

# Statistical correlations concerning dental and periodontal status and the level of education in oral health in pupils of Bucharest schools

Cristian Funieru<sup>1</sup>, Adrian Țandără<sup>1</sup>, Marian Cuculescu<sup>2</sup>, Roxana Ranga<sup>3</sup>, Cristian Comes<sup>4</sup>, Eugenia Panaitescu<sup>5</sup>, Loredana Ivan<sup>6</sup>

Bucharest, Romania

## Summary

**Objective.** We developed an epidemiologically pilot study to evaluate dental and periodontal status in schoolchildren of Bucharest. In order to do this, we examined 97 pupils in two schools, one of them in downtown Bucharest (school A) and the other in the periphery of the city (school B).

**Materials and methods.** The clinic examination was conducted with the usual dental instruments (mirror, probe and pleat). Using clinical diagnostic methods, we detected cavities, coronary restorations, occlusal pigmentations, etc. After that, we were able to determine the DMF-T index, DMF-S index with their components: DT, MT, FT and DS, MS, FS). We also used the periodontal probe to evaluate the papillary bleeding index - PBI (Muhlemann). At the same time, the level of education in dental hygiene was evaluated by means of a 15 points questionnaire.

**Results.** We used the 3.3.2 version of EpiInfo for data analysis - the WHO statistics free software. There is an obvious difference between the average of DMF-s result from school A (2.15) and school B (2.84). Occlusal surfaces of the permanent teeth were with maximum caries prevalence. The result from the analysis of the questionnaires evinces that the level of dental hygiene education is different in the two schools, but not what was expected.

**Conclusion.** The financial status could be put into relationship with the existence or quality of dental hygiene instruments. We found a low level of oral health education, which is in direct relationship with parents' education, because they are one of the sources that transmit information to their children.

**Keywords:** questionnaire, correlations, knowledge, habit, oral hygiene.

## Introduction

The purpose of a wide scale epidemiological evaluation for oral health is to determine the severity and the prognosis of the detected

lesions in a certain population and the actual community needs for oral treatment [1]. The number and the seriousness of the dental and periodontal lesions are the consequence of multiple etiological factors [2,3].

<sup>1</sup> DMD, PhD student, Assist. Prof., Department of Preventive Dentistry, Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy, Bucharest

<sup>2</sup> DMD, PhD, Assoc. Prof., Department of Preventive Dentistry, Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy, Bucharest

<sup>3</sup> DMD, PhD student, Lecturer, Department of Preventive Dentistry, Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy, Bucharest

<sup>4</sup> DMD, PhD student, Lecturer, Department of Orofacial Diagnosis, Ergonomics and Research Methodology, Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy, Bucharest

<sup>5</sup> PhD student, Assist. Prof., Department of Biostatistics, Faculty of General Medicine, "Carol Davila" University of Medicine and Pharmacy, Bucharest

<sup>6</sup> PhD student, Lecturer, Faculty of Sociology and Social Assistance, Bucharest University

Two of these are the low education level for preservation of oral health and the lack of self-care habits [1].

In 1991 the Centre for Medical Statistics of the Romanian Health Ministry published an Oral Morbidity Report that found an increase in the prevalence for all oral diseases as against 1983 [1]. In 2000 a DMFt index less than 3 was the World Health Organization's objective for the 12 years old population group. In Romania, we had values of 3.98 in 1988, 4 in 1992 and 7.3 in 1999 [1].

Observational studies substantially support all the present and future public dental health programs [4,5]. These studies collect valuable data for the design and finance planning of the health programs [4].

In oral medicine, observational studies assess the prevalence or the incidence of oral diseases and calculate morbidity indices [4]. Common instruments are the DMFt and DMFs indices for dental caries and various periodontal or dental plaque indices for gingival and periodontal diseases [5].

Our study was developed in two of Bucharest's schools on 11 to 13 years old pupils. Our study design was to collect clinical and educational data in order to establish certain correlations between the different measured variables.

