were within this range. Mean values of DMFT components for FPM in all examined locations were less than 1. Results of statistic analyzes for DMFT/dmft values and treatment needs between different locations were published in previous paper [3,4].

Different values of dmft and its components were registered in different survey locations (**Table 2. Figure 4**).

Discussion

The 2004 value of DMFT index for twelve-year-olds in Bosnia and Herzegovina was 4.16 out of which the D-component constituted the major part of the index (45.43%), followed by filled teeth (42.0%) and a smaller percentage or 12.57% of extracted teeth.

When the above values are compared with DMFT index of the twelve-year-old children in the former Yugoslavia Register in 1985, which was 6.3 [5], and the results of the study conducted in some parts of Bosnia and Herzegovina which established the DMFT value of 6.1 [2], it becomes obvious that the oral health has significantly improved. It is difficult to explain the reasons for this improvement because all measures taken had been limited to local level. However, one of the possible explanations might be that this study used WHO methodology for caries diagnosis under which decayed teeth do not include teeth affected by changes preceding clinically detectable enamel lesions or conditions similar to the early stages of caries. Other explanation could be that the use of CPI periodontal probe lowers the number of diagnosed caries lesions. Based on the established decrease in caries prevalence in highly industrialized countries, Kunzel points to the existence of two European regions. West European region (low risk countries) with average DMFT index of 1.7 and 40% of twelve-year-olds without decayed teeth and East European region (high risk countries) with DMFT index of 4.1 and 10% of twelve-year-olds without decayed teeth [6]. It is obvious that BH is a country with high caries prevalence. WHO Oral health database for DMFT of 12-year-olds shows similar results for neighbouring countries such as Croatia 4.9, Serbia

7.8, Former Yugoslav Republic Macedonia 3.0 and Albania 3.1 [7]. A survey conducted in eight European countries (Belgium, Germany, Greece, Ireland, Italy, Scotland, Spain and Sweden) revealed that DMFT among twelve-year-olds varies from between 1.07 in Spain and 2.58 in Germany [8,9]. The values of DMFT in non-European countries also vary standing at 3.24 in Mexico [10] and 2.4 at Philippines [11]; the value registered in Israel is 1.66 [12], while the lowest values of 0.64 and 0.1 was recorded in Nicaragua [13] and India [14] respectively. The trend of increased DMFT index values was registered in some transitional countries, precisely in Czech Republic, Slovakia and Lithuania [7]. Although DMFT index for our country is decreasing, it is still far below the average 2.78 DMFT index value for the European region established by the WHO based on surveys conducted in 48 European countries in the 1996-2000 period [7].

DMFT index values by separate survey locations (Table 1) also revealed differences, with the highest values registered in Široki Brijeg (5.38) and Vitez (4.85) and the lowest in Sanski Most (2.70). However, proportional representation of separate DMFT index components (Decayed, Missing, Filled Teeth) also points to different approaches to dental protection. Data provided in the table indicates that the dental protection in Široki Brijeg is well organized but based on curative procedures supported by the fact that filled teeth constitute 80.47% and extracted teeth only 3.26% of the index. It is also obvious that untreated decayed teeth constitute 65.73% and extracted teeth 20.22% of the DMFT index in Visoko.

Among five-year-olds in eight European countries dmft index varies from between 0.8 in Sweden to 3.06 in Scotland [9]. The 2004 dmft index in 6-year-olds in Bosnia and Herzegovina was 6.71 out of which the d-component constituted the major part of the index (88.79%), followed by extracted teeth (8.89%) and a small percentage of filled teeth (2.32%). In the former Yugoslavia in 1986, the dmft index for the same age group was 7.4 [4] and in Bosnia and Herzegovina, according to Ivankovic's study, it was 4.8 in 1997 [2]. This shows that the dmft index for primary teeth varies. Comparisons of dmft index values by separate survey locations again reveal differences, with the highest values registered in Gorazde (8.63), Banja Luka (7.06) and Vitez (7.00) and the lowest in Mostar (5.05). As the results for Bosnia and Herzegovina show that decayed, missing and filled teeth constitute

88.79, 8.89 and 2.32 of the dmft index respectively, we can conclude that the care for primary teeth in our country is neglected. The pattern of proportional share of specific components of dmft index (decayed, missing, filled teeth) is the same in entire Bosnia and Herzegovina. Demographic features related to oral health indices were analyzed and published in previous articles [3,4]. Comparing those results with analyzing descriptives in this paper, we can conclude that despite of statistic significant differences between locations there are no satisfactory results for oral health in any of examined cities. Preventive and treatment dental care is the same and equally poor throughout the country. Having in mind that previous caries experience is considered as very serious and reliable predictor of future caries development [15], it is urgent to develop new approaches to dental care in the country.

When the results of research conducted so far in BH are compared with those obtained in other European countries it is easy to conclude that the oral health of our six and twelve year old children is in a dramatic state. There are probably numerous reasons for that, but most importantly, the difference is due to absence of oral disease prevention and oral health promotion programs in BH which are standard in most developed European countries with well-organized system of dental care.

Conclusion

Results of national survey for two monitoring children population groups revealed insufficient preventive and curative dental care in entire Bosnia and Herzegovina. The imperative is to develop and implement a disease prevention program, based on education of parents and care providers, as well as to improve access to dental care and shift focus from curative to preventive procedures.

It is necessary to set realistic goals for improvement of oral health, which can be implemented within desired time frame, as well as to precisely define measures to be taken. Our national goals must be less ambitious than are those currently promoted by WHO and FDI, because oral health of our children is poorer than that of the children in most other European countries.

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Declaration of interest

All authors clearly state that there is no conflict of interest for any person or institution included in this research project.

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