Socio-economic factors and hygienic food-illness involved in determining dental caries of 12-year-old children in rural and urban area

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Abstract

Age of 12 is considered in most current research, reference age influencing both the incidence and intensity of dental caries and harmonious development of the dento - jaws of life of future periods. Two groups of students 12 years old, were studied, living in rural and urban areas, which were examined by a dentist and then they were questioned about the dental control method. The children's parents were also asked to complete a questionnaire on maternal age at childbirth, mother's education level, monthly family income, brushing supervision and control of children's dentistry. The obtained data were registered in individual files and then centralized and statistically processed. Tags in rural areas have the following values: 89.6% caries frequency, intensity indicators DMF-T = 4.38, DMF-S = 9.11 and 6 year molars decayed percentage 69.44%. The values are the same indicators of urban decay rate 79.2%, DMF-T = 2.76, DMF-S = 5.69 and 6 year molars decayed percentage 30.55%. The study said that risk factors can act

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differently in rural areas where dental health problems are 1.48 higher than in urban areas. Regular dental check up, tooth brushing and effectively change your toothbrush every three months can significantly influence dental health at the age of 12 years in both environments.

Keywords: rural area; urban area; socio-economic factors; the risk of caries; 12 years old.

Introduction

The dental caries etiology shows that in producing of this disease, interact some principle factors alimentation, bacteria, and dental tissue resistance (Iliescu,2002,2001). A many studies sustain there are some secondary etiological factors, connected to the socio economic level of the family, the decay prevention knowledge, the way of life, the education level of mother, etc (Resine2001, De Reu, 2008).

Even if in Europe there is a remarkable caries decrease, to our country this tendency is less remarkable. The reported values of caries prevalence at 12-year-old from Romania to World Health Organization show a decrease 2-3 more than the country from West Europe (Petersen, 1992; 2000; 1995). One of possible cause is the complexes interfere in etiology of dental caries the personal hygienic and diet factors and also the socio economic and educational factors (Vanobbergen, 2001; Nuca, 2009).

Despite Romania is at 20 years after the dictatorship, the 12-year-old children health, doing not follow a comparable evolution as the neighbor European country. One of the causes might be that the children parents who have reduced knowledge about dental health preserving, and the social economic status restrict their access to the preventive measures.

Objectives

The this current study, we aim to determine whether a series of socio-economic factors such as those represented by education level of parents: maternal age at childbirth, the average monthly family income, food-hygienic and personal factors can lead to significant differences oral health in children 12 years old, in rural versus urban area.

Material and method

For this purpose we made two study groups composed of students aged of 12 years (± 8 months) represented as follows: 67 students from rural and 72 urban students. Children from rural villages of Poplaca and șura Micã, Sibiu County, and those in urban areas from Sibiu, are students in classes VI-secondary schools.

The study was conducted in 2009 and started by obtaining the ethical permission by Ethical Committee of Medical College of "Victor Papilian" Faculty. Also we was obtained the written consent from the local school authorities. The school authorities obtained the written consent from the parents of the children. In school we was distribute with the teachers help of a questionnaires for parents of children involved in the study. Through these questionnaires we want to know the following data:

- Maternal age at childbirth
- Mother's education level (secondary education, higher education)
- How many times per day parents supervise / guide the child's oral hygiene
- On what occasion parents go with the child to a dentist (occasionally due to pain / discomfort or control two times a year regularly)
- Average monthly family income is less than or greater than 1000 RON.

By the questions 3 and 4 from parents questionnaire we wish to find if there is a different between rural area parents and urban area parents concerning the importance of caries prevention knowledge. At the same time, by question number 5 we wished to know if the access to the prevention treatments is influenced by the monthly family budget.

Through questionnaires, parents were also expressed agreement on carrying out this study. Children were examined in the dental office of the selected school, using plain mouth mirrors, ball-ended dental probes, and sterile gloves, under artificial optimal light in accordance with World Health Organization criteria (WHO Basic Method 1997). Data were recorded in individual records of prophylaxis. These records included information on dental health and treatments (DMF-T index).

Dental caries were diagnosed at the caries into dentine (D_3) without radiography or fibreoptic transillumination or compressed air. By the children questionnaires we wanted to know the following data about the examined child:

- If the child goes to the dentist occasional, caused by pain/discomfort or makes regularly 2 times a year a dental control.

