

# DENTAL CARIES IN CORRELATION WITH LIFE STYLE AND HABITS

## КАРИЕСОТ ВО КОРЕЛАЦИЈА СО ЖИВОТНИОТ СТИЛ И НАВИКИ

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### Abstract

**INTRODUCTION.** Dental caries is a multifactorial disease. Sugar consumption, oral hygiene, quantity and composition of saliva, the presence of fluoride and other factors play a major role in its emergence. Everyone is at risk of dental caries, but children and adolescents above all. The majority of dental caries occurs in adults because the disease is cumulative. **AIM.** To determine the correlation of dental caries with lifestyle and habits. **MATERIAL AND METHOD.** We have examined 134 respondents aged over 6 years at the Dental Clinic "Jane Sandanski" Skopje. To realize the goal with the help of a questionnaire and dental examination, we noted the parameters DMF and OIH-index. **RESULTS.** The value of the DMF increases with age, ranging from 1.47 in the group from 6 to 12 years to 15.92 in the group over 51 years. In each age group, various risk factors have shown to be dominant. **CONCLUSION.** Health education and motivation of the entire population is needed. **KEY WORDS:** dental caries, risk factors, prevention.

### Апстракт

**ВОВЕД.** Кариесот е мултикаузално заболување. Во неговото настанување голема улога имаат конзумацијата на шеќери, оралната хигиена, количината и составот на плунката, присуството на флуор и други фактори. Секој е изложен на ризик од забен кариес, но децата и адолесцентите се најмногу изложени на ризик. Во поголем дел кариесот е присутен кај возрасните, затоа што ова заболување е кумулативно. **ЦЕЛ.** Да се утврди корелацијата на забниот кариес со животниот стил и навики. **МАТЕРИЈАЛ И МЕТОД.** Беа опфатени 134 испитаници на возраст над 6 години кои се обратиле на Дежурна стоматолошка служба „Јане Сандански“ Скопје. Целта ја реализиравме со помош на анкетен лист и стоматолошки преглед, ги нотиравме параметрите КЕП и ОИИ-индекс. **РЕЗУЛТАТИ.** Вредноста на КЕП индексот расте со возраста, почнувајќи од 1,47 во групата 6-12 години до 15,92 во групата над 51 година. Кај секоја возрасна група различни ризик фактори се покажаа како доминантни. **ЗАКЛУЧОК.** Потребна е едукација и мотивација на целокупното население. **КЛУЧНИ ЗБОРОВИ:** дентален кариес, ризик фактори, превенција.

### Introduction

Dental caries is still a major oral health problem in industrialized countries, affecting 60-90% of school-children and the vast majority of adults<sup>1</sup>. The prevalence of caries has increased steadily with the advance of civilization. The causes and mechanism for the formation of dental caries are well known. Several factors influence the formation of dental caries, including: diet, microorganisms, saliva, age, gender and genetic predisposition.

Under the influence of acids produced by cariogenic microorganisms in the dental plaque, when metabolizing sugars from food and beverages, demineralization of the enamel occurs. Demineralization counteracts the saliva with its buffering capacity; it is also a mineral reservoir that allows remineralization. These processes of dem-

ineralization and remineralization occur many times a day. When demineralization prevails, caries develops. The early manifestation of caries is in the form of a small stain of demineralized enamel, most often hidden in the fissures and pits of the teeth, or their approximate surfaces<sup>2</sup>.

When demineralization occurs frequently, and overcomes remineralization over months, it leads to cavity formation. The destruction of the enamel spreads to the softer and more sensitive part of the tooth - dentine. The weakened enamel without support is subjected to breaking, and gradually a cavity<sup>3</sup> is formed. Untreated dental caries causes pain, dental abscess, severe local and systemic infections, and tooth loss<sup>4</sup>. It reduces quality of life, limits activities at school, work and home, causing millions of lost hours away from school and work every

year, worldwide<sup>5</sup>. At the end of the last century, developed European countries and North America, having perceived the problem, started implementing preventive and prophylactic measures.

A decline in caries prevalence has been observed in many developed countries as a result of public preventive health measures, combined with lifestyle changes and improved care for their own health. Developed countries have put dental caries under control, which is not the case with developing countries where caries is still a major economic problem<sup>6</sup>.

