

PRESENCE OF CARIES WITH DIFFERENT LEVELS OF ORAL HYGIENE

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Abstract: The objective of this abstract is to examine the presence of caries in the adult population with different levels of oral hygiene; to examine the concentration of Streptococcus Mutans in saliva of patients with different levels of oral hygiene; to examine the correlation among Streptococcus Mutans, caries and level of oral hygiene.

This examination was made on 50 (fifty) patients, both male and female, at the age of 20 to 65.

The examinees were split into 5 groups.

The examinations and sampling were done randomly at the Department of Cariology and Endodontics at the Faculty of Dental Medicine in Skopje.

The microbiological researches were made at the Institute of Microbiology and parasitology at the Faculty of Medicine in Skopje.

The examination of all patients was made according to a unique methodology.

The results obtained indicate that the Plaque index level and the number of Streptococcus Mutans in saliva (CFU) are correlated to the number of carious teeth in all age groups except for Group V (61–65) where the Plaque index level and the level of Streptococcus Mutans in saliva were much higher compared to the number of carious teeth (51–99 and >100 CFU), particularly for examinees with prosthesis.

Initial enamel caries was dominant in patients up to the age of 50, and for those older than 50 surface root caries was dominant.

Initial caries was present in 28.62% of Group I and was 5.66% in Group V, unlike the root surface caries in Group 1, with 1.14%, and Group 5 with 28.30%.

Key word: Oral hygiene, caries, streptococcus mutans, plaque index.

Introduction

The effects of the measures for oral hygiene and occurrence of caries are still an actual issue. The level of oral hygiene and the level (concentration) of Streptococcus Mutans in saliva are frequently correlated with the occurrence of dental caries.

Emilsson & Krasse [8] and Loeche [11] consider Streptococcus Mutans as the main agencies in the caries etiopathogenesis of human caries and experimental animals.

Researches made by Ziexert and Krasse [16] point out that the presence and number of Streptococcus Mutans in saliva represent a risk of the development of dental caries. The number of Streptococcus Mutans in saliva can be used as an indicator in the evaluation of the development and risk of dental caries.

The increased number of Streptococcus Mutans in saliva is also in direct correlation with their colonization of teeth and their relation to dental plaque [15].

In 1994 and 2001 researches were also made at the Cariology and Endodontics Department at the Faculty of Dental Medicine in Skopje into the correlation among the bacterial diagnosis of caries masses, the saliva and the primary bacterial implantation on a clinically healthy enamel surface and the role of Streptococcus Mutans and Lactobacillus in the etiopathogenesis of caries. [1, 2, 3, 4, 10]

Almost all of the research into Streptococcus Mutans and caries has been made on groups of young individuals, whereas data about the adult population are rare.

Disregarding the level (concentration) of Streptococcus Mutans, the research data prove that the number of caries lesions per tooth in the adult population is rather higher. Explanations of these data point to the following: gingival recession, lowered saliva secretion, motor function of the masticatory system, wearing a dental prosthesis, poor oral hygiene and inordinate dental examination.

The objective of this abstract is to confirm or deny the opinion on the connection and relation of the various levels of oral hygiene, Streptococcus Mutans and caries.

Aim

The aim of this abstract is to examine the presence of caries in the adult population with different levels of oral hygiene; to examine the concentration of Streptococcus Mutans in saliva of patients with different levels of oral hygiene; to examine the correlation among Streptococcus Mutans, caries and the level of oral hygiene.

Materials

This examination was made on 50 (fifty) patients, both male and female, at the age 20 to 65.

The examinees were split into 5 groups:

Group 1 : 10 patients (examinees) at the age 20 to 30;

Group 2 : 10 patients (examinees) at the age 31 to 40;

Group 3 : 10 patients (examinees) at the age 41 to 50;

Group 4 : 10 patients (examinees) at the age 51 to 60;

Group 5 : 10 patients (examinees) at the age 61 to 65.

The examinees and sampling was made randomly at the cariology and Endodontics Department at Faculty of Dental Medicine in Skopje.

The microbiological research was made at the Institute of Microbiology and Parasitology at the Faculty of Medicine in Skopje.

Method and Technique

The examination of all patients was made according to a unique methodology.

