

THE CORRELATION BETWEEN DENTAL CARIES AND SOCIO-ECONOMIC STATUS IN CHILDREN FROM 4 - 6 YEARS

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Abstract

The purpose of our research is to examine the connection of between the presence of dental caries and socio-economic conditions in children aged 4 - 6 years.

Included in the survey were 74 examinees, aged 4 - 6 years, divided into two groups, or experimental group of 43 examinees, and control group of 31 examinees. For determining the socio-economic status of the examinees we used specially structured questionnaire, which contain questions about the monthly income of the family, where according to the statistics of the State service for the year 2015 the average wage was 22.300 denars. Based on the answers of all questions of socio-economic status among families, evaluation was the following: Score 0 - High, Score 1 - Medium, Score 2 - Humble. Results were analyzed by arithmetical mean.

The distribution of the data pertaining to the socio-economic status of children with primary dentition from the control group, pointing out that there is no significant difference between the two groups. Information obtained for studied group are pointing out that 15 (20.30%) were children with low 20 (27.00%) are medium, and 8 (10.80%) children had a high socio-economic status.

The results which we got for the socio-economic status of the children with primary teeth and intensity of dental caries showed that there is no significant difference between the two examined groups.

Key words: Caries, Primary dentition, Socio-economic status.

1. Introduction

Epidemiological studies conducted in order to evaluate the relationship between the oral health and the socio-economic conditions, suggest that the low socioeconomic status is associated with a higher prevalence of dental caries. Marmot believes that the reason for the link between oral health and the socioeconomic status is due to the fact that it provides access to resources for getting information about the oral health, with special emphasis on the consumption of sugars, oral hygiene, preventive activities, and regular dental checkups [1].

Timiş [2], highlights that the population groups with a low level of dental care are overall characterized by low levels of education and poor economic condition. In most cases, high income families have optimal living conditions regarding space, while providing increased access to dental services. The authors believe that the differences, such as the monthly income and the education level of the parents, generate inequality among children regarding their general, oral, and dental health.

Regardless of advances in science and technology, dental caries remains a constant and major public health problem worldwide, and includes people of all ages, especially children, in which it occurs more often [3].

Motivated by new challenges and knowledge, our study is an attempt to recognize the complexity of the etiology of dental caries in children with primary teeth, where the goal was focused toward determining their socio-economic status and its association with dental caries and its intensity.

2. Materials and Methods

The study included 145 examinees, from which, 74 children (35 females and 39 males) aged 4 - 6 years (experimental group), and a control group of 31 subjects without dental caries, fillings and extractions, or more precisely subjects without decayed, missing, and filled teeth (DMF = 0).

For determining the socio-economic status of the families, we used specially structured questionnaires which comprised of the basic general information of the examinees (number of questionnaire, name and surname, and date of birth), monthly family net income according to the national statistics in the year 2015 (the average salary was 363 euros) and social status (low social status - one employee with a minimum salary, a moderate social status - one average income salary, and high social status with at least two average income salaries). On the basis of the poll and the answers from the questions about the socio-economic status in the families, the valuation was as follows:

- Score 0 - High
- Score 1 - Average
- Score 2 - Low

The clinical research was directed towards verification of data on the prevalence of dental caries, by using the generally accepted index of presence or absence of carious processes, the Klein - Palmer - Hirschman index.

1. The dental status of the examinees from the study group, was noted for those with primary teeth, as follows:

- Examinees with DMF (decayed, missing and filled teeth)
- Examinees with D_t (decayed teeth)
- Examinees with F_t (filled teeth)
- The examinees with primary teeth according to the findings according to tooth surfaces:
- Examinees with DMF_s (decayed, missing and filled teeth surfaces)
- Examinees with D_s (decayed teeth surfaces)
- Examinees with F_s (filled teeth surfaces)

2. Risk assessment for dental caries in primary and permanent dentition

According to data obtained from the clinical examination, we determined the intensity (presence/absence) of dental caries and we noted and interpreted as follows:

For the primary dentition the interpretation was as follows:

- ≤ 3 - low caries risk
- 4 - 6 - moderate caries risk
- ≥ 7 - high caries risk

The statistical analysis of the data was performed in the statistical programs Statistica 7.1 for Windows and SPSS Statistics 17.0. The following methods were used:

- The analysis of the series with attributive features-gender, socio-economic status and the presence of dental caries (DMF and risk) are determined as percentages (%).
- The correlation between the value of the DMF index and the socioeconomic status, is investigated by applying the Exact Fisher test and Spearman Rank (R).
- The significance was determined for $p < 0.05$.