## Materials and methods

The present study is a pilot clinical observational study, meant to determine the dental and periodontal status, the level of education for oral health and various correlations between them for the designated population. The study was developed in two schools of Bucharest, one in downtown and one in a periphery area of the town. The subjects were 97 pupils in the 5th and 6th grades aged 11 through 13 years. We had 48 male and 49 female subjects. The age distribution was: 36 subjects at age 11, 53 subjects at age 12 and 7 subjects at age 13. The subjects

were chosen randomly in both schools. To minimize bias, there were two examiners calibrated at the beginning of the study. We recorded the simple and complicated carious lesions, fillings, missing teeth and occlusal incipient lesions along with the dental surfaces they were on. We could determine the caries indices: DMFt and DMFs with their components: Dt, Mt, Ft, Ds, Ms and Fs. To determine the periodontal status we recorded the Muhleman Papillary Bleeding Index (PBI). We examined, with the periodontal probe, the gingival papilla in the following mode: maxillary – buccal right and lingual left and mandibular – buccal left and lingual right [1,2]. We considered this index relevant for periodontal diseases. This includes the developing gingivitis lesions, which are often occult, with the gingival bleeding as the only clinical indicator [2].

We also requested each subject to fill in a questionnaire to evaluate the level of knowledge and habit regarding the preservation of oral health. We analyzed 15 of the 16 questions of this questionnaire. There were two kinds of questions: single variable questions (with one or more possible answers) and multiple variable questions (each variable had a scale of 5 possible values). The questions focused on personal hygiene habits (toothbrushing and toothbrushing techniques, auxiliary measures to complement toothbrushing and mouth rinses) and the importance of the risk and protection factors for dental caries and periodontal diseases. We could make correlations between clinical records and questionnaires, each pupil having the same code for both of them. We also recorded the parents' professional status according to the following scores: 0 – high school or less, 1 – vocational studies, 2 – graduate or postgraduate studies, 3 – dental profession. The parents' professional score was calculated by adding both parents' scores.

The collected data were analyzed with the EpiInfo program, version 3.3.2. We

began by determining the mean indices values for each school, the mean professional score of the parents and different questionnaire scores. We continued by testing different statistical compilations among all these variables.

**Results**

We calculated the mean values for caries indices for every age group. We only had 7 subjects in the 13 years old group, which is not relevant for our study. We present the data in *Table 1*. All the values in the tables were approximated at two digits.

We also calculated the mean values of the bleeding index: 0.19 for the 11 years old group and 0.17 for the 12 years old group.

The mean professional parents scores were 3.60 at the central school and 1.98 for

the outskirts one.

For both schools we calculated first the caries indices and then the bleeding index. We present the results in *Table 2*.

We established the risk areas for dental caries and gingivitis. We calculated the mean values for DMFs and bleeding index (PBI) for the following areas: lateral maxillary, lateral mandibular, frontal maxillary and frontal mandibular. The DMFS index was measured for the following surfaces: mesial/distal, buccal/lingual and occlusal. We present the data in *Table 3* and *Table 4*.

We calculated the mean number of occlusal surfaces with incipient lesions: 4.36. For the central school the mean was 3.28 and for the outskirts one it was 5.33. As for the age groups the mean values were 3.05 for the 11 years old group and 5.05 for the 12 years old one.

**Table 1.** Mean values of caries indices for both age groups (11 and 12 years)

Age group	No. of children	DT	MT	FT	DMFt	DS	MS	FS	DMFs
11	36	0.72	0.02	0.36	1.11	1.82	0.13	0.47	1.38
12	53	1.62	0.13	0.54	2.88	1.92	0.66	0.73	3.33

DT - decayed teeth index, MT - missing teeth index, FT - filled teeth index, DMFt - decayed missing filled total index, DS - decayed surfaces index, MS - missing surfaces index, FS - filled surfaces index, DMFs - decayed missing filled surfaces index

**Table 2.** Mean values of caries and bleeding indexes for both schools

School	No. of children	DT	MT	FT	DMFt	DS	MS	FS	DMFs
Downtown	46	1.21	0.02	0.52	2.41	1.36	0.10	0.67	2.15
Outskirts	51	1.35	0.13	0.39	1.90	1.58	0.68	0.54	2.84
Booth	97	1.28	0.08	0.45	2.14	1.48	0.41	0.60	2.51

PBI - Muhleman Papillary Bleeding Index

**Table 3.** Mean value of DMFs index for surfaces and zones

School	No. of children	DMFs MPMx	DMFs FMx	DMFs MPMd	DMFs FMd	DMFs V/O	DMFs M/D	DMFs Ocl
Downtown	46	0.95	0.10	1.08	0	0.47	0.28	1.39
Outskirts	51	1.03	0.11	1.64	0.01	0.62	0.54	1.62
Booth	97	1.00	0.11	1.38	0.01	0.55	0.42	1.51

