

EVALUATION OF ORAL HEALTH IN CHILDREN OF SCHOOL AGE FROM THE REPUBLIC OF MACEDONIA

ЕВАЛУАЦИЈА НА ОРАЛНОТО ЗДРАВЈЕ КАЈ ДЕЦА НА ШКОЛСКА ВОЗРАСТ ОД РУРАЛНА ОБЛАСТ НА Р МАКЕДОНИЈА

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Abstract

Dental caries is a widespread disease in our country and even wider in the world, whose prevalence and incidence are a challenge to public health. Caries is the most common teeth disease in childhood. Despite the significant scientific achievements and the fact that caries can be prevented, the disease continues to be an important public health problem. **Objective:** The aim of this paper was to evaluate the prevalence of the DMFT index in schoolchildren from rural settlements in the Prespa region of the Republic of Macedonia with mixed ethnicity through conducting clinical trials. **Material and method:** In order to achieve the goal set in the survey, 198 respondents were surveyed, including students aged from 6 to 14 of both sexes, with different national backgrounds. All respondents were divided into two groups: pupils with deciduous dentition from 6 to 10 years of age and students with mixed dentition from 11 to 14 years of age. Prior to the start of the research, approval was requested from the managers and teachers of the schools that were involved in the research. Given the fact that the respondents were juveniles, a written consent from the parents was requested, which ensured the permission to use the surveyed information for scientific - research purposes. **Results:** Our results showed that in the group of students from 6 to 10 years, the prevalence of the DMFT index on teeth was 73.53%, whereas in the group of students from 11 to 14 years, the prevalence of the DMFT index on teeth was 93.75%. **Conclusion:** The analysis of the results of our research indicates the need for taking stronger measures for primary and preventive dental care among children of school age from rural settlements in the Prespa region of the Republic of Macedonia with mixed ethnicity. **Keywords:** oral health, school children, caries, DMFT index

Апстракт

Забниот кариес е распространето заболување кај нас и пошироко во светот чија преваленца и инциденца се предизвик на јавното здравство. Кариесот претставува најчеста болест на забите во детската возраст. И покрај значајните научни достигнувања и фактот дека кариесот може да се превенира, болеста продолжува да биде значаен јавно-здравствен проблем. **Цел на трудот:** Целта на овој труд беше преку спроведување на клинички испитувања да се евалуира преваленцијата на КЕП индексот за состојбата на забалото кај деца на училишна возраст од руралните населени места во Преспанскиот регион на Република Македонија со мешана етничка припадност. **Материјал и метод:** За реализација на поставената цел во испитувањето беа вклучени 198 испитаници, ученици од 6 до 14 годишна возраст од обата пола, со различна национална припадност. Сите испитаници беа поделени во две групи: ученици со млечна дентиција од 6 – 10 годишна возраст и ученици со мешовита дентиција од 11 – 14 годишна возраст. Пред да почнеме со истражувањето беше побарана дозвола од директорите и наставниците на училиштата кои беа вклучени во истражувањето. Имајќи го предвид фактот дека се работи за малолетни лица беше побарана и писмена согласност од родителите, со што ни беше овозможено добиените податоци да ги употребуваме во научно-истражувачки цели. **Резултати:** Нашите резултати покажаа дека во групата на ученици од 6-10 години преваленцата на КЕП индексот за состојбата на забалото е 73,53%, а во групата на ученици од 11-14 години преваленцата на КЕП индексот за состојбата на забалото е 93,75%. **Заклучок:** Анализата на резултатите од нашите истражувања укажува на потребата за превземање на засилени мерки за примарна и превентивна стоматолошка заштита кај децата на школска возраст од руралните населени места во Преспанскиот регион на Република Македонија со мешовите национална припадност. **Клучни зборови:** орално здравје, школски деца, кариес, КЕП индекс

Introduction

Poor oral health has potential and may impair the quality of life, as well as reduce food intake due to oral pain. Also, impaired dental status can cause low growth in children and worsen their nutritional status. Bad

dental status in children has a negative effect on the development of speech, and this may have a socially adverse effect in children that will affect their social acceptance¹. In developed countries, there is a decline in oral diseases, and globally an increase in their prevalence^{2,3}.

Various occurrences of oral diseases in different countries have been observed in different countries and hence the need for organizing an oral health service that would meet the needs of the local population with global strategic proposals from WHO^{4,5,6}.