## Aim

The purpose of this study was to determine the correlation between dental caries and lifestyle and habits. In the realization of our work the following conditions were observed among the respondents:

- Habits and oral hygiene situation
- Application of prophylaxis with fluoride at home
- Eating habits
- Habits to visit a dentist
- Dental health situation.

## Material and methods

The set goal was realized with the help of a questionnaire (children filled it with the help of parents) and dental examination of the teeth. 134 respondents from both sexes were included, aged 6 years onwards, who came to the Emergency Dental Service at the Clinic "Jane Sandanski" in Skopje, in the period from December 2018 until February 2019. For a more detailed interpretation of the results, respondents were divided into 5 groups depending on the age group: group 6-12 (43 respondents), group 13-20 (15 respondents), group 21-30 (31 respondents), group 31-50 (32 respondents) and a group over 51 (13 respondents). In total, we had 134 respondents.

The reviews were made in accordance with WHO recommendations.

As parameters of the test we noted:

- Klein - Palmer index (DMF – index),
- OHI (Oral Hygiene Index) - according to the Green-Vermillion method

## Results

The results of the survey and clinical research are shown in the following tables:

**Table 1.** DMF-Index Scores

Permanent teeth	6-12 years		13-20 years		21-30 years		31-50 years		Over 51 years		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Carious teeth	41	65%	104	58%	203	49%	134	31%	39	19%	<b>521</b>	<b>41%</b>
Teeth with filling	22	35%	53	30%	167	41%	190	44%	62	30%	<b>494</b>	<b>38%</b>
Extracted teeth	0	0%	21	12%	41	10%	105	25%	106	51%	<b>273</b>	<b>21%</b>
<b>Total</b>	<b>63</b>		<b>178</b>		<b>411</b>		<b>429</b>		<b>207</b>		<b>1288</b>	
DMF-index	1.47		11.87		13.26		13.41		15.92		9.61	

**Table 2.** OHI-Index values

Permanent teeth	6-12 years	13-20 years	21-30 years	31-50 years	Over 51 years	Total
		35	15	31	32	9
Total teeth surfaces	198	90	186	192	54	720
Points	350	141	296	267	76	1130
OHI-index	<b>1.8</b>	<b>1.6</b>	<b>1.6</b>	<b>1.4</b>	<b>1.4</b>	<b>1.6</b>

**Table 3.** Oral hygiene maintenance

RESPONDENTS	6-12 years		13-20 years		21-30 years		31-50 years		Over 51 years		Total	
	43	%	15	%	31	%	32	%	13	%	134	%

How often do you brush your teeth?

A	After every meal	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
B	Only in the morning	6	14%	1	7%	8	26%	8	25%	3	23%	26	19%
C	Only in the evening	11	26%	0	0%	1	3%	3	9%	1	8%	16	12%
D	In the morning and evening	12	28%	10	67%	15	48%	13	41%	7	54%	57	43%
E	Don't brush them every day	14	33%	4	27%	7	23%	8	25%	2	15%	35	26%

How long do you brush your teeth?

A	1 Minute	25	58%	8	53%	11	35%	13	41%	4	31%	61	46%
B	2-3 Minutes	15	35%	7	47%	16	52%	17	53%	9	69%	64	48%
C	Longer than 3 Minutes	3	7%	0	0%	4	13%	2	6%	0	0%	9	7%

Which additional tools for oral hygiene do you use?

A	1 Minute	1	2%	1	7%	7	23%	8	25%	1	8%	18	13%
B	2-3 Minutes	0	0%	1	7%	0	0%	1	3%	2	15%	4	3%
C	Longer than 3 Minutes	0	0%	6	40%	5	16%	4	13%	1	8%	16	12%
D	Dental floss	42	98%	7	47%	20	65%	22	69%	9	69%	100	75%

**Table 4.** Fluor Prophylaxis values

RESPONDENTS	6-12 years		13-20 years		21-30 years		31-50 years		Over 51 years		Total	
	43	%	15	%	31	%	32	%	13	%	134	%

Which fluoride supplements do you use?

