

THE STATE OF ORAL HEALTH AND ITS IMPACT ON THE QUALITY OF LIFE OF SIX-YEAR-OLDS IN THE CITY AREA OF ŽIVINICE

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ABSTRACT

Background: Oral health is one of the most important indicators of general health, individual well-being, and quality of life. Oral health in children and adolescents is often reflected by the state of their dental hard tissues in the form of their previous caries experience. Poor oral health in children increases the likelihood of more complex dental treatment and emergencies, which can lead to absenteeism from school and reduced learning abilities, causing slowed physical development, and overall reduced oral health-related quality of life.

Aim: To determine the state of oral health and its influence on the overall quality of life in six-year-olds in the city of Živinice.

Methods: The study participants were psychophysically healthy six-year-old children of both genders with residences in the urban and rural areas of the city of Živinice. Oral examinations were conducted according to the World Health Organization Oral Health Survey manual. The previous caries experience indexes of primary teeth (number of decayed, missing, and filled primary teeth, Significant Caries Index, and pufa index for primary teeth) were noted during clinical examinations of children, with a simultaneous filling of the Pediatric Oral Health-Related Quality of Life questionnaire by children's parents.

Results and Conclusion: The state of oral health of six-year-olds in the area of the city of Živinice was not on a satisfactory level. Analyzed oral health indexes were higher worldwide and national findings. High scores of all analyzed indexes indicated that oral health could impact the quality of life and that these values are high compared to the given recommendations.

Keywords: six-year-old children, dmft, pufa, SiC, POQL

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INTRODUCTION

Oral health is the main indicator of general health, individual well-being, and quality of life. Quality of life is defined as an individual's cultural and value system perception of its goals, expectations, standards, and interests [1]. Periodical epidemiological surveys on the nationwide level with clearly defined monitoring groups and oral health parameters have been suggested by The World Health Organization (WHO) [2].

Oral health in children and adolescents is often reflected by the state of their dental hard tissues in the form of their previous caries experience. Thus the previous caries experience of primary teeth is most often estimated by the number of decayed, missing, and filled primary teeth (dmft index) [3]. Furthermore, the severity of carious disease in primary teeth is most

often estimated by using Significant Caries Index (SiC) [4]. SiC as a supplement to the dmft index, is focused on the individuals with the highest caries intensity in primary teeth in the targeted population [5]. Finally, estimation of the presence and the severity of complications of caries in primary teeth is done by the pufa index, which evaluates caries complications from pulp involvement to periapical propagation of caries-caused pulpal infection [6]. The combination of all mentioned indexes (dmft, SiC, pufa) offers a good way to evaluate the health and status of hard oral tissues in primary teeth.

Poor oral health in children increases the likelihood of more complex dental treatment and emergencies, which can lead to absenteeism from school and reduced learning abilities, causing slowed physical development, and overall reduced oral health-related quality of life. Pediatric

Oral Health-Related Quality of Life (POQL) is a good and reliable measure that can be used in preschool institutions, in school children, and pre-teenagers. POQL shows a benefit when it is used, whether it is in clinical estimations or bigger population studies. To measure and evaluate POQL four domains are necessary to be used: physical functioning, social functioning, role functioning, and emotional functioning [7].

Regular visits to the dentist and routine oral examinations play a key role in the preservation of the oral health of children and adults as well. There are many reasons why the first visit to the dentist in the infant period is of great importance. Some of them are psychological before all, but preventive, diagnostic, and therapeutic reasons are crucial as well in the first visits to the dentist. That's why the first dental visit should represent an opportunity to make a plan for regular dental check-ups, and for the further tracking of the oral health of a child [8], which plays a big role in preventing dental fear and anxiety in a child. That is why it is crucial to have epidemiological data about the state of the oral health of children, to be able to plan actions for its improvement.

This research aims to determine the state of oral health and its influence on the overall quality of life in six-year-olds in the area of the city of Živinice.

MATERIALS AND METHODS

The study research was of the cross-sectional prospective epidemiological kind and conducted with the approval of the Ethic committee of the public health institution Health Center Živinice, following the principles of The Declaration of Helsinki [9]. The study participants were psychophysically healthy six-year-old children of both genders with residence in the urban and rural areas of the city Živinice, which have undergone oral examination in "Health Center Živinice" during the Autumn of 2022. The purpose and content of the study were explained to the parents of the child respondents, and they were also asked for written approval for participation in this research of them and their offspring.