3. Results and Discussion

3.1 Results

The distribution of data concerning the socio-economic status of children with primary teeth, from the experimental group is following: 15 (20.3%) children had a low, 20 (27%) had an average, and 8 (10.8%) children had a high socioeconomic status. In the control group all 31 (41.90%) children had an average socio-economic status, and according the Exact Fisher test = 26.67 and $p < 0.001$ ($p = 0.000 / 0.000$) there is no significant difference between the two groups (Table 1).

Table 1. Group and socio-economic status

Group		Socio-economic status			Total 1
		Low	Average	High	
Experimental	Count	15	20	8	43
	% of Total	20.3%	27%	10.8%	58.1%
Control	Count	0	31	0	31
	% of Total	0%	41.9%	0%	41.9%
Total	Count	15	51	8	74
	% of Total	20.3%	68.9%	10.8%	100%

In the experimental group the DMF index varies in the range 4.63 ± 1.99 ; $\pm 95\%$ KI: 4.02 - 5.24; the minimum value is 2 and the maximum value is 10 (Table 2 and Figure 1).

The descriptive statistics of the values relating to the components of the DMF index (caries, extraction, filling) in children with primary dentition in the experimental group, is shown in Table 2 and Figure 1, and they show that the values for dental caries vary in the range 2.88 ± 1.69 ; $\pm 95\%$ KI: 2.36 - 3.4; the minimum value is 0 and the maximum 8. The values for extraction vary in the range 0.51 ± 0.83 ; $\pm 95\%$ KI: 0.26 - 0.77; the minimum value is 0 and the maximum 3. The values for dental fillings vary in the range 1.21 ± 1.61 ; $\pm 95\%$ KI: -0.71 - 1.71; the minimum value is 0 and the maximum value is 6 (Table 3 and Figure 2).

Table 2. DMF Index/Descriptive Statistics

Parameters	Valid N	Mean	Confidence -95%	Confidence +95	Minimum	Maximum	Std.Dev.
DMF index	43	4.63	4.02	5.24	2	10	1.99

Table 3. Dental caries & Extraction & Dental fillings / Descriptive statistics

Parameters	Valid N	Mean	Confidence -95%	Confidence +95	Minimum	Maximum	Std. Dev.
Dental caries	43	2.88	2.36	3.40	0	8	1.69
Extraction	43	0.51	0.26	0.77	0	3	0.83
Dental fillings	43	1.21	0.71	1.71	0	6	1.61

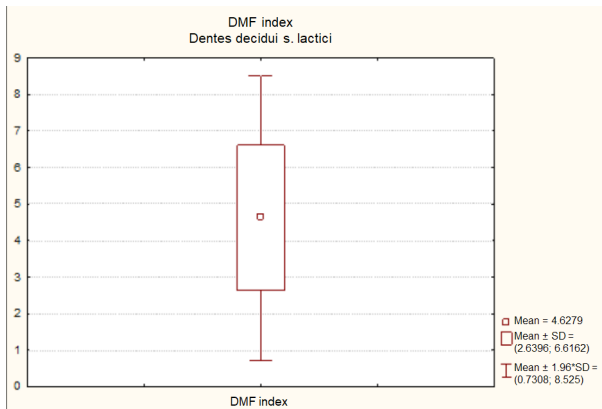


Figure 1. DMF index / Descriptive statistics (primary teeth)