Caries and periodontal disease are the two most common oral pathologies, and the indices that describe their prevalence are often used to roughly describe the oral health status of the population. One important caries index is new and has been introduced to identify individuals or groups with the highest DMFT values⁷. Early epidemiological studies have proven that the DMFT Index is a relevant indicator of oral health and socioeconomic status⁸. In industrialized Western countries the prevalence of caries has decreased and concentrated among 20% of the population⁹. Quite worrying is the fact that only 66.9% of the total population has functional dentition (21-32 teeth) and in the near future, the goals of the WHO 2020 will be difficult to achieve¹⁰.

Dental caries is a widespread disease in our country and even wider in the world, whose prevalence and incidence are a challenge to public health. The caries is the most common teeth disease in childhood.

Despite the significant scientific achievements and the fact that caries can be prevented, the disease continues to be an important public health problem. In developing countries, changing habits and diet considerably increase the incidence of cavities¹¹. According to the World Health Organization, 60-90% of school-age children around the world have dental caries and the disease has the highest prevalence among children from Asian and Latin American countries². The last two decades have seen a significant decline in the appearance of caries in children in industrialized countries^{12,13}. This is due to the increased culture and knowledge of maintaining oral hygiene, the use of fluoride, the use of improved tooth brushes, improved access to dental health care, and prevention campaigns and programs aimed at raising awareness among population for oral health. Conversely, an increased frequency of dental caries has been reported in developing countries and especially in countries where preventive dental programs have not yet been established^{14,15,16}.

In social groups with a lower standard of living the need for teeth treatment is prevailing, while among the population with a higher level of income, the approach to providing dental services is greater.

Objective

The purpose of this paper was to carry out the clinical trials on schoolchildren from rural settlements in the

Prespa region of the Republic of Macedonia with mixed ethnicity to determine the following objectives:

1. To examine the prevalence of DMFT, and to determine the differences between the two examined groups: students from 6-10 and students from 11-14 years of age;
2. To examine the relationship between the soft and hard deposits of Greene-Vermillion, the index of gingival inflammation following Sillnes&Loe and DMFT index.

Material and methods

In order to achieve the goal set in the survey, we surveyed 198 respondents, including students aged from 6 to 14 of both sexes, with different national backgrounds. All respondents were divided into two groups: pupils with primary dentition from 6 to 10 years of age and students with mixed dentition from 11 to 14 years of age. Respondents involved in the research were students of three primary schools located in rural areas, as follows: Primary School "Slavejko Arsov" village Podmochani, Primary School "Dimitar Vlahov" village Ljubojno, and Primary School "Brakja Miladinovci" village Carev Dvor, in the Prespa region of the Republic of Macedonia.

Prior to the start of the research, permission was obtained from the managers and teachers in the schools mentioned above. Given the fact that juveniles were involved a written consent from the parents was requested, which enabled us to use the obtained data for scientific and research purposes.

Within the scope of the clinical trials, the degree of maintenance of teeth (DMFT index) was noted. All data obtained from clinical trials were noted in a pre-prepared questionnaire for each patient separately.

For determining the condition of the teeth, we used the DMFT index in the permanent dentition in the elderly group of pupils from 11-14 years of age, and this assessment was done for each tooth (caries, extraction and flame), whereas in the primary dentition, we used the dmft index of the teeth in the group of pupils from 6-10 years of age, and this assessment was done only for sealed and carious teeth, because here, the extraction is considered to be normal resorption and the removal of the primary teeth into permanent teeth.

All clinical trials of this study were performed in the Private Health Institution "DENT-S", village Krani, Resen, as part of a pre-scheduled systematic dental examination of all students (examinees) from the primary schools mentioned above.

Statistical analysis

The data analysis was performed with the statistical program Statistica 7.1 for Windows.

Results

Description and Differences Between the Groups

Descriptive statistics of the DMFT index of students from the two groups is shown in Table 1.

In the 6-10 years group, the value of the DMFT index varies in the range of 2.4 ± 1.89 ; $\pm 95.00\%$ CI: 2.04-2.78; the minimum value is 0 and the maximum value is 8.00.

In the 11-14 age group, the value of the DMFT index varies in the interval of 7.03 ± 4.09 ; $\pm 95.00\%$ CI: 6.20-7.86; the minimum value is 0 and the maximum value is 19.00.

The value of the DMFT index is higher for 11-14 years students, but the difference compared to pupils

from 6-10 years for $Z = -8.50$ and $p < 0.001$ ($p = 0.000$) is significant (Table 1.1).

In Table 1.2, the data presented refer to the presence of DMFT on teeth in the students of both groups.

In the group of 6-10 years out of a total of 102 students, 75 (73.53%) had dmft on the teeth, and 27 (26.47%) did not have dmft on their teeth.