Oral examinations were conducted according to the fifth WHO Oral Health Survey manual [10]. During examinations, the state of the oral health of the children was estimated by noting dmft, SiC, and pufa indexes in

children study single records. To determine the dmft index in respondents, the presence of decayed (d), missing (m), and filled (f) primary teeth was noted. After that, the dmft index was calculated as the average value of the sum of those present decayed, missing, and filled primary teeth inside examined population group [3]. The severity of caries disease in the primary teeth of the respondents was evaluated through the SiC index, in such a way that the average dmft was calculated in one-third of the respondents with the highest values of the dmft index inside examined population [4]. The presence of caries complications in child respondents during the oral examination was noted with the presence of pulpal involvement (p), the emergence of ulcerations on surrounding gingiva (u), the presence of fistula related to the root of the involved tooth (f) and presence of dentoalveolar abscess that has relation to the infected tooth (a). The pufa index was calculated as the average value of the total sum of mentioned signs of complications related to caries on affected teeth [6].

Parents of the children were simultaneously fulfilling POQL questionnaires in the name of their children. POQL questionnaire consisted of ten questions in total (Annex 1). The answers to the questions were in two ways, how often these events occurred (with values 0-3), and if they did how much these events have bothered their child (with values 0-4), with a total score of 70 [7].

Descriptive values of the obtained results were presented in the text and tables. Analysis of the differences between observed independent variables is done by the Mann-Whitney test, and between dependent ones by the Friedman test. Analysis of correlations between observed variables was performed by Spearman's correlation coefficient. All statistical analyses were done in IBM SPSS software package v. 23 for Windows operative system, at the $p \leq 0.05$ level of significance.

RESULTS

Fifty 6-year-old respondents (25 boys and 25 girls) participated in this study, where 74% of them (37 examinees) were from the urban area, while 26% (13 examinees) were from the rural area of the city of Živinice.

The state of oral health of respondents was presented with the dmft index, pufa index, and SiC index of their primary teeth (Table 1).

Table 1. Descriptive values of the previous caries experience in primary teeth of child participants in the study sample

	d	m	f	dmft	p	u	f	a	pufa
mean	7.76	4.76	0.04	12.56	7.56	0.04	0.00	0.00	7.60
stand. dev.	4.22	2.52	0.20	4.79	4.20	0.28	0.00	0.00	4.20
minimum	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
maximum	16.00	9.00	1.00	20.00	16.00	2.00	0.00	0.00	16.00

The values of dmft, pufa, and SiC indexes were extremely high, with the dominant caries (c) component. Dental caries prevalence was 90%. Besides the expected correlation between the values of the dmft and SiC index, a high and statistically important level

of correlation was noticed between the dmft and pufa indexes (Spearman $r=0.830$, $p=0.01$).

Recorded values of the dmft, pufa, and SiC indexes regarding participants' gender and location were shown in Table 2.

Table 2. Descriptive value of the results of dmft and pufa indexes regarding sex and location of the study sample participants

	gender	mean	stand. dev.	location	mean
dmft	boys	13.24	4.95	urban	12.19
	girls	11.88	4.62	rural	13.62
pufa	boys	8.12	3.93	urban	7.38
	girls	7.08	4.48	rural	8.23
SiC	boys	17.89	1.16667	urban	16.67
	girls	16.38	1.40789	rural	18.40

Although the average scores of the dmft, pufa, and SiC indexes were mainly higher in boys in rural areas (except higher average values of the SiC index in urban areas), statistical analyses using the Mann-Whitney

test didn't determine that these differences were statistically significant.

The quality of life of child respondents was shown through the values of the POQL scale in Table 3.

Table 3. Descriptive values of the POQL results obtained in the study sample

	POQL_ social	POQL_ educational	POQL_ functional	POQL_ emotional
mean	0.42	0.08	3.64	2.20
standard deviation	1.50	0.34	3.81	3.86
median	0.00	0.00	3.00	0.00
percentiles	25	0.00	0.00	0.00
	50	0.00	0.00	0.00
	75	0.00	0.00	7.25

When observing the quality of life of the children in this study, the most affected were emotional and especially functional components. The functional component was even statistically the highest (Friedman test, $p<0.001$). There were no statistically important correla-

tions between the results of the oral health indexes and those on the POQL scale in child examinees.

The average values of the results obtained by components of the POQL scale regarding the gender and location of respondents were shown in Table 4.