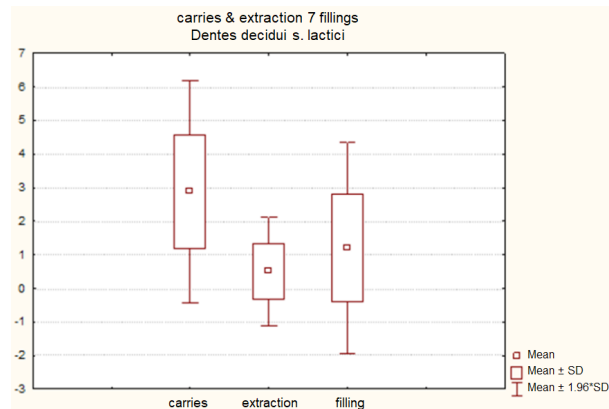


Figure 2. Dental caries & Extraction & Dental fillings/ Descriptive statistics (primary dentition)

The descriptive statistics of the values of the DMF by teeth surfaces, in children with a primary dentition vary in the interval 6.60 ± 3.13 ; $\pm 95\%$ KI: 5.64 - 7.57; the minimum value is 2 and the maximum value is 16 (Table 4 and Figure 3).

The descriptive statistics values relating to dental caries and dental fillings / by surfaces / in children with primary dentition, shows that they vary in the interval 4.63 ± 2.79 ; $\pm 95\%$ KI: 3.77 - 5.49; the minimum value is 0 and the maximum 12. The values for dental filling by surfaces vary in the interval 1.63 ± 2.36 ; $\pm 95\%$ KI: 0.9 - 2.35; the minimum value is 0 and the maximum value is 9. (Table 5 and Figure 4).

Table 4. DMF by surfaces/Descriptive statistics

Parameters	Valid N	Mean	Confidence -95%	Confidence +95	Min.	Max.	Std. Dev.
DMF _s	43	6.60	5,64	7,57	2	16	3.13

Table 5. Dental caries & fillings - surface / Descriptive statistics

Parameters/ surfaces	Valid N	Mean	Confidence -95%	Confidence +95	Min.	Max.	Std. Dev.
Dental caries	43	4.63	3.77	5.49	0	12	2.79
Dental fillings	43	1.63	0.90	2.35	0	9	2.36
Dental fillings	43	1.21	0.71	1.71	0	6	1.61

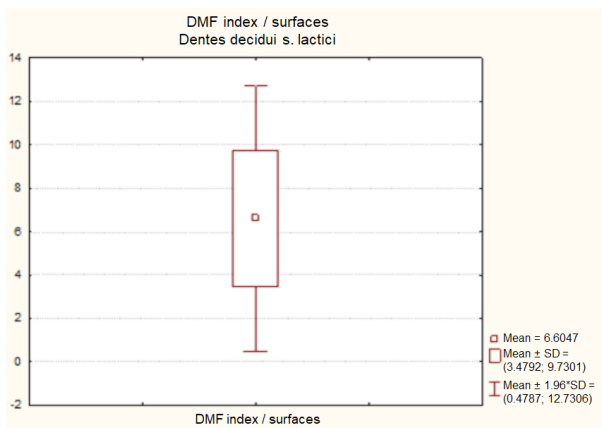


Figure 3. DMF by surfaces / Descriptive statistics (primary dentition)

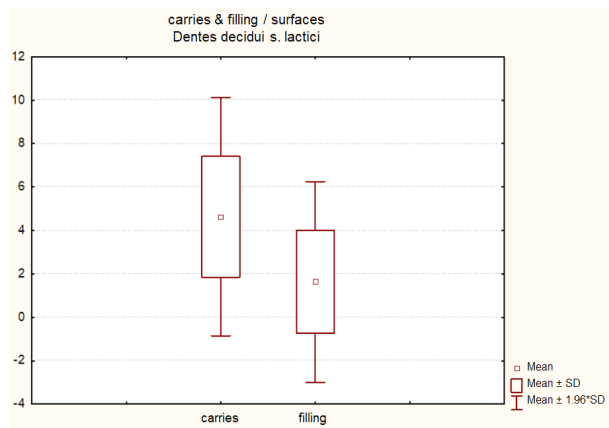


Figure 4. Dental caries & fillings - surface/ Descriptive statistics (primary dentition)

The intensity of dental caries in children with primary dentition is shown in Table 6. In the experimental group of 43 (58.1%) children, 15 (20.3%) had a low dental caries risk (≤ 3), 20 (27%) had a moderate dental caries risk (4 - 6) and 8 (10.8%) had a high dental caries risk (≥ 7). In the control group, all 31 (41.90%) examinees had a low dental caries risk (≤ 3).