The diagnosis of caries lesions was made clinically (with a mirror and probe) and with X-rays.

Clinically, initial caries lesion was considered to be in cases when the probe stuck in the dental substance (enamel) at low pressure and needed a certain effort to pull and take it out.

White chalky stains on the enamel surface layer were also considered as initial caries, but with no surface damage in the form of a cavity when examined with a probe.

Root caries was also determined as a cavity or softened surface where the probe easily passed with light pressure of the finger.

X-ray and graphic diagnosis was made according to the Gröndagl H.G. system [9].

Damage to the enamel over the dental dentine borders was also considered as initial caries, whereas damage which reached the dentine was considered as manifested caries.

Damage to the root was registered by X-rays as root caries, i.e. when the apical border of the damage was located on the dental root or when there was no dental substance under the cement-enamel juncture.

The concentration of *Streptococcus Mutans* was diagnosed according to Köler & Brathall's 'spatula' method [12].

The material was taken with a sterile wooden spatula which spanned the tongue immediately after a 2-minute stimulation of saliva secretion chewing paraffin. Then the spatula was taken out with lips closed in order to remove the excess saliva. After taking the material (contaminated spatula), we pressed on an agar plate with Mitis Salivarius agar (MSB) with 15% sucrosis and 3.3% mgr/l selective bacitracine for *Streptococcus Mutans*. Counting the colonies was made after 48 hours' incubation of the basis.

The assessment of the *Streptococcus Mutans* was done on the basis of a previously determined standardized (CFU) surface of 1.5 cm² which matches >10⁶ *Streptococcus Mutans* in ml saliva.

All the *Streptococcus* which grew on the selective (MSB) agar were evaluated as *Streptococcus Mutans*, no matter their type: *Streptococcus Mutans*, *Streptococcus Ratus*, *Streptococcus Sabrinus*, or *Streptococcus ferus*.

The assessment of the dental plate for oral hygiene was evaluated according to Silness & Loes's method with a dental count [14]. When there was no tooth, the closest tooth was used or the tooth opposite the lateral side. According to the observations, we evaluated the average value of the Plaque Index (Pl.I) for each patient (examinee).

We made an analysis of the multiple regression for examination of the relation among the carious teeth. The age and the number of carious teeth were included in the analysis. We summarized the multiple correlation and the coefficient of the partial correlation. The partial correlation considers the correlation among each pair of variables, whereas the value of the other variables is constant.

Results

The results from the research are shown in Tables and Figures.

993 teeth and 50 samples of Saliva mixta from 50 patients (examinees) were statistically processed. The concentration of Streptococcus Mutans was evaluated according to Köhler & Bratthall's (1973) 'spatula method'.

The evaluation of Streptococcus Mutans was made on the basis of previously determined standardized (CFU) surfaces of 1.5 cm² which equals > 10⁶ Streptococcus Mutans in ml saliva.

The evaluation of the dental plate for oral hygiene was evaluated according to Silness & Loe's method of counting the number of teeth.

Manifold regression analysis was made when examining the relation among the number of carious teeth, Streptococcus Mutans and Plaque index.

In Table 1 we can see the number of examinees, with fixed and mobile prostheses or without any.

In Table 2 we can see the presence / frequency of the caries in patients who had or did not have a prosthesis (average value A + B + C) in relation to the patients of examined present teeth (N) in the group.

In Table 3 we can see the average number of carious teeth in correlation to the number of Streptococcus Mutans in the saliva (CFU) of examinees, without (A) of with prosthesis (B).

In Figure 1, we can see the presence of the initial enamel caries on the root surface on the dental root and the dentin of the examined groups.

In Figure 2 we can see a graphic presentation of the level of Streptococcus Mutans in saliva, the number of carious teeth and the level of oral hygiene (Plaque index) of all the examined groups.

We used Fisher's exact test for statistical processing of the data.

Table 1

Number of examinees with (fixed or mobile) or without prostheses

Age	Number of examinees	Without prosthesis (A)	With prosthesis		Total
			Fixed (B)	Mobile (C)	
20–30	10	10	0	0	10
31–40	10	8	2	0	10
41–50	10	6	3	1	10
51–60	10	4	3	3	10
61–65	10	1	4	5	10
Total	50	29	12	9	50

Of 50 patients (examinees), 29 did not have a prosthesis (A), 12 had a fixed prosthesis (B) and 9 had a mobile-movable prosthesis (C).