In the group of 11-14 years out of 96 students, 90 (93.75%) had DMFT on the teeth and 6 (6.25%) did not have DMFT on the teeth.

In the distribution of data related to the presence of DMFT on teeth, students of both groups for Pearson Chi-square = 14.56 and $p < 0.001$ ($p = 0.000$) have significant difference.

In the group of students from 6-10 years, the prevalence of dmft is 73.53%.

In the group of students aged 11-14, the prevalence of DMFT is 93.75%.

Descriptive statistics of the index of students from the 6-10 years group is shown in Table 2.

Table 1. DMFT Index/Status of permanent dentition

Group	Number	Average	Confidence -95.00%	Confidence + 95.00%	Minimum	Maximum	Standard deviation
6 - 10 years	102	2.41	2.04	2.78	0.00	8.00	1.89
11 - 14 years	96	7.03	6.20	7.86	0.00	19.00	4.09

Table 1.1. DMFT Index/Status of permanent dentition

Difference between groups

Parameter	Rank Sum 6-10 years	Rank Sum 11-14 years	U	Z	p-level	Valid N 6-10 years	Valid N 11-14 years
DMFT index	6723.00	12978.00	1470.00	-8.50	0.000	102	96

Table 1.2. Presence of DMFT

	Group	Presence of dmft/DMFT		Total
		Present	None	
Number	6-10 years	75	27	102
%		73.53%	26.47%	
Number	11-14 years	90	6	96
%		93.75%	6.25%	
Number	Total	165	33	198

Table 2. Index/Status of primary dentition

Group	Number	Average	Confidence -95.00%	Confidence + 95.00%	Minimum	Maximum	Standard deviation
6 - 10 years	102	6.98	6.20	7.76	0.00	18.00	3.97

Table 2.1. Index/Sex of the respondents

Parameter	Mean Boys	Mean Girls	t-value	df	p	Valid N Boys	Valid N Girls	Std.dev. Boys	Std.Dev. Girls
index	8.08	6.00	2.73	100	0.008	48	54	3.89	3.81

In the 6-10 years group, the value of the index varies in the range of 6.98 ± 3.97 ; $\pm 95.00\%$ CI: 6.20-7.76; the minimum value is 0 and the maximum value is 18.00.

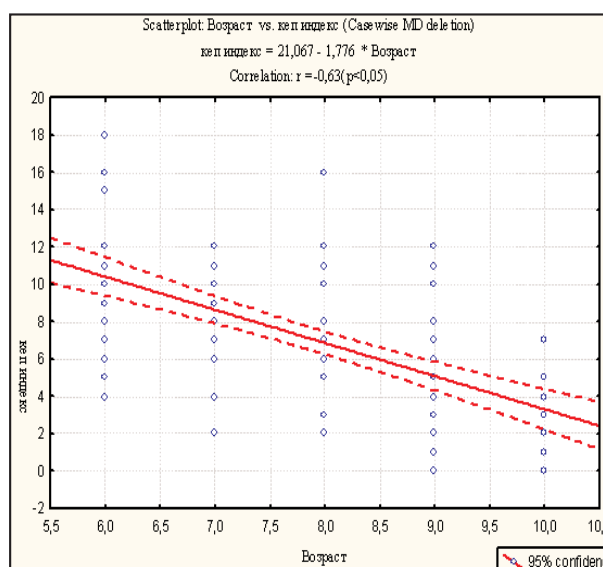
For $t=2.73$ and $p<0.01$ ($p=0.008$) the value of the index in the male students was significantly higher in terms of value rather than that of the female students. (Table 2.1)

Graph 1 shows the relationship between the age of students of 6-10 years and the value of the index's index.

For $r=-0.63$ ($p<0.05$), a very significant negative correlation was found in the examined relationship. Namely, with the increase in the age of students in a year, the value of the index was significantly lower by 1.78.

The differences between the values of the KP index in relation to the ethnicity of the students are shown in Table 2.2 and Table 2.2.1.

For $F = 1.87$ and $p > 0.05$ ($p = 0.14$) there is no significant difference between the values of the cap index



Graph 1

Table 2.2. Index/Sex of the respondents

Parameter	SS Effect	df Effect	MS Effect	SS Error	df Error	MS Error	F	p
DMFT index	86.38	3.00	28.79	1505.58	98	15.36	1.87	0.14

Table 2.2.1. index/Ethnic affiliation of the respondents/Post hoc

Ethnicity	{1} M=6.82	{2} M=6.42	{3} M=8.91	{4} M=11.00
Macedonians {1}		0.63	0.11	0.14
Albanians {2}	0.63		0.07	0.11
Turks {3}	0.11	0.07		0.49
Roma {4}	0.14	0.11	0.49	

compared to the ethnicity of the students from 6-10 years.