A	Fluoride tooth paste	43	100%	15	100%	31	100%	32	100%	13	100%	134	100%
B	Fluoride rich tablets	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
C	Mouthwash with fluoride	0	0%	6	40%	5	16%	4	13%	1	8%	16	12%
D	Fluoride varnish and gels	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
E	Don't use fluoride supplements	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%

**Table 5.** Dietary habits values13

RESPONDENTS		6-12 years		13-20 years		21-30 years		31-50 years		Over 51 years		Total	
		43	%	15	%	31	%	32	%	13	%	134	%
A	2-3	18	42%	4	27%	14	45%	19	59%	9	69%	64	48%
B	3-5	25	58%	11	73%	15	48%	12	38%	4	31%	67	50%
C	6 or more	0	0%	0	0%	2	6%	1	3%	0	0%	3	2%

How often do you consume the following food products?

Fruit and fizzy drinks

A	Once a day	6	14%	5	33%	4	13%	4	13%	1	8%	20	15%
B	Many times a day	10	23%	3	20%	5	16%	5	16%	0	0%	23	17%
C	Once a week	3	7%	0	0%	3	10%	1	3%	1	8%	8	6%
D	Many times a week	7	16%	6	40%	7	23%	9	28%	1	8%	30	22%
E	Rarely or never	17	40%	1	7%	12	39%	13	41%	10	77%	53	40%

Cakes , chocolates

A	Once a day	12	28%	3	20%	9	29%	6	19%	2	15%	32	24%
B	Many times a day	20	47%	5	33%	4	13%	2	6%	0	0%	31	23%
C	Once a week	1	2%	2	13%	2	6%	5	16%	1	8%	11	8%
D	Many times a week	8	19%	5	33%	6	19%	15	47%	6	46%	40	30%
E	Rarely or never	2	5%	0	0%	10	32%	4	13%	4	31%	20	15%

Candies, lollipops

A	Once a day	0	0%	0	0%	0	0%	0	0%	1	8%	1	1%
B	Many times a day	6	14%	0	0%	2	6%	1	3%	3	23%	12	9%
C	Once a week	1	2%	2	13%	1	3%	0	0%	0	0%	4	3%
D	Many times a week	8	19%	3	20%	3	10%	0	0%	1	8%	15	11%
E	Rarely or never	28	65%	10	67%	25	81%	31	97%	8	62%	102	76%

Chips, snacks

A	Once a day	5	12%	0	0%	3	10%	4	13%	1	8%	13	10%
B	Many times a day	6	14%	2	13%	0	0%	1	3%	0	0%	9	7%
C	Once a week	3	7%	2	13%	2	6%	5	16%	0	0%	12	9%
D	Many times a week	16	37%	6	40%	10	32%	5	16%	1	8%	38	28%
E	Rarely or never	13	30%	5	33%	16	52%	17	53%	11	85%	62	46%

**Table 6.** Dentist visiting habit values

<b>RESPONDENTS</b>	6-12 years	13-20 years	21-30 years	31-50 years	Over 51 years	Total
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How often do you go to dentist?

A	Every 3 months	8	19%	0	0%	4	13%	4	13%	0	0%	16	12%
B	Every 6 months	1	2%	2	13%	2	6%	4	13%	1	8%	10	7%
C	Once a year	1	2%	0	0%	3	10%	2	6%	2	15%	8	6%
D	When needed	25	58%	6	40%	4	13%	6	19%	6	46%	47	35%
E	Only in case of a pain	8	19%	7	47%	18	58%	16	50%	4	31%	53	40%

If the answer of the previous question is D, what do you think the reason might be?

A	Fear	5	12%	5	33%	9	29%	8	25%	0	0%	27	20%
B	Financial condition	3	7%	2	13%	0	0%	1	3%	1	8%	7	5%
C	Lacking of dental knowledge	0	0%	0	0%	0	0%	1	3%	2	15%	3	2%
D	Not enough time	0	0%	0	0%	9	29%	6	19%	1	8%	16	12%

### DMF - INDEX

Table 1 shows the DMF-index score. In the first group we got the DMF 1.47, of these carious teeth 65%, teeth with fillings 35%, and extracted teeth 0%. In the second group (13-20 years) we received a DMF 11.87, of this caries 58%, teeth with fillings 30% and extracted teeth 12%. In group 21-30 years we noted the DMF was 13.26, from this carious teeth 49%, teeth with fillings 41% and extracted teeth 10%. In group 31-50 years we noted the value of DMF 13.41, of this 31% are carious teeth, teeth with fillings 44% and extracted teeth 25%.

