THE CONNECTION BETWEEN SOCIOECONOMIC INEQUALITIES AND THE APPEARANCE OF THE TOOTHLESSNESS IN MOSTAR

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SUMMARY

Background: *To determine the existence of the toothlessness within the patients in the area of Mostar. The aim is to determine the topography of toothlessness within the population of Mostar, according to Kennedy classification. The aim is to connect measures of socioeconomic status with the appearance of the toothlessness. To develop a model that includes a form of toothlessness and the socioeconomic status of the patients in Mostar.*

Subjects and methods: *The study was conducted at the Health Center in Mostar and the Regional Medical Center in Mostar. The research was cross-sectional study. It included 800 patients who regularlyoccurred to the dental ambulance because of the toothlessness and because of the prosthodontics treatment. The measurement was conducted by the dentist based on the anonymous research cardboard at the first examination of the patient. The dentist will determine the topography of the toothlessness according to Kennedy classification and the etiology of the toothlessness.*

Results: *In the total sample of respondents, the toothlessness was significantly higher represented (P<0.001). The manifestation of thetoothlessness was significantly higher among temporary employees and the retirees (P<0.001). In the total sample, toothlessness affected the sociological status of a higher percentage of the respondents (P<0.001).*

Conclusion: *In our study, in a total sample of respondents, toothlessness was significantly higher represented (90% of respondents). The influence on the sociological status of the patient is most visible in the groups with the lower material status.*

Key words: toothlessness - socioeconomic status - topography - Mostar

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INTRODUCTION

A partial or complete toothlessness is defined as a disease state in the patient's mouth caused by extraction of the one, more or of the all teeth in the one or both jaws (Suvin 1984, 1991). The main consequence of this occurrence is the distortion of the external appearance of orofacial system, and sometimes of the facial symmetry. The orofacial system is the backbone of the appearance of the patient in the terms of the social perception and the recognizability of the patient (Knezović Zlatarić et al. 2001, Trifunović et al. 1995). The most common cause of the loss of the teeth is dental caries, which if it is not treated on time leads to the large destruction, not only of the teeth crown, but also of the root and the bone itself, and then the only way out is the tooth removal.The occurrence of the caries in the human development had several stages, from sporadic to epidemic occurrence (Gvozdenović-Simić 1994, Aurer Koželj 1996, Cockburn 1995). Based on archaeological findings, it was assumed that in the Neolithic and Bronze Age the caries occurrence was very low and it occurred under 1% (Day 1965, Hillson 1996, Keeih 1925). Based on archeological research that was conducted in France, Greece, Denmark and Great Britain it was estimated that in the countries of the Europe in the first 4000 years BC the caries prevalence ranged from 2 to 10 of caries on 100 teeth, so that in the 1000 years BC prevalence increased to 24 caries on 100 teeth (Larsen et al. 1991, Price 1989). There was the initiation of the sugar in the daily nutrition that influenced on an increased rate of the caries prevalence (Dawes 1989). Caries appearance is caused by dynamic process, in which occurs the process of demineralization of the hard dental tissue. The certain products of bacteria affect the process of demineralization, especially Streptococcus mutans, as well as the ferments of carbohydrates. In the beginning of its development, caries clinicalmanifests in the form of the white spot (macula cariosa) on the lead glaze, which later changes to the brown or black and depends on whether the caries begins its development on a smooth surface or on the fissures. The World Health Organization (WHO 1995) adopted the doctrinal principles about the prevention of caries, where the role of fluoride in the prevention of formation of caries was pointed out.Examples from the US suggest that the prevalence rate in some regions is insignificant and that is under the complete control, but still in some areas toothlessness is a serious public health problem.

So, data among children of immigrants from Mexico indicate that the rate of the prevalence of the caries ranges from 21 to 46%, which is much more than in Central America where the rate of the caries ranges