In the Post hoc analysis between the average values of the cap population index of the Macedonians ($x = 6.82$), the Albanians ($x = 6.42$), the Turks ($x = 8.91$) and the Roma ($x = 11.00$) for $p > 0.05$ no significant difference was observed (Table 2.2.1).

Group 1: Students from 6 to 10 years of age

1. Soft and hard dental plaques according to the reene-Vermillion and IGI after Silness&Loe/DMFT index

The results shown in Table 3 refer to the investigated relationship between the DMFT index as a dependent variable and the soft and hard dental plaques according to Greene-Vermillion index and the index of gingival inflammation following Silness&Loe as independent variables.

For $R=0.30$ and $p<0.05$ ($p=0.03$), a moderately strong significant correlation was found in the examined relation.

The DMFT index has the strongest impact on the IGI after Silness&Loe ($Beta=0.24$), the soft plaque on teeth in the Greene-Vermillion index ($Beta=0.14$), and the weakest is the impact of hard dental plaque according to Greene-Vermillion index ($Beta=-0.04$).

With each increase in the single value of the Silness&Loe gingival inflammation, the DMFT index increases by 1.87 units ($B=1.87$), significant for $p<0.05$ ($p=0.02$), with unchanged values of soft plaque on teeth in the Greene-Vermillion index and of hard tooth deposits according to the Greene-Vermillion index.

With each increase in the single value of the soft plaque on teeth in the Greene-Vermillion index, the DMFT index increases by 0.52 units ($B = 0.52$), insignificantly for $p>0.05$ ($p=0.17$), with unchanged values of the Silness&Loe gingival inflammation and of the hard tooth deposits according to the Greene-Vermillion index.

With each increase in the single value of the hard teeth in the Greene-Vermillion index, the DMFT index decreases by 0.25 units ($B = -0.25$), insignificantly for $p>0.05$ ($p=0.68$), with unchanged values of the Silness&Loe index of gingival inflammation and of the soft plaque on teeth according to the Greene-Vermillion index.

Group 2: Students aged 11 - 14

2. Soft and hard dental plaques according to the Greene-Vermillion and IGI after Silness&Loe/DMFT index

The results shown in Table 4 refer to the investigated relationship between the DMFT index as a dependent variable and the soft and hard dental plaques according to Greene-Vermillion index and the index of gingival inflammation following Silness&Loe as independent variables.

For $R=0.22$ and $p>0.05$ ($p=0.21$), a moderately weak insignificant correlation was found in the examined relation.

The DMFT index has the strongest impact on the IGI after Silness&Loe ($Beta=-0.19$), the soft plaque on teeth in the Greene-Vermillion index ($Beta=0.13$), and the weakest is the impact of hard dental plaque according to Greene-Vermillion index ($Beta=-0.11$).

With each increase in the single value of the Silness&Loe gingival inflammation, the DMFT index decreases by 2.15 units ($B=-2.15$), insignificantly for $p>0.05$ ($p=0.08$), with unchanged values of the soft plaque on teeth in the Greene-Vermillion index and of hard tooth deposits according to the Greene-Vermillion index.

With each increase in the single value of the soft plaque on teeth in the Greene-Vermillion index, the DMFT index increases by 1.15 units ($B = 1.15$), insignificantly for $p>0.05$ ($p=0.25$), with unchanged values of the Silness&Loe gingival inflammation and of the hard tooth deposits according to the Greene-Vermillion index.

With each increase in the single value of hard teeth in the Greene-Vermillion index, the DMFT index decreases by 1.22 units ($B=-1.22$), insignificantly for $p>0.05$ ($p=0.32$), with unchanged values of the Silness&Loe index of gingival inflammation and of the soft plaque on teeth according to the Greene-Vermillion index.