In the displayed distribution of data, concerning the intensity of dental caries in children with mixed dentition, for Fisher's Exact Test = 36.52 and $p < 0.001$ ($p = 0.000 / 0.000 - 0.000$) there is no significant difference between the two groups.

The examined relationship between the socio-economic status of children with primary dentition and the severity of dental caries was $R = -0.23$ ($p < 0.05$) and a moderately strong negative significant correlation was determined, and with the growth of the socio-economic status of the children with mixed dentition, the presence of dental caries in children declines (Figure 5).

The results which we got, for the socioeconomic status of the children with primary teeth, showed that there is no significant difference between the two examined groups, which is identical to the data that presents the number of meals during the day and the frequency of teeth brushing ($p > 0.05$).

The total value of the DMF index varied in the interval 4.63 ± 1.99 (dental caries 2.88 ± 1.69 , extracted teeth 0.51 ± 0.83 and teeth with dental fillings 1.21 ± 1.61). The values of the DMF index on the surface of the teeth varied in the interval 6.60 ± 3 (dental caries 4.63 ± 2.79 and teeth with dental fillings 1.63 ± 2.36).

The intensity of dental caries in children with primary teeth from the experimental group, showed that from a total of 43 (58.1%) children, 15 (20.3%) children had a low dental caries risk (≤ 3), 20 (27%) children had a moderate dental caries risk (4 - 6), and 8 (10.8%) children had a high dental caries risk (≥ 7), while the examinees from the control group had a low dental caries risk (≤ 3).

Table 6. Group / DMF index - intensity

Group		DMF index			Total 1
		Low dental caries risk	Moderate dental caries risk	High dental caries risk	
Experimental	Count	15	20	8	43
	% of Total	20.3%	27%	10.8%	58.1%
Control	Count	31	0	0	31
	% of Total	41.9%	0%	0%	41.9%
Total	Count	46	20	8	74
	% of Total	62.2%	27%	10.8%	100%