- How often they change their toothbrush (3, 6, 12 months)

- What kind of brushing are they using (horizontal, vertical, circular)

- What kind of food they prefer for snacks between meals (sweet, non-carbonated soft drinks or sweetened foods fast food)

The answers of the questionnaire were recorded by the examiner, by checking the boxes with the following answers chosen by the child. By these we want to find if there is a different between the children from the two area, concerning the knowledge and the hygiene died behaviors who can determine the dental health.

Statistical analyses were performed using statistical software (SPSS for Windows Version 12; SPSS Inc, Chicago, USA). The calibration of the examiners was carried by the principal investigator in the Department of Cariology, Victor Papilian Faculty, Sibiu. The intra and inter examiner reliability in the oral health recording and the test retest reliability of the questionnaire we tested using kappa statistics (Tigan, 2001; Joba, 2004)

Results and discussions

The incidence of dental caries in the studied groups had the following values: 89.6% in rural areas, respectively 79.2% in urban areas.

Concerning the intensity dental caries most international indices employed are indications DMF-T DMF-S (Decay, Missing, Filled, Tooth, Surface). This study obtained medium values DMF-T 2.76 and DMS 5.69 for urban area and DMF-T 4.38 and DMF-S 9.11 for country area. Medical data obtained were recorded in Table 1.

Table No. 1 –The intensity of decay indices in studied groups

	Number of examined subjects	D - T	M- T	F- T	D- S	M- S	F -S	DMF-T	DMF-S
Rural	67	201	40	53	325	231	55	4.38	9.11
Urban	72	105	18	76	220	115	78	2.76	5.69
Total	139	306	58	129	545	346	130		

Another possibility for assessing the intensity of dental caries is assessing the degree of impaired 6-year molars (M 6). Keeping the tooth on the arch is now considered a way to prevent many dento-maxillary anomalies (Momeni, 2007; Cahen, 1998; Momeni, 2006,; Acu, 2003). Values to quantify the degree of impairment of M 6 studied groups are represented in *Table 2*.

Table No. 2 – Indices of intensity of dental caries in the molars of 6 years

Affected Molars of 6 years / Medium	M 6 decayed		M 6 filled		M 6 extracted		M 6 examined	
	No.	percent	No.	percent	No.	percent	No.	percent
Rural	150	69.44	89	30.37	29	61.7	268	48.2
Urban	66	30.55	204	69.62	18	38.29	288	51.79
Total	216		293		47		556	

Already at this stage we can see that the values which quantify the oral health are higher in rural areas (teeth and decayed surfaces, missing teeth, high percentage of decayed molars at 6 years old) then urban values. In these circumstances, we ask whether there is a link between the living environment in which children live and "dental problems" (Boitor, 2010; Totolici, 2006; Momeni, 2006; Piper, 2007). We checked with p = 0.01 significance level the hypothesis that among these attributes (environment and dental problems) there is no connection. Chi square test (χ^2) with two degrees of freedom in this case, has value of χ^2 = 79.8 is higher than $\chi^2_{tabular}$ = 9.21, which means that they reject the hypothesis that the two attributes are independent. So we can say that there is a statistically significant dependence between the health status of 6-year molars and the environment from which the children are.

Concerning the dental health of those who submit to the dentist, occasionally/ regularly two times a year, recorded data are represented in Table 3.

Table No. 3 – The relationship between control and intensity of dental caries

Medium	Occasional Control						Regular Control 2 times/year					
	subjects	M6 decayed		DMF-T		DMF-S		subjects	M6 decayed		DMF-T		DMF-S	
		total	average	total	average	total	average		total	average	total	average	total	average
Rural	40	125	3.13	162	4.05	344	8.6	27	25	0.93	132	4.89	267	9.89
Urban	37	55	1.49	100	2.7	187	5.05	35	11	0.31	99	2.83	223	6.37

The χ^2 test and applying these values we get 40.37 > $\chi^2_{tabular}$ = 9.21 for rural areas, respectively χ^2 = 32.38 > $\chi^2_{tabular}$ = 9.21 for urban areas. Since the value obtained is greater than the table shows that there is statistical significance between the environment and dental problems (regular monitoring twice a year).

To determine the problems that make major contributions to statistically significant differences, we are calculating the standardized residue (R). For grater values than 2 in absolute value of R, we can consider that the element has an important role in the achievement of significant χ^2. Statistical values of these instruments were calculated and values are assigned in *Table 4*.