Table 4. Descriptive values of the results on the POQL scale regarding the gender and location of the study sample respondents

	gender	mean	stand. dev.	location	mean
POQL_ social	boys	0.16	0.80	urban	0.22
	girls	0.68	1.95	rural	1.00
POQL_ educational	boys	0.04	0.20	urban	0.11
	girls	0.12	0.44	rural	0.00
POQL_ functional	boys	4.40	4.35	urban	3.76
	girls	2.88	3.09	rural	3.31
POQL_ emotional	boys	2.28	4.30	urban	2.19
	girls	2.12	3.44	rural	2.23
POQL total	boys	6.88	7.85	urban	6.27
	girls	5.80	7.15	rural	6.54

The quality of life was the most affected in boys and rural areas, especially with observing functional components. However, no statistically important differences were determined regarding the gender and location of respondents analyzed by the Mann-Whitney test.

DISCUSSION

Study research results in the six-year-old participants showed significantly high values of previous dental caries experience. The most widespread disease in the world is dental caries, where caries of primary teeth (early childhood caries, ECC) comes to tenth place among other conditions [11].

The last known results extracted from the Global Burden of Diseases in 2017 showed a mean ECC prevalence of 57.3% in preschool children aged 36 to 71 months [11, 12]. Also, the extracted pooled global ECC prevalence from the last 30 years was 48% and ranged from 16% to 89% in children until the age of 6, and results for Europe showed a pooled prevalence of 43% [13]. Previous national results showed ECC prevalence in 6-year-old participants at the level of 86-93.2% [14-16]. The last known national local and regional results for this child's age showed declined ECC prevalence, ranging from 53 to 74.11% [17-19]. Our study results showed a seriously high ECC prevalence of 90%. Former national results showed average dmft values ranging from 4.9-7.3 [14-16], with the carious component as the most dominant. The last ones showed similar results, with the average dmft value ranging from 5.03 to 5.13 [18, 19]. Our results showed very high average dmft values, which corresponded with our high ECC prevalence. These findings should be the most important oral pub-

lic health concern, not only for our local community but also for our country. Furthermore, most recent national trends showed the tendency for ECC to be the leading disease among preschool children [20].

Several studies observed the severity and complications of ECC within primary dentition in 6-year-old children. Thus the SiC average index varied from 5.17 to 7.75 [21, 22], with the last known national results of 10.16 [19]. The results analyzing the pufa index were similar and of important concern, with the average values ranging from 0.9 to 2.44 [23, 24]. Our seriously high average SiC (17.18) and pufa (7.60) index values show the severity and extent of the ongoing rampant untreated carious process.

If oral health was impaired in children, their quality of life was also worsened in every aspect to a certain extent. Although the influence of such bad oral health on the quality of life in our child participants also could be reasonably expected, the obtained average POQL scores showed surprisingly low values, with the emotional and functional components as the most affected ones.

Based on the results we have acquired in this research, and the comparison with the other worldwide and national findings, we could notice all previous caries experience index values in primary teeth in 6-year-old children were pretty lower than in the city of Živinice. Hence, it should be necessary to start with the public oral health plan and program as soon as possible, with the intention and the main goal to improve the oral health situation in our city.

This study had several limitations. The first one should be the study sample size. Also, when oral health has been analyzed, other various related variables should be included, such as oral hygiene and dietary habits,

socioeconomic conditions, etc. Hence this was a kind of pilot study initially founded to explore the situation of the state of oral health in the targeted population, enlarging the sample size (population-based, for example) and extending the observed variables should be of our primary concern in the next similar studies.

CONCLUSIONS

The state of oral health of six-year-olds in the area of the city of Živinice was not on a satisfactory level. Analyzed oral health indexes were higher worldwide and national findings for the 6-year-old children and further epidemiological studies would be necessary to conduct to affirm general health trends in Bosnia and Herzegovina.

High scores of all analyzed indexes indicated that oral health could impact the quality of life in six-year-olds and that these values are high compared to the given recommendations.

The main focus should be placed on the prevention, preservation, and improvement of oral health in children, hence new reforms and changes in public health are necessary to be carried out to improve the quality of oral health and overall quality of life in new young generations.

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Annex 1. Pediatric Oral Health-Related Quality of Life Scale (POQL) [7]

POQL questions
Did your child not want to laugh or smile around others because of his or her teeth or mouth?
Did your child worry that he or she was not as good-looking to others because of his or her teeth or mouth?
Was your child unhappy with the way he or she looked because of his or her teeth or mouth?
Did your child have trouble paying attention in school because of his or her teeth or mouth?
Did your child miss school because of his or her teeth or mouth?
Did your child have pain because of his or her teeth or mouth?
Did your child have trouble eating food (hard/hot/cold) because of his or her teeth or mouth?
Was your child angry or upset because of his or her teeth or mouth?
Did your child feel worried because of his or her teeth or mouth?
Did your child cry because of his or her teeth or mouth?

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