In the last group over 51 years we noted the DMF was 15.92. Carious teeth were 19%, teeth with fillings 30% and extracted teeth 51%.

From the overall analysis of all respondents we received the DMF was 9.61. Carious teeth were observed in 41%, teeth with fillings in 38% and extracted teeth in 21% of the cases.

### OHI-INDEX

Table 2 shows the values of the OHI Index. We found the highest value in the group 6-12 years, namely OHI 1.8, then in the groups 13-20 and 21-30 years, we established the value of OHI index 1.6, and in the last two groups, that is, the group 31-50 years and over 51 years, the OHI index was 1.4. The total value of the index for all respondents was OHI 1.6.

### ORAL HYGIENE HABITS

Table 3 shows the results of the survey list for the maintenance of oral hygiene.

When patients were asked how often they brushed their teeth, none of the respondents from any group gave a response that they were brushing them after each meal. In group 6-12 years 33% (the largest percentage) reported that they do not brush their teeth every day, 28% in the morning and in the evening, only 26% in the evening and only 14% in the morning. In the other groups, the largest percentage reported that they brushed their teeth in the morning and in the evening, as follows: in group 13-20 years in the morning and in the evening 67%, do not brush every day 27% and 7% in the morning only; in group 21-30 years in the morning and in the evening 48%, in the morning only 26%, do not brush every day 23% and only 3% brush in the evening; in the group 31-50 years in the morning and in the evening brush their teeth 41%, do not brush every day 25%, the same percentage answered only in the morning, and only in the evening 9%; in the group over 51 years in the morning and in the evening brush 54%, in the morning only 23%, not every day 15% and only in the evening 8%.

The total score is as follows: in the morning and in the evening 43%, not every day 26%, only in the morning 19% and only in the evening 12%.

When asked how long they brushed their teeth, most of the first two groups replied 1 minute, as follows: in the group 6-12 years: 1 minute 58%, 2-3 minutes 35%, longer than 3 minutes 7%; in the group of 13-20 years, 1 minute 53% and 2-3 minutes 47%.

In the other groups, the biggest percentage responded 2-3 minutes, as follows: in the group of 21-30 years: 2-3 minutes 52%, 1 minute 35%, longer than 3 minutes 13%; in the group 31-50 years: 2-3 minutes 53%, 1 minute 41%, longer than 3 minutes 6%; in the group over 51 years: 2-3 minutes 69%, 1 minute 31%.

The total results are: 2-3 minutes 48%, 1 minute 46%, longer than 3 minutes 7%.

On the question which additional tools for oral hygiene they use, the highest percentage in all groups responded that they do not use additional tools. The overall results are as follows: additional tools do not use 75%, dental floss use 13%, mouth rinse 12% and interdental brushes 3%.

### FLUOR PROPHYLAXIS

From the Fluor prophylaxis table 4, it is evident that 100% of the respondents answered that they use a tooth paste with fluoride. Of the remaining fluoride supplements, only fluoride mouth rinse was listed by 12% of the subjects. No one uses fluoride tablets and fluoride varnish and gels.

### DIETARY HABITS

Table 5 presents the results for dietary habits. When asked how many meals they have during the day, the largest percentage of respondents in the first three groups reported that they had 3-5 meals per day. In the other two groups, most respondents reported having 2-3 meals a day. The overall result shows: 50% had 3-5 meals a day, 48% had 2-3 meals a day, and only 2% had 6 or more meals a day.

In terms of sweet food products, fruit and fizzy juices are most commonly consumed by respondents in the group of 13-20 years, as follows: 40% consume them many times a week, 33% once a day, 20% more times a day, and 7% respond rarely or never.

