Oral health status in Slovak population of 15-year-old children

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Abstract:
Objective: The aim of this study was to evaluate the prevalence of dental caries among 15-year-old children in Slovakia and to compare the results with previous similar studies.
Method: A total of 257 fifteen-year-olds were examined in spring 2015 for caries prevalence according to WHO criteria.
Results: The mean DMFT index was 3.49 (SD 3.2). There was a statistically significant relationship between the value of DMFT index and gender (for boys its value was 2.92, for girls 3.91).
Conclusion: In our epidemiological study we detected the average value of DMFT of 15-year-old children to be 3.49. We are still failing to meet the goals about oral health status laid down by WHO till 2010. To find out the exact cause of the current state, as well as clarifying the trend in caries prevalence in the studied sample, further studies are needed. In order to improve the dental health situation of Slovak children, health authorities had to focus more on preventive oral health programs.

Introduction:

World Health Organization (WHO) recommends the population of 15-year-olds as one of the target groups, which should be focused on when it comes to evaluation of oral health. At this age all permanent teeth are exposed to environment of oral cavity at least 2-3 years. This time is sufficient enough for tooth decay to arise under certain conditions. The evaluation of prevalence of dental caries in this age group is therefore relevant (WHO: Oral Health Studies, 2013). Dental caries is one of the most extended diseases affecting 60-90% of children going to school (WHO: http://www.who.int/mediacentre/factsheets/fs318/en/).
Despite prevention programs and progress in dentistry, dental caries remains a public health problem in Slovakia. Due to lack of data about oral health status of adolescents in Slovakia the project "Oral health status of children in Slovakia 2014/2015" was created. Its aim is to assess the prevalence of dental caries in children and to compare the situation with other countries. DMFT index is worldwide used for evaluation of tooth decay, devised by Klein and Palmer already in 1937 (Klein and Palmer, 1937). This index was also applied to assess caries prevalence in population of 15-years-olds in our study.

Material and Methods:

This prospective cross-sectional study was conducted on a clustered sample. The surveyed sample of 15-year-olds included children from different localities of Slovakia (western, middle, eastern) and from various socioeconomic backgrounds, all selected according to WHO recommendations (WHO, 2013). Thorough calibration of examiners was done before start of examining the sample. The study sample was chosen randomly only from schools willing to participate in. Examiners visited 18 localities on total. The biggest quantity of children was examined in two largest cities of Slovakia (Bratislava and Košice) where schools showed the highest interest in taking part in the study. We do not regard our sample as representative mainly because of this disproportionate distribution of examined children. Despite that fact we consider our study to be of a very valuable base for further investigation.

Before the study was carried out, consistent calibration was done in order to reach uniform assessment among 11 examiners. The calibration proceeded under the supervision of prof. MUDr. Neda Markovská, Csc. who was taken as a gold standard examiner. She participated in numerous epidemiological studies in the past (Markovská 2001, Markovská 2003) and was calibrated according to WHO standards for basic oral health studies. Calibration had two sections. Initially it covered the theory of diagnostic criteria, coding and common diagnostic problems, using images of all different clinical conditions of teeth with and without caries. In the second part of the calibration there were ten children examined twice by doctors selected for this study in order to gather data necessary for analysis of intra- and inter-examiner error. Based on the examinations of examiners and gold standard, results were then analyzed and disagreements discussed to a common consensus. According to WHO recommendations a level of consistency accepted for this study was in the range of 85- 95% (WHO, 2013). No examiner was excluded, but in terms of some inconsistent findings, 10 other children were examined by these non-standard examiners. Results were discussed till reaching the full agreement of all examiners.

All examinations were realized by one of 11 calibrated doctors with the help of a trained recorder. The examinations were held in the schools´classrooms using reclining chairs, portable lights, mirrors and blunt ball-ended probes. Cotton rolls and gauze were available for moisture control and removal of plaque as necessary.

All dental surfaces were examined and caries was diagnosed at the cavitation level (D3) threshold according to the BASCD criteria (Pitts *et al, 1996/97*), using a visual method without X-rays, fibre-optic transillumination or compressed air. Data were recorded in the pre-printed formular according to WHO recommendations (WHO, 2013). DMFT index was used and the prevalence of caries was evaluated. The index was analyzed in relation to age, gender and location. All children with fixed appliances currently in treatment were omitted from the sample.

Statistical tests Mann-Whitney, chi-square and gamma (in SPSS software) were used in the study.

 Parental consent was obtained from all children involved in the study prior to the examinations of their dental status.

Results:

283 children aged 15 years were examined, of which 113 boys (39.9%) and 170 girls (60.1%). Slovak nationality was represented in 281 children (99.3%).

According to the used methodology children with fixed appliance were excluded from the sample. That makes 26 children out of sample (9.2%), 5 boys and 21 girls. Available data revealed statistically significant association in proportion of girls versus boys with deployed fixed appliance in favor of 15-year-old girls.

