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*The activity of dental caries in students of the Faculty of Dentistry,  
the study with the use of microbiological and biochemical  
tests (Dentocult SM)*

Contemporary theories state that dental caries is a non-specific infectious process. Its origin and development are connected with the presence of *Streptococcus mutans* and *Lactobacillus acidophilus* bacteria in the mouth. The analysis of the bacterial level in saliva may have clinical significance in planning the treatment and qualifying patients for dental caries prevention procedures. The use of Dentocult SM may reveal *Streptococcus mutans* not only in saliva but also in plaque on the surface of teeth, serving to assess the risk of caries on exposed surfaces of roots, contact or chewing surfaces (1, 2). This microorganism is considered to be responsible for starting the process of caries.

In the recent years one may observe an increased interest in research on the risk of caries prevalence in the population of children up to 12 years old (3, 4, 5, 6).

The aim of the study was to assess the risk of caries in students of dentistry with the use of standard tests Dentocult SM.

#### MATERIAL AND METHODS

The study included 66 stomatology students, 30 men and 36 women, aged 20–25, who had not taken antibiotics in the previous month and had not rinsed the mouth with anti-septic mouthwashes. The examinations were performed using a mirror and probe in artificial light. Dental state was assessed by using average numbers of DMF, DMF<sub>s</sub> and D<sub>s</sub>

(the number of surfaces with active caries at the present moment). In order to determine the number of *Streptococcus mutans* bacteria in saliva a standard medium from SM Strip-Mutans set was used. This test was performed as follows:

1. A bacitracin tablet was dissolved in a liquid medium for bacteria 10 minutes before the start of the examination. This selectively inhibits development of all other bacteria except *Streptococcus mutans*.

2. Secretion of saliva was stimulated by a paraffin tablet.

3. A plastic test strip was inserted into the mouth and turned 10 times in saliva gathered on the tongue or under it. Test strips were placed in a medium prepared before and were incubated at the temperature of 37 degrees for 48 hours.

4. The results were read and the colony density on the strip was compared with the standard provided by the company. The values of Dentocult SM test were presented

Tab. 1. Correlation between *Streptococcus mutans* class and DMF

SM class	Number of examined people	DMF		Total
		<= 14	> 14	
0	Number of examined people	7	3	10
	% of examined people	70.0	30.0	100.0
	% of whole examined group	10.3	4.4	14.7
1	Number of examined people	11	4	15
	% of examined people	73.3	26.7	100.0
	% of whole examined group	16.2	5.9	22.1
2	Number of examined people	14	15	29
	% of examined people	48.3	51.7	100.0
	% of whole examined group	20.6	22.1	42.6
3	Number of examined people	8	6	14
	% of examined people	57.1	42.9	100.0
	% of whole examined group	11.8	8.8	20.6
Total	Number of examined people	40	28	68
	% of examined people	58.8	41.2	100.0
	% of whole examined group	58.8	41.2	100.0

Value of Dentocult SM test

Class 0:  $0-10^3$  CFU/ml, Class 1:  $10^3-10^5$  CFU/ml; Class 2:  $10^5-10^6$  CFU/ml.

Class 3:  $>10^6$  CFU/ml.

$\text{Chi}^2 = 3.168$ ;  $p = 0.366$ .

as classes: Class 0: 0–10<sup>3</sup> CFU/ml, Class 1: 10<sup>3</sup>–10<sup>5</sup> CFU/ml, Class 2: 10<sup>5</sup>–10<sup>6</sup> CFU/ml, Class 3: >10<sup>6</sup> CFU/ml.

Class 2 shows a high probability of danger, class 3 – a high risk of dental caries (7, 8). The obtained results underwent statistical analysis to investigate the relationship between SM and DMF, DMF<sub>S</sub>, D<sub>S</sub>. DMF was divided into two categories: DMF ≤ 14 and DMF > 14, DMF<sub>S</sub> was considered as either DMF<sub>S</sub> ≤ 25 or DMF<sub>S</sub> > 25, D<sub>S</sub> ≤ 3 and D<sub>S</sub> > 3. In statistical analysis chi-square test was applied. 5% risk of conclusion error was assumed in the study. The results of the examinations were juxtaposed in tables and graphically illustrated.