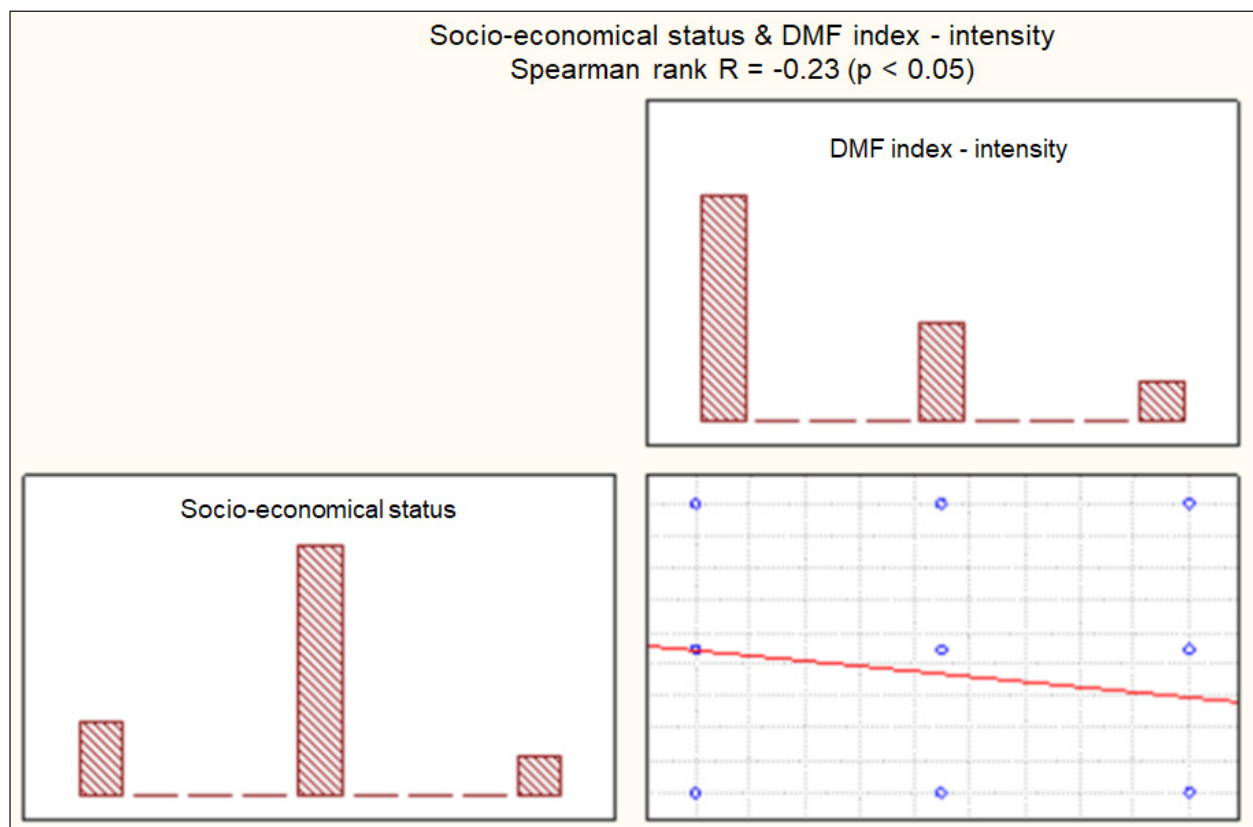


Figure 5. DMF index - intensity/Socio - economic status /Spearman rank $R = -0.23$

3.2 Discussion

Previous experimental and clinical studies suggest that the incidence of dental caries was due to different risk factors, and they can at the same time act independently or in association with each other [3, 4].

Numerous data is documented on the mutual relationship of the prevalence of dental caries and socio-demographic features [5]. The severity of the prevalence of dental caries on primary teeth in the US has been studied over a 10-year period over which time surveys have been carried out about the socio-economic status. This study caused an alarm among public health dental professionals because of the large percentage of untreated carious teeth, especially in children with poor socio-demographic characteristics [6].

In order to systematically summarize the evidence regarding the association between the incidence and prevalence of dental caries, studies were carried out regarding the relationship between the socioeconomic status and brushing of the teeth. For this purpose 3,138 abstracts and 272 articles were identified. After the processing of the results, strong evidence of an inverse relation between the socioeconomic status and the prevalence of caries in children who had less than twelve years, was gotten. The evidence for this relationship were weaker for older children and adults. Also there was weak evidence that supported the brushing of teeth as a preventive measure in the evolution of dental caries, but found with certainty, whether the effects from brushing teeth were due to the use of fluoride in dental tooth pastes or from the mechanical removal of the plaque from tooth surfaces [7].

The data received on the values of the total DMF, vary in the interval 4.63 ± 1.99 , while for dental caries vary in the interval 2.88 ± 1.69 , for extracted teeth in the interval 0.51 ± 0.83 and for teeth with dental fillings, in the interval 1.21 ± 1.61 .

The descriptive statistics of the values of the DMF index by surfaces, of teeth in children with primary dentition, vary in the interval 6.6 ± 3.13 , where the minimum value is 2 and the maximum value is 16. The values for the component of the same, by surfaces of teeth, for dental caries vary in the interval 4.63 ± 2.79 , while the maximum value is 12 carious surfaces, unlike the teeth with dental fillings, by surfaces, which are much less, and vary in the interval 1.63 ± 2.36 , with a maximum of 9 surfaces.