Afterwards in the group considered for DMFT index remained 257 children from the whole sample, including 108 boys (42.0%) and 149 girls (58.0%). 71 children were examined in urban areas (27.6%), 79 (30.7%) in periurban and 107 (41.6%) in rural areas.

Intact dentition was found in 56 (21.8%) individuals from the investigation group. (Chart 1) There were statistically significant differences in proportion of children with intact teeth when compared between the sexes. In figures, boys with intact teeth (30 boys from the surveyed sample; 27.8%) and girls with intact teeth (26 girls from the surveyed sample; 17.4%). (Table 2) The proportion of individuals with intact teeth also depends on the size of residential location: their representation declines from urban (54.7%) through periurban (41.7%) to rural areas (25.2%). (Chart 2) This relationship is as well statistically significant (α

Values of DMFT index in surveyed sample are as follows: average value of DMFT index is 3.49, for boys it has a value of 2.92 and for girls 3.91 (Table 1). There is statistically significant relationship between the value of DMFT index and gender(αThe relationship of value of DMFT index and size of residential location was confirmed too. (Table 2) The size of residential location is connected to sub parameters D and M statistically significantly. The representation of these sub parameters increase from urban through periurban to rural areas: 273 individuals (92.2%) from the evaluated group had all teeth erupted (i.e. without extraction due to caries).

Discussion:

The age of 15 is not only important as a period when all permanent teeth are exposed to the environment of oral cavity already at least 2-3 years, but it is time when orthodontic treatment can be carried out. In the study group the fixed appliance had been deployed in larger proportion of girls than boys. As a possible explanation we present the increased interest in dental aesthetics in girls during the adolescence. This area has not been investigated in our study, so for the confirmation of this hypothesis we recommend further research with the similar study group.

When evaluating the proportion of children with intact teeth we come up with the finding that DMFT 0 is represented more in boys. This may be related to the timing of second phase of dentition exchange. Generally for girls, it comes earlier in comparison to boys. Nevertheless, it is questionable whether this difference may manifest also 2-3 years after replacing the teeth. This assumption may be the subject to a more thorough examination. From our results it is obvious that the representation of children with intact teeth decreases from urban to rural areas. Among the factors involved in this relationship belong the economic concentration of capital and higher socioeconomic status of individuals in larger towns. From this we assume greater awareness about oral health as well as increased emphasis on prevention in larger towns. It is likely better availability of complex dental services there.

The average value of DMFT of examined children is 3.49. Relationship between DMFT value and gender was recognized as statistically significant. There are more studies confirming our findings (Shaffer *et al., 2015*; Lukacs and Largaespada, 2006; Ferraro and Vieira, 2010). As the possible reasons we allege not only the delayed eruption of

permanent dentition among boys but also different eating habits. This phenomenon is still not sufficiently explained.

The value of index DMFT is according to our study not consequent to the size of residential location. There is a significant relationship between the size of the place of residence and values of sub parameters D and M. The proportion of caries and extractions is rising from rural through periurban areas, with the lowest values in urban areas. There are more factors that contribute to this. The oral health care system and the emphasis on effective preventive measures can work more efficiently in larger towns where there is a higher concentration of medical stuff. The equipment of practices is important as well. In larger towns it is more likely to use diagnostic methods such as bitewing X-rays in dental examination. Similarly, the difference in therapeutic options of dental practices influences the prognosis of teeth. These hypotheses need to be confirmed by further research first. The special areas to be tackled are the habits of population in receiving dental care. It is possible that the inhabitants of smaller towns and villages go less often for preventive check-ups and see dentist only in painful conditions.

The deeper analysis of the stated reasons can improve the area program for prevention and care of oral health. By creating better conditions in dental care we would then be closer to the developed countries. In comparison to these developed countries the average value of DMFT of 15-year-old Slovak children is higher. In Greece the value of 3.19 was measured (Oulis*et al., 2011*), in Spain 1.84 (Almerich-Silla and Montiel-Company, 2006). In Germany the value of DMFT was 1.8 already by the year 2006 (Institut der DeutschenZahnarzte, 2006) and in United Kingdom- Wales 1.48 (Pitts *et al., 2006*).

The global objective of WHO for oral health by the year 2010 for the population under 18 years is 100% of individuals with all teeth erupted (i.e. without extractions due to caries) (FDI, 2000). In our sample it meant 92.2%, suggesting the need for rising the level of dental care in this group.

The first limitation of this study is the size of the sample. Taking into consideration the total number of 15-year-olds in Slovakia which is 54 989 (28 202 boys and 26 787 girls) (Statistical department of Slovak republic), the studied sample could have been bigger in order to map the oral health situation of Slovak adolescents even more precisely. The second important limitation was that the examiners were allowed to visit only the schools that agreed to participate in the study. Majority was situated in two largest cities that influenced the randomization process. The same situation resulted from the parental cooperation and their willingness to sign the informal consent for the study. Moreover, mainly parents with positive approach to oral health themselves lead children to the proper oral healthcare and those are the parents willing to sign the consent and vice-versa.