Tab. 2. Correlation between *Streptococcus mutans* class and DMF<sub>S</sub>

SM class	Number of examined people	DMF <sub>S</sub>		Total
		< = 25	> 25	
0	Number of examined people	8	2	10
	% of examined people	80.0	20.0	100.0
	% of whole examined group	11.8	2.9	14.7
1	Number of examined people	11	4	15
	% of examined people	73.3	26.7	100.0
	% of whole examined group	16.2	5.9	22.1
2	Number of examined people	15	14	29
	% of examined people	51.7	48.3	100.0
	% of whole examined group	22.1	20.6	42.6
3	Number of examined people	7	7	14
	% of examined people	50.0	50.0	100.0
	% of whole examined group	10.3	10.3	20.6
Total	Number of examined people	41	27	68
	% of examined people	60.3	39.7	100.0
	% of whole examined group	60.3	39.7	100.0

Value of Dentocult SM test

Class 0: 0-10<sup>3</sup> CFU/ ml, Class 1: 10<sup>3</sup>-10<sup>5</sup> CFU/ ml; Class 2: 10<sup>5</sup>-10<sup>6</sup> CFU/ ml; Class 3: >10<sup>6</sup> CFU/ ml.

Chi<sup>2</sup> = 4.197; p = 0.241.

Tab. 3. Correlation between *Streptococcus mutans* and D<sub>s</sub>

SM class	Number of examined people	D <sub>s</sub>		Total
		<= 3	> 3	
0	Number of examined people	8	2	10
	% of examined people	80.0	20.0	100.0
	% of whole examined group	11.8	2.9	14.7
1	Number of examined people	12	3	15
	% of examined people	80.0	20.0	100.0
	% of whole examined group	17.6	4.4	22.1
2	Number of examined people	19	10	29
	% of examined people	65.5	34.5	100.0
	% of whole examined group	27.9	14.7	42.6
3	Number of examined people	7	7	14
	% of examined people	50.0	50.0	100.0
	% of whole examined group	10.3	10.3	20.6
Total	Number of examined people	46	22	68
	% of examined people	67.6	32.4	100.0
	% of whole examined group	67.6	32.4	100.0

Value of Dentocult SM test

Class 0:  $0-10^3$  CFU/ ml, Class 1:  $10^3-10^5$  CFU/ ml; Class 2:  $10^5-10^6$  CFU/ ml; Class 3:  $>10^6$  CFU/ ml.

$\chi^2 = 3.795$ ;  $p = 0.284$ .