Data concerning the intensity of dental caries in children with primary dentition from the experimental group, showed that from a total of 43 (58.10%) children, 15 (20.3%) had low a low dental caries risk (≤ 3), 20 (27%) children had a moderate dental caries risk (4 - 6), and 8 (10.80%) had a high dental caries risk (≥ 7), all examinees from the control group had a low dental caries risk (≤ 3).³

In the displayed distribution of data, concerning the intensity of dental caries in children with primary dentition, there is a significant difference between the two groups of examinees ($p < 0.001$).

Dawani [8] carried out studies in preschool children, from Karachi, where the prevalence of dental caries of primary teeth in 4 to 5-year-old children was 76%, which corresponds to the situation in Saudi Arabia (75%) and UAE where a higher prevalence was registered (70 - 80%), which are worse results than the ones we got [9, 10].

The aforementioned findings that we got, for the DMF index in children, was still far from the figures published by researchers in developed countries, such as Sweden, where the percentage of 3-year-old children, without dental caries is 69%, and in Brisbane, Australia the percentage of children from 4 - 6 years which don't have dental caries is 66% [11, 12].

The most likely explanation for these differences, may be, the inequality in economic conditions and resources, in effective policies for fluoridation, in the effectiveness of the health system, availability and use of refined sugars, in building standards for oral health awareness in children and parents about nutrition and oral hygiene, in the way of life and the motivational status of parents and children [8].

Saied-Moallemi [13] with his studies concluded that mothers with higher education tend to take their children to the dentist at the beginning of the emergence of teeth and have controls and treatment of dental caries as soon as it appears.

The figures we got about the dental caries index among examinees at the age of 5 years, seem to be far from the WHO goals for the year 2000, in which 50% of the children aged 5 to 6 years should be free of dental caries [14]. However this data varies from the data from two decades ago and are more than satisfactory, and they are certainly due to the systematic preventive measures that are used and also due to the fact that the drinking water in the city of Stip contains an optimal amount of fluoride.

The relationship between the general health and the socio-economic status is well known, but still poor oral health is linked to a low socio-economic status [15].

The relationship between the socioeconomic status and the condition of the oral and dental health, are displayed in the available literature in this field. Numerous studies have proven that people with a low socio-economic status have bad oral and dental health, which is a result of the correlation of the inequalities, that can be complex, biological (age and gender) or general (limited knowledge, access to a doctor) [16].

The data on the socio-economic status of the children with primary teeth, which we evaluated, from the experimental group showed that 15 (20.30%) children had a low socio-economic status, 20 (27%) children had an average socio-economic status and 8 (10.80%) children had a high socio-economic status, which differed from the results of the children in the control group, where all 31 (41.90%) children had an average socio-economic status and there was no significant statistical difference between the two groups of examinees ($p < 0.001$).

The relationship between the socio-economic status of children with primary dentition and the severity of dental caries was a moderately strong negative significant correlation and with the growth of the socio-economic status of children with primary dentition, the presence of dental caries in children decreases. Our studies are consistent with the study by Zukanović [17], conducted in the year 2005, in Bosnia, in 12 year old children from Sarajevo, with a different socio-economic status, where, there was also a difference in the dental caries risk, in which the children with a low socio-economic status had a higher risk to get dental caries, for ($p < 0.001$).

The study of Arora *et al.*, [18] confirmed the link between dental caries and the socio-economic characteristics, and also that there is an increase in the risk in early childhood, for the onset of dental caries associated with poor socio-economic characteristics, including low-income and low education. The authors emphasize that low-income families have social and financial problems that compromises their ability to care for themselves and their children. These families have trouble getting professional and health services, poor nutritional status, less access to early diagnosis which makes the prognosis of the dental caries, worse. All these factors lead to reduced resistance to diseases, including oral.

4. Conclusions

- Detailed analysis of the ratio between the socio-economic status and the onset and risk of dental caries should be made, in order to identify the risk factors associated with the socio-economic status and the dental caries, and of course preventive measures should be recommended, stressing the importance of fluoride toothpastes.

- The realization of our study for the association of the socio-economic parameters and dental caries can be used as screening factor that would serve as a tool for assessing the risk of cavities.

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