Table 2

Presence – frequency of caries in patients without or with prosthesis (average value A + B + C) in relation to the examined present teeth (N) in the group

CARIES FREQUENCY												
Age of the group	Examinees	Number of teeth (N)	Initial enamel on root surface								TOTAL	
			(A)	(B)	(C)	%	(A)	(B)	(C)	%	(A+B+C)	%
20–30	10	262	75	–	–	28,62	3	–	–	1,14	78	29,77
31–40	10	238	47	14	–	25,63	4	5	–	3,78	70	29,41
41–50	10	193	23	16	3	21,76	6	9	4	9,85	61	31,60
51–50	10	184	8	5	2	8,15	18	11	13	22,82	57	30,97
61–65	10	106	2	3	1	5,66	4	8	18	28,30	36	33,96
Total	50	993	155	38	6	20,04	35	33	35	10,37	302	30,41

The caries frequency in examinees with or without a prosthesis was variable. It was more common in those patients who had a prosthesis compared to those who had not.

In Group 1 (20–30) clinical and X-rayed caries was determined in 78 teeth (75 initial or 28.62% + 3 on the root or 1.14%) out of 262 present teeth or a total of 29.76%.

In Group 2 (31–40) in 70 (61 + 9) out of 238 teeth (29.71%).

In Group 3 (41–50) in 61 (42 + 19) out of 193 teeth (31.60%).

In Group 4 (51–60) in 57 (15 + 42) out of 184 teeth (30.97%).

In Group 5 (61–65) in 36 (6 + 30) out of 106 teeth (33.96%).

Initial enamel caries is dominant in the age groups up to 50 years whereas for those above the age of 50 root surface and dentine caries dominate.

The level of *Streptococcus Mutans* in saliva (0,1–10, 11–50, 51–99 and > 100 CFU) in the examinees up to 50 years is in correlation to the number of carious teeth, and for the examinees older than 50 it increases (51–99 and > 100 CFU) in those with prostheses, and is much greater in comparison with the others.

Table 3

Average number of carious teeth in correlation to the number of streptococcus mutans in saliva (CFU) in examinees without (A) or with prosthesis (B + C)

Age of group	Examinees	Number of caries teeth A+B+C	Number of Streptococcus Mutans (CFU)									
			0		1-10		11-50		51-99		> 100	
			A	B+C	A	B+C	A	B+C	A	B+C	A	B+C
20-30	10	78	1	-	3	-	4	-	2	-	-	-
31-40	10	70	1	-	2	-	3	-	2	1	-	1
41-50	10	61	-	-	-	-	3	1	2	1	1	2
51-60	10	57	-	-	-	-	1	2	1	3	1	2
61-65	10	36	-	-	-	-	-	2	1	3	-	4
Total	50	302	2	-	5	-	11	5	8	8	2	9

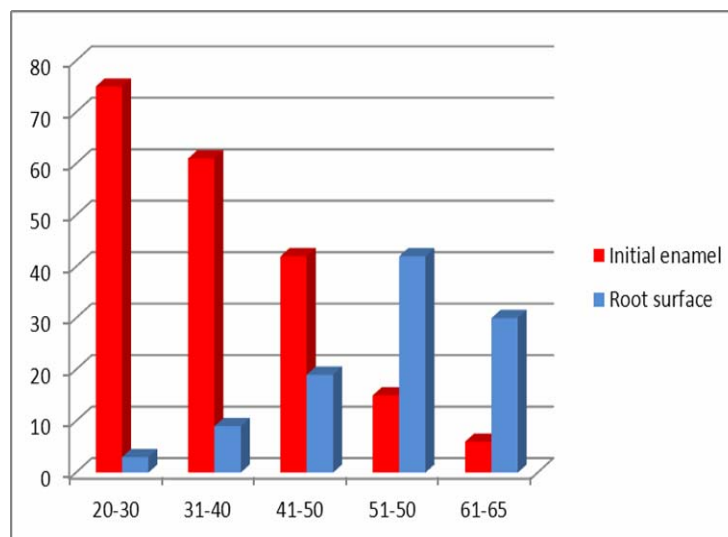


Figure 1 – Correlation between initial enamel caries and caries on the dental root in examinees of different age groups

Initial enamel caries is dominant in the patients up to 50 years, whereas root surface and dentine caries is dominant in those older than 50.