MPMx - Maxillary - molar and premolar teeth zone, FMx - Maxillary - frontal teeth zone, MPMd - Mandibullary: - molar and premolar teeth zone, FMd - Mandibullary frontal teeth zone, V/O buccal and oral surfaces, M/D - mesial and distal surfaces, Ocl - occlusal surfaces

**Table 4.** Mean value of PBI index for each zone

School	No. of children	PBI MPMx	PBI FMx	PBI MPMd	PBI FMd
Downtown	46	0.14	0.15	0.18	0.18
Outskirts	51	0.28	0.09	0.25	0.09
Booth	97	0.21	0.12	0.22	.013

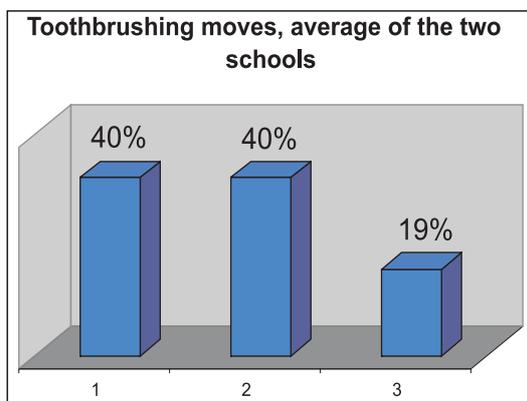
In the questionnaires we assessed different brush motions. The question allowed the subjects to choose one or more answers referring to horizontal, rolling and other motions (rotary, up-and-down, scrub). We present the answers in *Figures 1, 2 and 3*.

For the evaluation of the brushing time we used a single answer question with 3 possible answers: less than 3 minutes,

between 3 and 5 minutes, more than 5 minutes. Here are the results: *Figures 4, 5 and 6*.

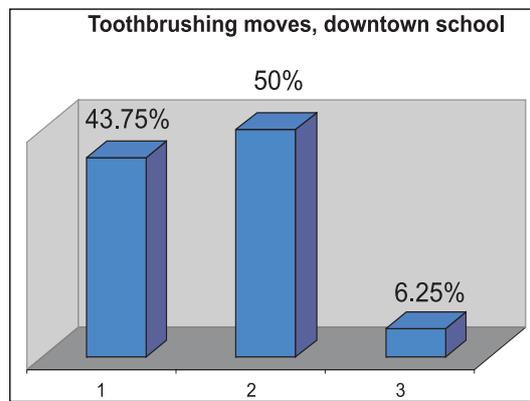
For the evaluation of the brush frequency we also used a single answer question with the following possible answers: twice a day or more, once a day in the evening, once a day in the morning, several times a week, several times a month, not at all. We present the results in *Figures 7, 8 and 9*.

**Figure 1**



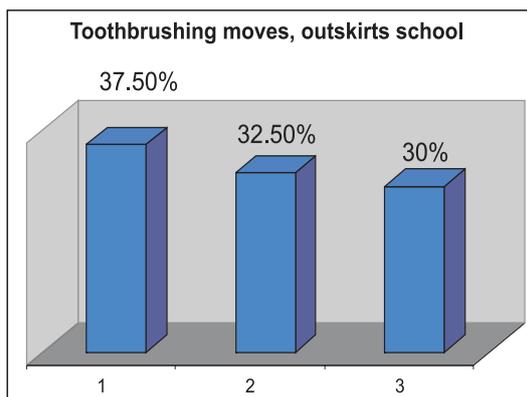
1 - horizontal: 40.27%  
 2 - vertical & circular: 40.27%  
 3 - rolling: 19.44%

**Figure 2**



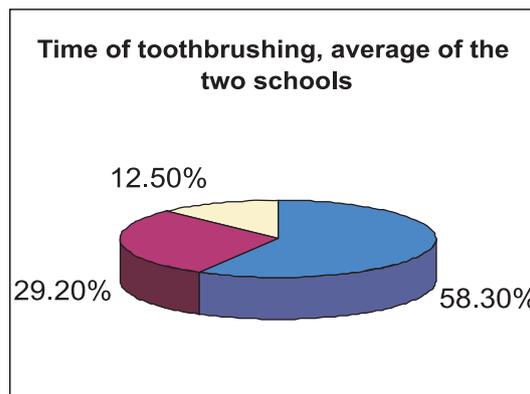
1 - horizontal: 43.75%  
 2 - vertical & circular: 50%  
 3 - rolling: 6.25%