The total score of all groups shows: 40% rarely or never, 22% more times a week, 17% more times a day, 15% once a day and 6% once a week.

Cakes and chocolates are most commonly consumed by the respondents from the first two groups. The largest percentage of them, 47% of the group 6-12 years and 33% of the group 13-20 years, answered several times a day.

The overall result is as follows: 30% more times a week, 24% once a day, 23% more times a day, 15% rarely or never and 8% once a week. The candies and lollipops are more frequently consumed by the respondents in the first and last group compared to the other groups.

However, in all groups, the largest percentage reported that they are consuming rarely or never.

The total score shows: 76% rarely or never, 11% more times a week, 9% many times a day, 3% once a week and 1% once a day.

Chips and snacks are more likely consumed by the respondents from the first two groups than others. Most of them answered several times a week.

The total score shows: 46% rarely or never, 28% many times a week, 10% once a day, 9% once a week and 7% many times a day.

### DENTIST VISITING HABIT

Table 6 shows the results from the Dentist visiting habits. The first two groups of respondents visit the dentist more regularly, in both groups, most of them responded that they go if needed (these are in the stage of treating decayed teeth).

In the 6-12 year group, 58% go if needed, 19% every 3 months, and the same percentage answered only in case of pain, 2% every 6 months and the same percentage answered once a year. In the group over 51, 46% answered if needed, 31% in the case of pain, 15% once a year and 8% at 6 months. In the other groups, most of them responded that they go to the dentist only in case of pain. In the group of 13-20 years, 47% go only in case of pain, 40% when needed, and 13% at 6 months. In the group of 21-30 years, 58% go only in case of pain, 13% when needed and the same percentage answered at 3 months, 10% once a year and 6% at 6 months. In the 31-50 age group, 50% they go only in case of pain, 19% when needed, 13% every 3 months and the same percentage at 6 months, 6% once a year. The total score shows: 40% only in case of pain, 35% when needed, 12% every 3 months, 7% every 6 months and 6% once a year.

When we asked patients, who go to the dentist only in case of pain (40%), what is the reason for this, half of them (20%) answered that the cause is fear, 12% stated the reason not having enough time, 5% answered financial situation and 2% answered lack of dental knowledge.

### Discussion

In this study, we obtained a statistically significant difference in the values of the DMF Index between the group 6-12 years (DMF 1.47) and the remaining groups:

group 13-20 years (DMF 11.87), group 21-30 years (DMF 13.26), group 31-50 years (DMF 13.41) and a group over 51 years (DMF 15.92). We can notice that with the age the value of the DMF index increases. The D (decay) component of the DMF index is dominant in the respondents up to 30 years, the F (filling) component is dominant in the respondents from 31-50 years, while in the group over 51, the E (extraction) component is in the lead. These results are similar to a study involving 26 countries around the world, which studied the differences in the caries level between 12-year-olds and 35-44 year-old people. Much higher levels of caries occurred in adults than in children in all 26 countries. Whereas the DMFT in 18 of the 26 countries had levels below 1.5 at 12 years of age, 14 of those with such low scores for children had DMFT levels above 10 at 35-44 years<sup>7</sup>.

By the respondents from 6-12 years of age we received the DMF 1.47 with no extracted permanent teeth, which is really encouraging data. However, we received disappointing results from the questionnaire and from the examination of oral hygiene (OHI 1.8).

FDI (World Dental Association) recommends brushing the teeth 2 times a day<sup>8</sup>. In our study, as many as 72% of children in this group do not brush frequently enough, with a high proportion of those who replied that they do not brush every day which is 33%.

FDI recommends that the duration of brushing should be 2-3 minutes<sup>8</sup>.

Most of the respondents in this group or 58% reported that they brush their teeth for 1 minute.

Most of them (98%) do not use additional oral hygiene tools, and no one has stated that they use any fluoride supplements at home, except toothpaste.

From the results about the dietary habits we can see that they often consume cakes and chocolates, and 47% of them consume them many times a day.

The data obtained for the oral hygiene and dietary habits are correlated with the high value of the OHI - index.

Regarding to how often they go to the dentist, 58% responded if needed (in the process of treating the decayed teeth), which can be taken as a positive result.