Table 3. Soft and hard dental plaques according to the Greene-Vermillion & IGI after Silness&Loe/DMFT index

Regression Summary for Dependent Variable: DMFT index $R=0.30$; $F(3,98)=3.19$ $p<0.03$

	Beta	Std. Error of Beta	B	Std. Error B	t (99)	p-level
Intercept			-0.25	0.89	-0.28	0.78
Soft deposits according to Greene-Vermillion index	0.14	0.10	0.52	0.37	1.39	0.17
Hard deposits according to Greene-Vermillion index	-0.04	0.10	-0.25	0.62	-0.41	0.68
Silness&Loe index of gingival inflammation	0.24	0.10	1.87	0.79	2.37	0.02

Table 4. Soft and hard dental plaques according to the Greene-Vermillion & IGI after Silness&Loe/DMFT index

Regression Summary for Dependent Variable: DMFT index R = 0.22; F (3.928) = 1.529 p <0.21

	Beta	Std. Error of Beta	B	Std. Error B	t (99)	p-level
Intercept			8.41	1.54	5.48	0.000
Soft deposits according to Greene-Vermillion index	0.13	0.11	1.15	0.99	1.17	0.25
Hard deposits according to Greene-Vermillion index	-0.11	0.11	-0.22	0.22	-1.00	0.32
Silness&Loe index of gingival inflammation	-0.19	0.11	-2.15	1.22	-1.76	0.08

Discussion

The determination of the condition of the teeth was conducted and compared with the DMFT Index, which records the presence of carious, extracted and sealed teeth, between the two groups of examinees: students with primary dentition 6-10 years of age and students with permanent dentition of 11 -14 years.

The results of this study are presented in Tables 1, 1.1, and 1.2, from which it can be concluded that the value ($p < 0.001$) and the presence of DMFT index ($p < 0.001$) in pupils from 11-14 years is greater than the 6-10 years and the difference is statistically significant. This difference is considered to be due to the fact that this group has a mixed dentition, i.e. the presence of lactic dentition and the emergence of permanent teeth.

We found that the value of the DMFT index increases with increasing age. Our results do not coincide with those of Dhar et al.¹⁷, Gao et al.¹⁸ and Nalweyiso et al.¹⁹, but are correlated with the results of Mahesh et al.²⁰, Retnakumari et al.²¹, Prasai et al.²², Motohashi et al.²³, Shourie et al.²⁴, Holm AK²⁵, Bego et al.²⁶, Rajic et al.²⁷ and Juric et al.²⁸ which confirm that the DMFT index increases with age.

In the group of students from 6-10 years, the prevalence of the dmft index is 73.53%. In the group of students from 11-14 years, the prevalence of the DMFT index is 93.75%.

The high prevalence of the DMFT Index is considered to be a consequence of poor and inadequate oral hygiene, hygiene-dietary rhyme, eating habits and health education, as well as the health culture for taking measures for preventive health care.

The descriptive statistics of the DMFT index among students from 6-10 years of age in terms of gender in

Table 2.1 found that the value is significantly higher in males than in females. Our results coincide with those of Mahesh Kumar et al.²⁰, Gauba et al.²⁹ and Jose et al.³⁰ which indicate that boys have worse oral hygiene compared to girls, and are contradictory to those of Saha and Sarkar³¹ and Retnakumari²¹ who concluded that there was no statistically significant difference between the DMFT index in boys and girls of both groups. Graph 1 shows the relationship between the age of students of 6-10 years and the value of the DMFT index: namely, by increasing the age of the students in a year, the value of the DMFT index decreases. With increasing age, milk teeth are replaced and this contributes to the reduction of the DMFT index. The differences between the values of the DMFT index in terms of ethnicity of students Table 2.2 and 2.2.1 do not have statistical significance $p > 0.05$ ($p = 0.14$).

The results shown in Table 4 relate to the examined relationship between the DMFT Index as the dependent variable and the index of soft and hard deposits and the index of gingival inflammation as independent variables. For the examined relationship, a mean - strong significant correlation was established $p < 0.005$. The index of gingival inflammation, soft plaques is the most influential on the DMFT index, and the weakest is the influence of hard deposits.

These results confirm the harmful effects of microorganisms from dental plaque, not only on gingival health, but also on the condition of the dentition, that is, on the overall oral health.

Conclusion

The analysis of the obtained results from our clinical trials in the two groups of respondents, students from 6

to 10 years and from 11 to 14 years of different ethnic background from the Prespa region of the Republic of Macedonia, point to the following conclusions:

1. The prevalence of the DMFT index among all respondents showed high values. In the group of students from 6 to 10 years, the prevalence of the DMFT Index was 73.53%, and in the 11-14 age group, 93.75%, and the difference between them is statistically significant. The lower DMFT index in students from 6-10 years old is considered to be due to the process of replacing the primary with permanent teeth;
2. The presence of soft deposits and gingival inflammation have an impact on the DMFT index or, more precisely, on the condition of the dentition;
3. The analysis of the results of our research indicates the need for taking stronger measures for primary and preventive dental care among children of school age from rural settlements in the Prespa region of the Republic of Macedonia with mixed national affiliation.

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