**Figure 3**



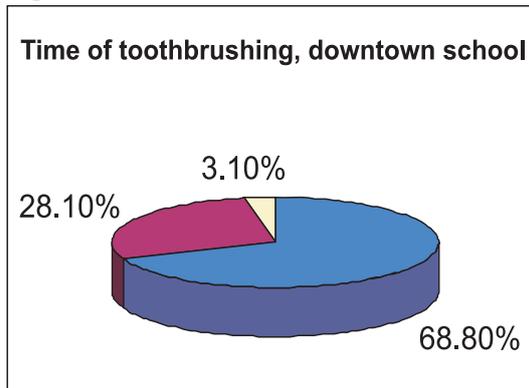
1 - horizontal: 37.5%  
 2 - vertical & circular: 32.5%  
 3 - rolling: 30%

**Figure 4**



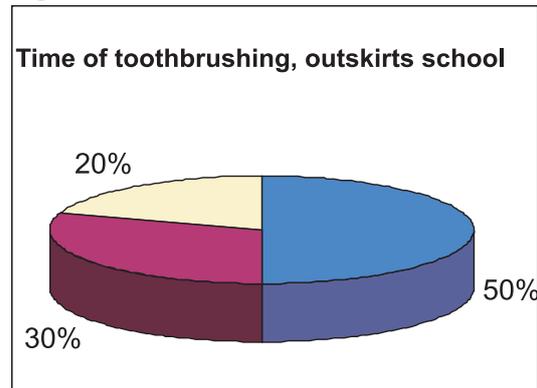
1 - 3-5 minutes: 58.3%  
 2 - under 3 minutes: 29.2%  
 3 - more than 5 minutes: 12.5%

**Figure 5**



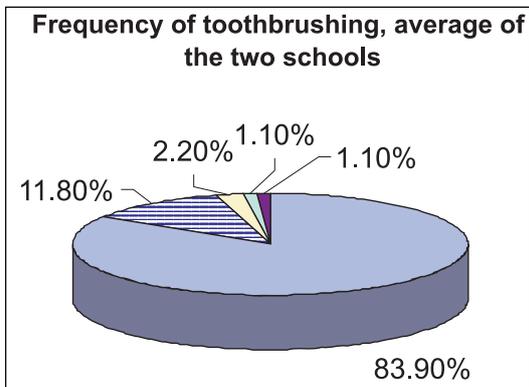
1 - 3-5 minutes: 68.8%  
 2 - under 3 minutes: 28.1%  
 3- more than 5 minutes: 3.1%

**Figure 6**



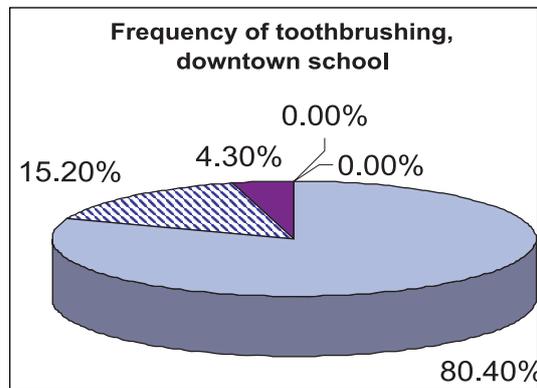
1 - 3-5 minutes: 50%  
 2 - under 3 minutes: 30%  
 3 - more than 5 minutes: 20%

**Figure 7**



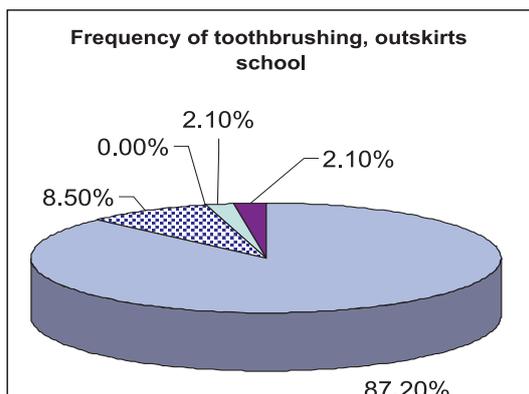
1 - twice a day: 83.9%  
 2 - once daily in the morning: 11.8%  
 3 - once daily before night: 2.2%  
 4 - several times per week: 1.1%  
 5 - several times per month : 1.1%