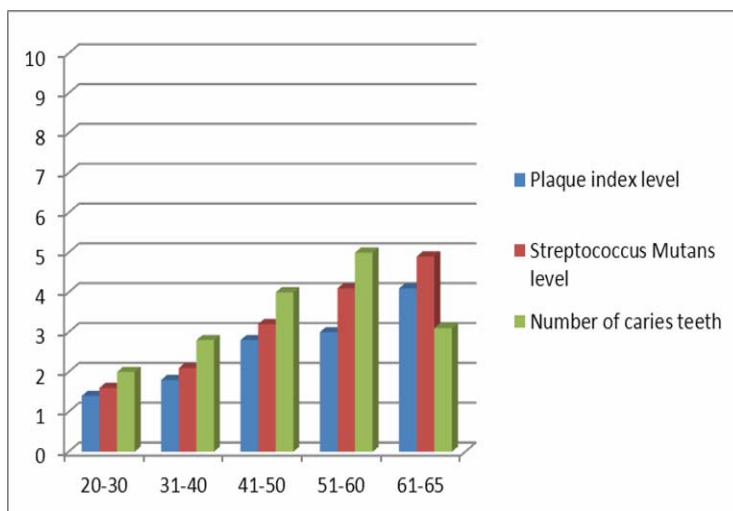


Figure 2 – Correlation among the plaque index, the level of streptococcus mutans in saliva and the number of carious teeth in examinees in different age groups

The level of the Plaque index (Silnes & Loe) and the number of Streptococcus Mutans in saliva (CFU) on a surface of 1.5cm² which coincides > 10⁶ Streptococcus Mutans in ml saliva, is in correlation to the number of carious teeth in all age groups except for Group 5 (61–65), where the level of Plaque index and the Streptococcus Mutans level are much higher in relation to the carious teeth, which is most probably because of the huge number of examinees with fixed (B) or mobile (C) prostheses, 8 out of 10.

Discussion

The effect of measures for oral hygiene and the appearance of caries still represent an actual issue today.

The level of oral hygiene (Plaque index) and the level (concentration) of Streptococcus Mutans in saliva are frequently in correlation to the appearance of teeth caries [15].

Almost all the research into Streptococcus Mutans and caries has been done on groups of young patients, whereas data for the adult population are rare.

The objective of this abstract was to examine the frequency of caries in the adult population with different levels of oral hygiene.

The same methodology was applied when diagnosing the examinees.

The same person made the diagnosis of the caries lesion (clinically and X-rays).

The concentration of *Streptococcus Mutans* was evaluated with Köhler & Bratthall's 'spatula method' [12], and the evaluation of *Streptococcus Mutans* was made on the basis of a previously determined standardized (CFU) surface of 1.5 cm² which corresponds to $> 10^6$ *Streptococcus Mutans* in ml saliva. The evaluation of dental plaque on oral hygiene was made according to Silness & Loe's method by counting the number of teeth. [14]

Analysis with multiple regression was made for the evaluation of the relation between the number of carious teeth, *Streptococcus Mutans* and the Plaque index.

The research results point to the fact that the presence of caries frequency in the examinees with and without prostheses is different. Caries was more present with those with a prosthesis compared to the others.

Initial enamel caries was dominant in the patients up to 50 years, whereas caries on the tooth surface was dominant in those older than 50 (Table 2). This was particularly expressed in Groups 1 and group 5.

In Group 1 (20–30) initial caries was present in 28.62% and in Group 5 (61–65) in 5.66%. With respect to root surface caries, in group 1 it was 1.14% and in Group 5 it was 28.30%.

Of the 993 examined teeth of patients divided into five groups, caries was diagnosed clinically and by X-ray on 302 teeth or 30.40%. Initial caries was found on 199 teeth, or 20.04%, and root surface caries on 103 teeth, or 10.37%.