Table No. 4 – Standardized residual values (R) for risk factor control in occasional/ regular control

R value	Occasional Control			Regular Control 2 times/year		
Medium	M6 Decayed	DMF-T	DMF-S	M6 decayed	DMF-T	DMF-S
Rural	3.72	-1.04	-1.12	-4.54	1.27	1.36
Urban	3.72	-0.08	-1.43	-3.77	0.08	1.45

Analyzing the data presented in this table, we can say that the values obtained for 6-year molars decay are greater than 2 for the occasional control, leads us to affirm that they have a statistically significant influence. By calculating the correlation coefficients C and V, according to χ^2 test results we obtain V = 0.195 and C = 0.191 for rural areas, that V = 0.219 and C = 0.213 for urban areas. In conclusion we can say that between the two features (control occasionally checked regularly) there is an association.

Data concerning the relationship between the type of tooth brushing and caries intensity are represented in *Table 5*.

Table No. 5 – The relationship between the type and intensity of dental caries brushing

	Horizontal Brushing				Vertical Brushing				Circular Brushing			
Medium	subjects	M6 decayed (average)	DMF-T (average)	DMF-S (average)	subjects	M6 decayed (average)	DMF-T (average)	DMF-S (average)	subjects	M6 decayed (average)	DMF-T (average)	DMF-S (average)
Rural	27	99 (3.67)	159 (5.89)	280 (10.37)	24	41 (1.71)	94 (3.92)	233 (9.71)	16	10 (0.63)	41 (2.56)	98 (6.13)
Urban	29	38 (1.31)	115 (3.97)	187 (6.45)	24	24 (1.00)	56 (2.33)	136 (5.67)	19	4 (0.21)	28 (1.47)	87 (4.58)

By applying the χ^2 test witch four degrees of freedom (at a value of p = 0,01), and the correction coefficients values, we obtain the vales represented in Table 6.

Table No. 6 – The values of statistical indicators apply to perform oral hygiene conditions

	x^2	V	C
Rural Medium	$22.88 > \chi_{4,0.99} = 13.2767$	0.147295	0.145723
Urban Medium	$15.63 > \chi_{4,0.99} = 13.2767$	0.152177	0.150445

The analysis found that there is statistical significance between the area where the subjects are living and dental problems (tooth brushing types made) and between the characteristics that influence the statistical significance there is an association.

Data from the examination of patients by the time after which say they are changing the toothbrush shown in *Table 7*.

Table No. 7 – Relationship between caries intensity and the changing of the toothbrush

	Horizontal Brushing				Vertical Brushing				Circular Brushing		
Medium	subjects	M6 decayed (average)	DMF-T (average)	DMF-S (average)	subjects	M6 decayed (average)	DMF-T (average)	DMF-S (average	subjects	M6 decayed (average)	DMF-T (average)	DMF-S (average)
Rural	16	14 (0.88)	53 (3.31)	127 (7.94)	24	47 (1.96)	99 (4.13)	215 (8.96)	27	89 (3.30)	142 (5.26)	269 (9.96)
Urban	30	8 (0.27)	68 (2.27)	143 (4.77)	24	26 (1.08)	67 (2.79)	142 (5.92)	18	32 (1.78)	64 (3.56)	125 (6.94)

By analyzing the statistical significance of the level p = 0.01 in this case we obtained a value of $\chi^2 = 15.20 > \chi^2_{tabular}$ 13.27, so we have statistical significance. By analyzing the correlation coefficients R = 0.119 and V = 0.120 for rural and C = 0.149 and V = 0.151 for the urban environment we can say that between the three features is a poor combination.

Data about those who prefer sweetened beverages between meals are represented in *Table 8*.

Table No. 8 – The relationship between sweetened beverage preference and intensity of dental caries

	Prefers soft beverages				Prefer non-carbonated beverages			
Medium	subjects	M6 decayed (average)	DMF-T (average)	DMF-S (average)	subjects	M6 decayed (average)	DMF-T (average)	DMF-S (average)
Rural	19	42 (2.21)	79 (4.15)	140 (7.36)	48	108 (2.25)	215 (4.47)	471 (9.81)
Urban	55	45 (0.81)	149 (2.7)	326 (5.92)	17	21 (1.23)	50 (2.94)	84 (4.94)

In this case the statistical indicator calculated $\chi^2 = 2.26 < \chi^2_{tabular} = 9.21$ for rural respectively $\chi^2 = 4.87 < \chi^2_{tabular} = 9.21$ for urban, which proves that there is no statistically significant differences between type of beverage consumed and intensity of caries in both rural and urban areas.