between 6% and 9%. The reason of increasing of the rate of caries prevalence among the certain groups is associated with the lower oral hygiene in one hand and with the lower socioeconomic status (Herbert et al. 2008). In the countries of the Eastern Europe despite the efforts of the health service to reduce the rate of the caries prevalence, the results are achieved very slowly (Stamenković et al. 2003, Žabarović et al. 2008). The aim of the therapy in the dental prosthetic is to restore the disturb function and aesthetics after the loss of teeth and to prevent and slow down the changes in the alveolar ridge, by the prosthetic device, fixed and mobile, as the way of the therapy (Hellden et al. 1989, Slade 1990, Truin et al. 1988). In the former scientific researches the connection of the certain risk factor with the appearance of the poor condition of the denture and toothlessness is showed. A review of this area of the research shows the existence of the wide range of connection of poorer socioeconomic state with the unfavorable health outcomes. In addition to age and the gender, as two common factors that can strongly influence on the various biomedical outcomes, the recent medical literature often focuses on socio-economic inequality as a risk factor or even the cause of several conditions or diseases. These results were described in the dentistry, and they almost systemati-cally speak in favor of poorer condition of the denture, a greater chance of loss of one or more teeth and con-sequently higher incidence of toothlessness among the people of the lower socioeconomic status (Minach 1991, Jerolomov 2005, Herbert et al. 2008, Stamen-ković et al. 2003, Žabarović et al. 2008, Hellden et al. 1989, Slade 1990). In the available medical literature, none of those studies were completely focused on the connection between the appearance of the toothless-ness and the socioeconomic status. It is possible that there are significant differences in the location and the appearance of toothlessness, which are associated with some of the indicators of the socioeconomic status. The developed countries in the health care programs devote full attention to the primary and secondary prevention of the oral health (Stamenković et al. 2003). In Canada, although there has been a significant reduction of the prevalence of the caries in the last 15 years, it was estimated that the costs of the treatment of the caries were about $ 3.1 billion, although these costs were lower by more than twice than they were in 1980. In a study conducted among the older population in Mexico, 27% of respondents were completely toothless, while 22% of respondents used the dental care. A study conducted in Hamburg among 137 of respondents showed that the vast majority felt a fear of a dentist, and that the 10% had a significant phobia. The results also showed that the oral health was worse among older than among younger patients, among men than among women and among those respondents of the lower socioeconomic status. The complete toothlessness has a high prevalence in the German population. According to data in Ger-man research about the oral health, 22.6% of the retirees are toothless. In European comparison, there are higher values in Great Britain and Ireland, where almost 50% of those over 65 years old does not have any of their own teeth. Austria and Switzerland with 15% have significantly less toothless retirees. The condition of the oral health of the adult population of all countries is characterized with the high degree of the loss of teeth and with toothlessness. It is noticed the high level of addiction between the age and oral status. Among 90% of all respondents the periodontal disease is presented. In order to improve the condition of the oral health among the older population the concept of preventive measures for the reduction of caries and periodontal disease appropriate to the life age as well as appropriate guidelines of the treatment with the aim of prolonged preservation of the natural teeth is needed (Frisk et al. 2003, Locker et al. 1991, WHO 2007, Sisson 2007).

The topography of the toothlessness

The topography of the toothlessness is a constant default in the dental science.

The simplest topographic classification is according to the criterion of the interrupted or shortened dental arch, or according the position of the toothless alveolar ridge in relation to the remaining teeth.

Kennedy divides the topographic toothlessness in the four classes and the corresponding subclasses; the criterion is the relation of the toothless spaces according to remaining teeth.

- *Class I.* are the cases when the toothless alveolar ridge is located on the both sides behind the re-maining teeth;
- *Class II.* are the cases with unilateral alveolar ridge behind the remaining teeth;
- *Class III.* free space is unilaterally between the re-maining teeth;
- *Class IV.* toothless alveolar ridge is in front of the remaining teeth.

SUBJECTS AND METHODS

The study was conducted at the Health Center of Mostar and at the Regional Medical Center in Mostar. The research was cross-sectional study. It included 800 patients who regularly occurred to the dental ambulance because of the toothlessness and because of the needed prosthodontics treatment. Ethical approval received from the institutional Ethics Committee of the Uni-versity Clinical Hospital Mostar.The involvement in the study, including the surveys was on the voluntary basis, after the each subject got all the explanations and signed the Informed consent.

The measurement was conducted by the dentist based on the anonymous research cardboard at the first examination of the patient. The following indices were used for the evaluation of the resulting data: Townsend index of deprivation and own survey. The study involved adult patients; these are the patients older than 18 years, and that is the time of the finished growth of the permanent dentition. The input variables: gender, age, status of the teeth, the topography of the toothlessness, the etiology of the toothlessness.

Statistical analyses

The obtained results were processed using descriptive and nonparametric and parametric statistical methods. The distribution of data was tested by Kolmogor-Smirnov test.

Nonparametric variables are presented as frequency and percentage, and parametric variables are presented as arithmetic mean and as standard deviation. To test the difference between the groups, they used the chi-square test for the nominal variables. To test the differences between the examined groups for the continuous variables, they used the one way analysis of the variance (ANOVA). To determine the correlation between variables, they used the binary logistic regression analysis. The level of significance that was less than 0.05 was considered statistically significant. The statistical analysis was made using the program systems SPSS for Windows (version 17.0, SPSS Inc., Chicago, Illinois, USA) and Microsoft Excel (version 17.0, SPSS Inc., Microsoft Corporation, Redmond, WA, USA).