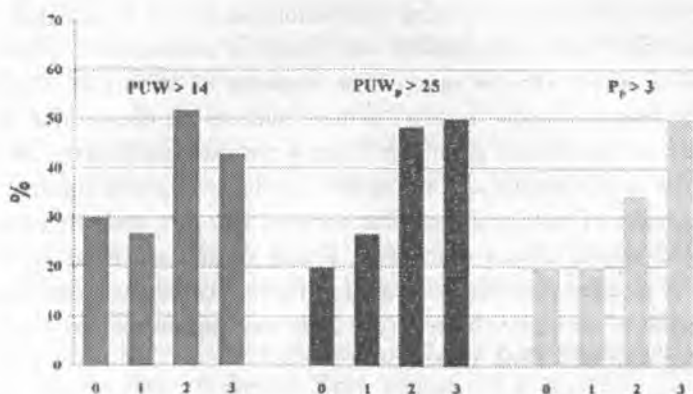


Fig. 1. Relationship between caries activity and SM class

## RESULTS AND DISCUSSION

No significant relationship was found between SM value and DMF ( $p=0.366$ ) – Table 1, DMF<sub>S</sub> ( $p=0.241$ ) – Table 2 and D<sub>S</sub> ( $p=0.284$ ) – Table 3. Lack of correlation between SM and dental caries was also demonstrated by Kruszyńska-Rosada et al. who assessed SM number in 19 children free of caries and 19 from a high risk group. Not only the presence of bacteria and sugars but also the susceptibility of tooth enamel to the action of acids increases possible caries prevalence. These authors emphasize little usefulness of microbiological examinations of saliva and oral hygiene index in assessing the risk of caries, but they stress the significance of CRT test. In the studies conducted by other authors among 10-17-year-old children (6) and 12-year-old children (3) the frequency of occurrence of high SM values correlated with caries prevalence expressed by DMF<sub>S</sub>. Assessment of the risk of dental caries in individual cases is not always unequivocal. Patients with little amount or absence of *Streptococcus mutans* (test 0 or 1) will probably develop new carious defects with time; false positive results may also be expected in adolescents and adults who, despite high *Streptococcus mutans* levels found, will not develop new carious defects (1). The test does not show whether *Streptococcus mutans* have the ability to form acids or acid tolerance. These are groups of bacteria with differentiated cariogenic potential (1). According to Loesche cariogenicity of *Streptococcus mutans* mostly depends upon its distribution on the surface of the tooth. If it is present in sulci then it is certainly cariogenic, if it occurs on other surfaces it may not cause caries. It can be limited by proper oral hygiene, presence of efficiently functioning neutrophils and also by composition and buffer properties of saliva (1, 2, 5, 9). The participants of our study were students from the Faculty of Dentistry, so it was a group of patients aware of genesis and prophylaxis of dental caries. Time, speed and size of colonization of cariogenic bacteria depends on individual predisposition and transfer of microorganisms, for example from the mother, and then on delivering substrates from food, especially sugars (6). If ingestion of carbohydrates is low, the risk of caries, despite high SM numbers, is small (7). Wojcieszek et al. quote interesting observations made by Carlsson from which it can be concluded that *Streptococcus mutans* was present in concentration  $>66$ /ml in approximately 40% of people with low or very low frequency of caries (10). This observation as well as the results of studies by other authors confirms the opinion that the prevalence of *Streptococcus mutans* in a given population is not exclusively correlated with the frequency of caries in this population. SM number gradually increases together with an increase in the number of teeth and accessible surfaces. Our own study concerns people (young adults) with carious defects which were already treated and filled. Barańska-Gachowska et al. emphasize that sanitation of the oral cavity has a significant influence on the amount of cariogenic bacteria (4). This may explain the fact that low SM values occur along with high DMF values.

## CONCLUSIONS

1. Risk of dental caries in people aged 20–25 cannot be determined only by SM number.

2. No statistically significant correlation was found in the study between *Streptococcus mutans* titre in saliva and DMF, DMF<sub>s</sub> and D<sub>s</sub> numbers.

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## SUMMARY

The aim of the paper is to answer the question whether the Dentocult SM tests could be used to study dental caries activity in the 20–25 age group. 66 students of the Faculty of Dentistry, Medical University of Lublin, were included in the study. In all cases dental state was assessed by using average numbers of DMF and DMF<sub>s</sub> D<sub>s</sub>. In the microbiological examinations a ready-made medium from Dentocult SM set was used. The results revealed that the risk of dental caries in the population studied cannot be determined only on the basis of *Streptococcus mutans* values.

Aktywność próchnicy zębów u studentów stomatologii. Badania z zastosowaniem testów mikrobiologicznych (Dentocult SM)

Celem badań było określenie ryzyka próchnicy u studentów stomatologii za pomocą standardowych testów Dentocult SM i uzyskanie odpowiedzi na pytanie: czy można wykorzystywać testy Dentocult SM do badań aktywności próchnicy w grupie wiekowej 20–25 lat? Materiał badawczy stanowiło 66 studentów oddziału stomatologii Akademii Medycznej w Lublinie. U wszystkich badanych dokonano oceny stanu uzębienia za pomocą średniej liczby PUW, PUW<sub>p</sub> i P<sub>p</sub>. Do badań mikrobiologicznych wykorzystano gotowe podłoże wchodzące w skład zestawu Dentocult SM. W wyniku przeprowadzonych badań stwierdzono, że ryzyko wystąpienia próchnicy nie może być określone wyłącznie wartością liczby *Streptococcus mutans*.