The last limitation recognized is related to the choice of evaluated index itself- DMFT. It does not distinguish the value of decayed, well-restored and missing tooth. What is more, examinations were realized with using only the visual method recommended by WHO criteria, without X-ray or fibre-optic transillumination which leads to the fact that examiners could have diagnosed only clinically visible lesions (D3), others were omitted. Therefore the data of mean DMFT obtained by this study might not properly represent the current situation of oral health. Nevertheless, we followed WHO recommendations in order to complete this study in a way to be able to compare the

acquired results with results known form the past and others worldwide and therefore we accepted these limitations.

Conclusion:

In our epidemiological study we detected the average value of DMFT of 15-year-old children 3.49, which is considerably more than how it is in western countries. The worrying state of oral health of 15-year-olds in our country is supported with the fact that we are still failing to meet the goals about oral health laid down by WHO till 2010. To find out the exact cause of the current state, as well as clarifying the trend in caries prevalence in studied sample the further study is needed.

Acknowledgements:

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Charts and tables:

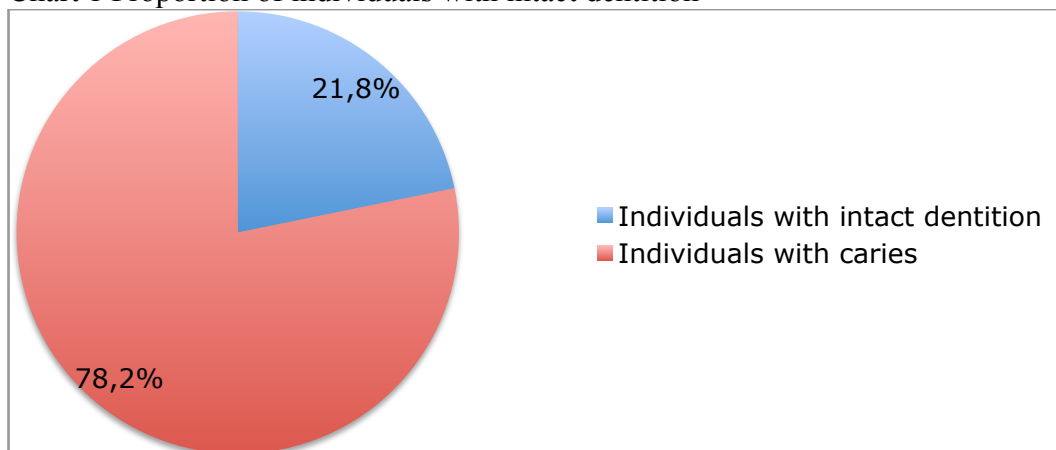Chart 1 Proportion of individuals with intact dentition

Chart 2 Distribution of children with intact dentition according to the residential location
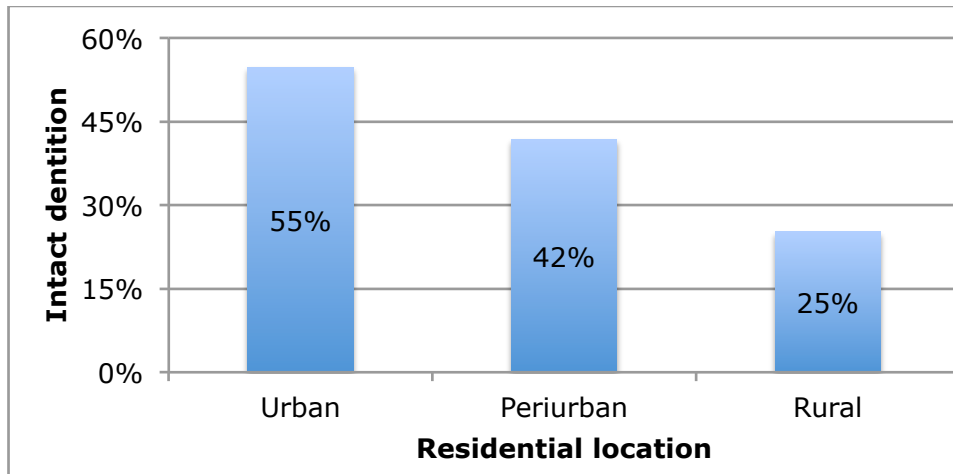

Table 1 Average values of DMFT index in the group of 15-year-olds

Age	Boys			Girls			Whole sample		
	Mean	SD	IC 95%	mean	SD	IC 95%	mean	SD	IC 95%
15	2.92	2.799	2.38 – 3.45	3.91	3.426	3.35 – 4.46	3.49	3.209	3.10 – 3.88

Table 2 Average values of DMFT index according to size of residential location

	Urban areas	Periurban areas	Rural areas
DMFT	2,73	3,08	4,30
D	0,32	0,33	1,11
F	2,39	2,71	2,93
M	0,06	0,04	0,25