RESULTS

In the total sample of respondents, the toothlessness was significantly higher represented (Figure 1). In the total sample of respondents the first and the fourth class of the toothlessness was dominated, and the difference was statistically significant (Figure 2).

The appearance of the toothlessness was significantly higher in the older age groups; topographic without the classification was younger age group, while the first and the fourth class were significantly represented in the older age groups (Table 1). The toothlessness was significantly higher in males. Topographic without the classification were more often female respondents, while the first and the fourth class was significantly represented within the males (Table 2). The toothlessness was significantly higher in the lowest and the highest educated group, topographic without the classification was of the lowest percentage, and with the first and the fourth class in the highest percentage were the respondents of the lowest level of education (Table 3). The appearance of the toothlessness was most common in the groups with the middle revenues. Topographic, the

first and the fourth class among the respondents with the revenues of 500-1000 BAM was mostly represented (Table 4). The appearance of the toothlessness was significantly more represented among respondents who had dental care less than three times a year. There were no significant differences in the appearance of the toothlessness in relation to the distance from the place of residence to the first medical institution which realizes dental care.

χ2=511,682; df=1; p<0,001
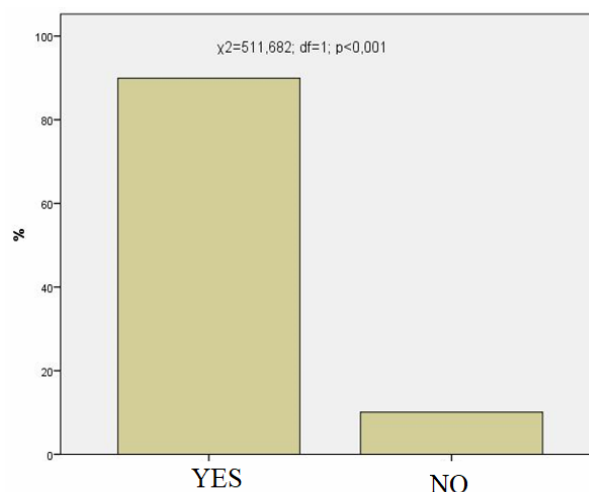
YES - subjects with toothlessness, NO - subjects without toothlessness
In the total sample of subjects, the toothlessness was presented at about 90% subjects, what is significantly higher represented than subjects without toothlessness

Figure 1. The representation of the toothlessness in the simple expressed as a percentage

χ2=282,682; df=6; p<0,001
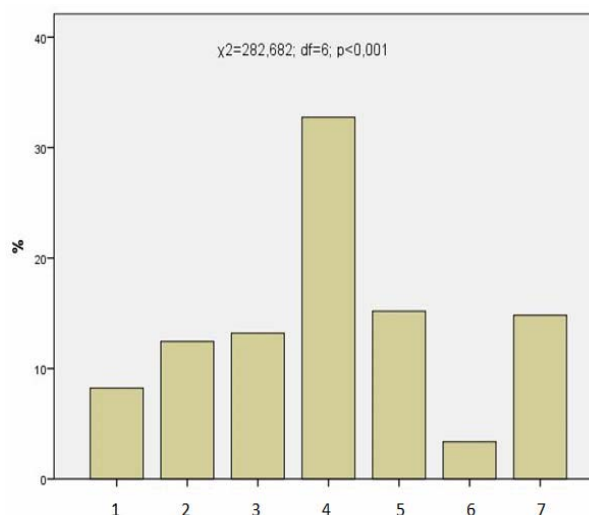
Topography according to Kennedy: 1 - without the classification; 2 - first and the second class; 3 - first and the third class; 4 - first and the fourth class; 5 - second and the third class; 6 - second and the fourth class; 7 - third and the fourth class.

In the total sample of respondents the first and the fourth class of the toothlessness was dominated, and the difference was statistically significant

Figure 2. The topography of the toothlessness in the total sample expressed as a percentage

Table 1. The differences in the dental status in relation to the age of respondents

	Age								χ^2	P
	18-34		35-49		50-64		65+			
	N	%	N	%	N	%	N	%		
There is the toothlessness in the patient	202	80.8	254	89.8	196	99.0	70	97.2	45.127	*<0.001**
Topography according to Kennedy									168.286	*<0.001**
Without the classification	44	17.6	21	7.4	1	0.5	0	0.0		
The first and the second class	48	19.2	28	9.9	18	9.1	6	8.3		
The first and the third class	33	13.2	19	6.7	52	26.3	2	2.8		
The first and the fourth class	60	24.0	126	44.5	60	30.3	17	23.6		
The second and the third class	23	9.2	47	16.6	33	16.7	19	26.4		
The second and the fourth class	14	5.6	8	2.8	4	2.0	1	1.4		
The third and the fourth class	28	11.2	34	12.0	30	15.2	27	37.5		