Compared with the habits of these respondents, we received a low value on the DMF index. This group of children is included in the Strategy for prevention of oral diseases in children from 0-14 years, introduced in our country in 2008. This strategy, besides educational programs in kindergartens and schools, include obligatory regular dental examinations, sealants for permanent teeth and local fluoride supplements<sup>8</sup>. In the future, if bad habits are not eradicated, we can expect a significant increase in the value of the DMF index, since we do not protect the proximal surfaces of the teeth with sealants.

The results that we have obtained in the group of 13-20 years were DMF 11.87 and OHI 1.6. Although a rather large percentage (67%) answered that they brush their teeth in the morning and in the evening, this does not support the high values of the OHI and the DMF index, which can be partly due to the short duration of the brushing, i.e. 53% answered 1 minute. The dental floss as additional tool for oral hygiene that removes the plaque from the proximal surfaces of the teeth is used by only 7%. Observational studies have shown that individuals using dental floss have lower levels of caries and gingival inflammation<sup>9</sup>.

Recently, additional tools for oral hygiene such as mouth rinses that contain fluoride have been implemented and 40% of the patients reported that they use them.

This group stands out from the rest with frequent consumption of juices. In one study, the association of the frequency of consuming sweetened drinks with carious growth was investigated in adults over a period of 4 years. It has been proven that adults drinking sweetened drinks 1-2 times and 3 or more times a day, had respectively 31% and 33% greater net DMFT increments than those not drinking any sweetened drinks<sup>10</sup>. A typical example of the strong cariogenic potential of the sweetened drinks is the occurrence of baby bottle caries by children fed with a baby bottle<sup>8</sup>.

Concerning to how often they go to a dentist, as many as 47% answered only in case of pain, most of them explained that the main reason for that is fear. This data is in favor of the high value of the DMF-Index.

The results of the survey list for groups 21-30 years and 31-50 years show a great similarity. A great similarity is also perceived in the values of the DMF and OHI index in these groups (group 21-30 years – DMF 13.26 and OHI 1,6, group 31-50 years – DMF 13,41 and OHI 1,4). About half of the respondents maintain oral hygiene regularly, the percentage of those who use additional tools for oral hygiene is small. Dental floss, as widely recommended tool for removing dental plaque from the proximal tooth surfaces<sup>11</sup>, is used by 23% of the group 21-30 years and 25% of the group 31-50 years.

Regarding the diet, we noted that cariogenic foods are used less often in these two groups compared to the previous two groups.

Regarding the habit of visiting a dentist, in these two groups, in comparison with the rest, we received the highest percentages with the answer that they go only in case of pain, and the fear and lack of time are almost equally mentioned as the reason for this. This goes in favor of the high value of the DMF - Index. We noted that with the rapid pace of living, work and family obligations, people have less time to visit a dentist, which significantly affects their oral health. Many of them do

not attach great importance to dental health; young people are easily opting for extraction.

On the other hand, dental anxiety proved to be an important indicator of poor dental and periodontal status<sup>12</sup>. The prevention of pain and discomfort combined with the correct psychological attitude of the dental team to the patient is the basis for success in overcoming fear<sup>13</sup>.

From the survey list in the group over 51 we noticed that the respondents are conducting regular oral hygiene, very few of them use additional tools for oral hygiene. The respondents in this group appear as the most common consumers of candy compared to the rest. Salivary flow is often diminished in this population and by taking candies; they try to relieve the feeling of dry mouth. Chronic periodontitis often present in this population leads to stripping of the teeth roots, and increased mobility. The teeth mobility, as well as their reduced number is the reason for consuming soft foods. This is the reason for frequent occurrence of cervical caries and root caries of the tooth<sup>14</sup>.

With this study we once again proved that caries is a multifactorial disease that commonly affects people of all ages, throughout their lifetimes, which through interacting with food, dental plaque and microorganisms over a long period of time leads to an irreversible destruction of the hard tooth substance<sup>15</sup>.

## Conclusion

Health education and motivation of the entire population is needed (pregnant women, young children, pre-school children, school children, adults, parents, educators, and teachers).

Only in this way we can expect an improvement in oral health.

## Reference

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