To determine if the maternal age at childbirth has an impact on the intensity decay statistical indicator we calculated both χ^2 in rural in urban areas, $\chi^2 = 0.67$ and $\chi^2 = 6.24$. Both values are lower than $\chi^2_{tabular} = 9.21$ which leads us to affirm that there is statistically significant. Correction coefficient values C = 0.025 and V = 0.025 are far beyond an expected value, which leads us to suggest that these factors have little importance in influencing the disease in the studied groups (Maxim, 2007; Ivan, 2005; Eckersly, 2011).

Of the same kind, for the relationship between the family's monthly net income below that over 1,000 RON and intensity of dental caries, we obtained values of χ^2 in rural areas $0.47 < 9.21$ and the value of the indicator table for urban $\chi^2 = 0.039 < \chi^2_{tabular} = 9.21$. It follows that in this case we have no statistically significant differences between family income and intensity of dental caries in both rural and urban areas.

Comparing the data on dental health in rural and urban children about the studied dental problems, we see that they follow a linear trend. The relationship between data can be written as (1) $y_i = b + a x_i + u_i, \quad i = \overline{1,48}$ where y_i, x_i represents the values of two variables (rural, urban) in the observation i and the observation is the error term. If we consider two estimators of the parameters *a* and *b*, noted as the value is obtained which represent the adjusted value of.

Using the method of most little squares they obtain these values

$$\tilde{a} = 1.434663148, \quad \tilde{b} = 0.5790750629.$$

Best straight line to approximate the point cloud observation is given by are plotted in Figure 1.
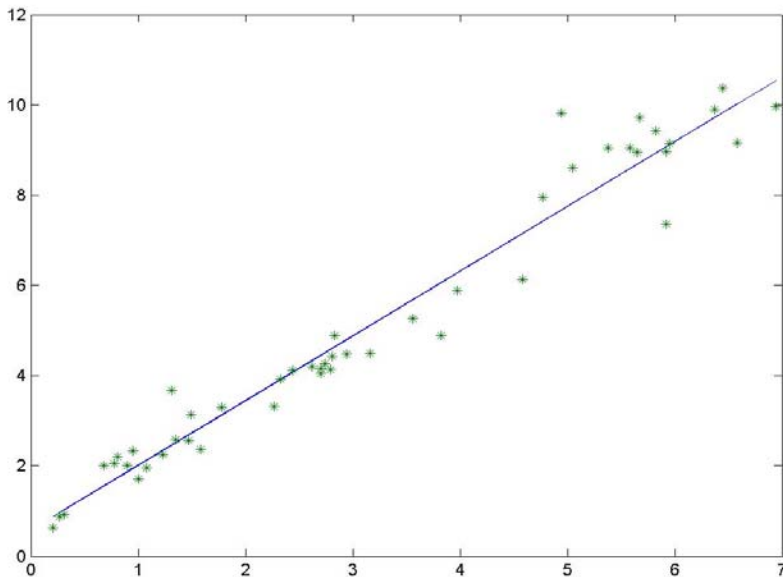

Figure No.1. The concentration of the cloud of observation points

Conclusions

Regarding the DMF-T index at 12-year-old children obtained by us, this has a little less value than a recent study realized in Constanta District (Nuca, 2009). His value is also bigger than the studies realized in West European country (Locker, 2004; Domejan- Orliaguet, 2007; Schulte, 2004). There are more dental health problems in rural than in urban areas. They consist of a high frequency of dental caries (number of subjects with caries, number of caries per subject, number of decayed surfaces, number of missing teeth because of caries complications, low number of fillings).That suggest that in the rural area the problems are 1,48 more then in urban area. We believe that there is a statistically significant link between the frequency of the dental check, type and frequency of brushing and of the toothbrush changing in both environments.

There were no statistically significant link between frequency of dental health problems and maternal age at childbirth, mother's education level and average monthly family income, both for rural and urban areas. The biggest difference between the frequency of dental health problems of the two environments are in the dental check (occasionally / regularly). We can affirm that a regular dental check 2 times per year prevent the dental caries frequency.

From the three types of brushing, the circular brushing prevents tooth decay better, so we conclude that the contribution of the educational factor in rural area may improve one part of dental problems at this age. The fact that we did not find statistical significance between maternal age at childbirth, level of education, average family income and intensity of caries in both rural and urban areas shows that the involvement of social and economic factors in the decay processing of this disease is complex and still incomplete known. It is clear that increasing the quality of life through education and health benefits can annihilate many factors determining also the dental caries.

Acknowledgement

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