The Plaque index level and the number of *Streptococcus Mutans* in saliva (CFU) on a surface of 1.5 cm², which equals $> 10^6$ *Streptococcus Mutans* in saliva, is in correlation to the number of carious teeth in all age groups except Group 5 (61–65), where the Plaque index level and the level of *Streptococcus Mutans* in saliva was much greater in relation to the carious teeth. It is our consideration that this was because most of the examinees in this group had fixed or mobile prostheses (8 to 10).

The level of *Streptococcus Mutans* in saliva (0,1–10, 11–50, 51–99 and > 100 CFU) in the examinees up to the age of 50 is in correlation to the number of carious teeth, and in the examinees older than 50 it increases (51–99 and > 100 CFU), particularly in those with a prosthesis (Figure 2).

The results obtained for the level of oral hygiene (Plaque index), the concentration–number of *Streptococcus Mutans* in saliva (CFU) and the dental caries in the examinees from all five groups are almost identical with the research done by Salonen L., Bratthall D., and Hellden, [13] which refers to the

correlation of Streptococcus Mutans, oral hygiene and dental caries in the adult population in Sweden.

Conclusion

The objective of this abstract was to confirm or deny the opinion concerning the connectivity and correlation of oral hygiene (Plaque index), Streptococcus Mutans and caries.

The results obtained indicate that the Plaque index level and the number of Streptococcus Mutans in saliva (CFU) are in correlation to the number of carious teeth in all age groups except Group 5 (61–65), where the Plaque index level and the level of Streptococcus Mutans in saliva were much higher compared to the number of carious teeth (51–99 and > 100 CFU), particularly in examinees with prostheses.

Initial enamel caries was dominant in patients aged up to 50, and in those older than 50 the surface root caries was dominant.

The initial caries in Group 1 was present at 28.62%, and in Group 5 it was 5.66%, unlike the root surface caries in Group 1 at 1.14% and 28.30% in Group 5.

1. The controversial question about the correlation of oral hygiene, Streptococcus Mutans and teeth caries still remains an actual issue. The contribution of this research is modest, especially if we take into account the small number of examinees [50]. However, we had a great wish to make our contribution regarding this topic, which has lately been given much greater attention.

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Резиме

**ПРИСУСТВО НА КАРИЕС КАЈ РАЗЛИЧНИ НИВОА
НА ОРАЛНА ХИГИЕНА****Апостолска С.¹, Рендова В.¹, Ивановски К.²,
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Апстракт: Целта на трудот е да се испита застапеноста на кариесот кај возрастното население со различно ниво на орална хигиена; да се испита концентрацијата на мутанс стрептококите во плунката, кај испитаници со различно ниво на орална хигиена и да се испита корелацијата помеѓу концентрацијата на мутанс стрептококите, кариесот и нивото на оралната хигиена.

Испитувањето е вршено на 50 пациенти (испитаници) од двата пола на возраст од 20 до 65 години.

Испитаниците беа поделени во 5 групи.

Изборот на пациентите и земањето на примероците беше извршено на Клиниката за болести на заби и ендодонтија на Стоматолошкиот факултет во Скопје, по случаен избор.

Микробиолошкото испитување извршено е на Институтот за микробиологија и паразитологија на Медицинскиот факултет во Скопје.

Испитувањето на сите испитаници беше вршено по иста методологија.

Добиените резултати укажуваат дека нивото на плак индексот и бројот на мутанс стрептококите во плунката (CFU), се во корелација со бројот на кариозните заби кај сите старосни групи освен кај петтата (61–65), каде што нивото на плак индексот и нивото на мутанс стрептококите во плунката се многу повисоки во однос на бројот на кариозните заби (51–99 и > 100 CFU), особено кај испитаниците со протези.

Кај старосните групи до 50 години доминираше иницијалниот – глеѓниот кариес, а кај оние над 50 години кариесот на површината на коренот на забот.

Иницијалниот кариес кај првата група, беше застапен со 28,62%, а кај петтата група со 5,66%, за разлика од кариесот на површината на коренот кај кој првата група беше застапена со 1,14% а кај петтата со 28,30%.

Клучни зборови: Орална хигиена, кариес, streptococcus mutans, plaque index.

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