**Figure 8**



1 - twice a day: 80.4%  
 2 - once daily in the morning: 15.2%  
 3 - once daily before night: 4.3%  
 4 - several times per week: 0%  
 5 - several times per month: 0%

**Figure 9**



1 - twice a day: 87.2%  
 2 - once daily in the morning: 8.5%  
 3- once daily before night: 0%  
 4 - several times per week: 2.1%  
 5 - several times per month: 2.1%

## Discussions

It is known that the dental plaque is the main etiological factor for the carious lesion and the gingival inflammation. We also know that there are other important factors for the development of dental caries: sugars in daily nutrition, the teeth enamel structure, the defense properties of saliva, the level of education and oral health preservation habits. For the gingival inflammation we can consider the dental calculus, dental caries in the gingival area, malocclusion,

habits and self-inflicted injuries, nutrition, poor oral hygiene, systemic disease and disorder [2].

The objective of the present study was to test the scientific research methodology, which can point out to the role of these risk factors in the developing lesions.

The previous data indicate that the populations in the two schools present different social and financial status. We intended to study such populations in order to point out certain differences between variables. For the outskirts school we determined a mean professional parents' score of 1.98 (a score of 2 represents a pupil with both parents having graduated high-school or less). For the central school we determined a mean professional parents' score of 3.60 (a score of 4 represents a pupil with both parents having graduated a university). The statistical association test between parents and school was relevant: Chi-Square test = 43.0534 ( $p = 0.0000$ ). These points lead us to a difference between the professional levels of the parents in the two schools. This has an influence over the social and material status of the whole family, including our subjects. As to the differences between the indices we determined for the two schools, our study proved that the social status has a certain influence for the development of caries and gingivitis.

We compared the number of occlusal incipient lesions, caries and bleeding indices between the two populations. The first correlation we made was between the number of occlusal incipient lesions: Chi-Square test = 30.3045 ( $p = 0.0069$ ). The differences for the caries and bleeding indices are obvious in the tables. However the statistical tests are not so relevant:

- DMFS – school: Chi-Square test = 14.8387 ( $p = 0.19$ )
- DMFT – school: Chi-Square test = 6.2503 ( $p = 0.5108$ )
- BI – school: Mann-Whitney/Wilcoxon test = 1.9681 ( $p = 0.1607$ )

There is a strong correlation between the parent's educational score and DMFS: Square-Chi = 70.7025 ( $p = 0.0397$ ). This association leads to the conclusion that parents have a significant influence for their children's oral health education.

Concerning oral hygiene, the statistical analysis shows that between the two schools there were not significant differences that could justify the differences between the caries and bleeding indices. According to questionnaires, we can state that the subjects in the school with lower parent's educational status had better oral hygiene habits. This could suggest that in spite of anonymity the children were afraid to choose „wrong answers” – at this point we reached the limitations of questionnaires. Another explanation could be that there are other factors involved that were not included in our study. A clear example for this opinion is the question regarding the brushing time. 12.5% of the subjects stated that their brush time is over 5 minutes. Such brushing time is not relevant for good oral hygiene. However, the pupils chose this answer because they thought that this brushing time could be useful for their oral health.

We can conclude that assessing oral hygiene with a questionnaire is not relevant, so we did not try to obtain any statistical correlations between oral hygiene habits and the dental and periodontal status.

## Conclusions

The gingival inflammatory lesions and dental caries are the consequence of dental plaque. There are other secondary factors involved in their etiology. One of them is the socio-economic status, which could influence the prevalence of these two diseases in two different ways. The first is the financial status, which could be put in relationship with the existence or quality of dental hygiene instruments (toothbrush, toothpaste, dental floss etc.). The second is the

low level of oral health education, which is relevant in our study. This low level is often in direct relationship with parents' education, because they are one of the sources that transmit the information to their children.

Another conclusion of our study was that questionnaires are not the perfect instruments for the evaluation of oral health education level, especially for assessing patient's habits.

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Correspondence to: Dr. Cristian Funieru, DMD, PhD student, Assist. Prof., Department of Preventive Dentistry, Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy, Bucharest. Address: Intr. Mina Gheorghe no. 7 sector 2 București, Romania.  
E-mail: Thyristi@yahoo.com