χ^2- Chi-square test

Table 2. The differences in the dental status in relation to the gender of respondents

	Gender				χ^2	P
	Male		Female			
	N	%	N	%		
There is the toothlessness in the patient	372	92.8	350	87.1	6.585	*0.007**
Topography according to Kennedy					21.679	*0.001**
Without the classification	19	4.7	47	11.7		
The first and the second class	49	12.2	51	12.7		
The first and the third class	54	13.5	52	12.9		
The first and the fourth class	144	35.9	119	29.6		
The second and the third class	70	17.5	52	12.9		
The second and the fourth class	8	2.0	19	4.7		
The third and the fourth class	57	14.2	62	15.4		

*$P<0.05$; χ^2- Chi-square test

Table 3. The differences in the dental status in relation to the level of education of the respondents

	The level of education								χ^2	P
	PS		HSE		CE		UD			
	N	%	N	%	N	%	N	%		
There is the toothlessness in the patient	100	97.1	448	88.4	86	86.0	88	94.6	6.585	*0.007**
Topography according to Kennedy									21.679	*0.001**
Without the classification	3	2.9	45	8.9	12	12.0	6	6.5		
The first and the second class	15	14.6	68	13.4	13	13.0	4	4.3		
The first and the third class	20	19.4	54	10.7	16	16.0	16	17.2		
The first and the fourth class	40	38.8	148	29.2	33	33.0	42	45.2		
The second and the third class	0	0.0	82	16.2	24	24.0	16	17.2		
The second and the fourth class	0	0.0	26	5.1	1	1.0	0	0.0		
The third and the fourth class	25	24.3	84	16.6	1	1.0	9	9.7		
The toothlessness affects the phonation	50	48.5	308	60.7	63	63.0	55	59.1		
The toothlessness affects the function	93	90.3	311	61.3	84	84.0	76	81.7		
The problems with chewing, swallowing, in the joint, in digestion	47	45.6	126	24.9	19	19.0	16	17.2	27.327	*<0.001**
The toothlessness affects the aesthetics	52	50.5	335	66.1	70	70.0	61	65.6	10.755	*0.013**

PS - primary school; HSE- high school education; CE - college education; UD - university degree
*$P<0.05$; χ^2- Chi-square test

Table 4. The differences in the dental status in relation to the revenues of the household

| | What are your revenues of the household | | | | | | | | χ^2 | P |
| | <300 | | 300-500 | | 500-1000 | | >1000 | | | |
	N	%	N	%	N	%	N	%		
There is the toothlessness in the patient	217	87.5	154	92.8	288	92.3	63	81.8	10.623	*0.014**
Topography according to Kennedy									83.168	*<0.001**
Without the classification	26	10.5	11	6.6	17	5.4	12	15.6		
The first and the second class	25	10.1	34	20.5	31	9.9	10	13.0		
The first and the third class	43	17.3	26	15.7	21	6.7	16	20.8		
The first and the fourth class	75	30.2	41	24.7	124	39.7	23	29.9		
The second and the third class	33	13.3	17	10.2	60	19.2	12	15.6		
The second and the fourth class	7	2.8	0	0.0	20	6.4	0	0.0		
The third and the fourth class	39	15.7	37	22.3	39	12.5	4	5.2		

$^*P<0.05$; $\chi^{2\text{-}}$ Chi-square test

DISCUSSION

The lack of one or more teeth is a widespread phenomenon, not only among adults, but also among a large number of children, and because of that it represents a significant problem of a modern dentistry.

The toothlessness is a syndrome which is characterized by a loss of permanent teeth in the dental arch of the upper or the lower jaw. Our study included 800 respondents. We examined the influence of the socio-economic status on the toothlessness representing. In the total sample of the respondents the toothlessness was significantly higher represented (90% of respondents), which was consistent with many studies conducted in Europe and in the region (Herbert et al. 2008). Our resultas showed that 44% younger subjects does not have toothlessness, while at older population, over 65, the first and the fourth class were significantly represented. Similar results were obtained in a study conducted in Serbia,where a large number of the population between 50 and 60 years do not have one to five teeth and every fifth that is over 60 years old does not have any own teeth. The problems with the chewing, swallowing, in the joint and digestion were the most expressed in the oldest group of the respondents. In a European comparison, there are higher values in Great Britain and Ireland, where almost 50% of those who are over 65 years old does not have any of their teeth which coincides with our research. The most recent national data discovered that the 40% of adults in age of 75 and over were completely toothless (Truin et al. 1988). The toothlessness was significantly higher in males. Topographic without the classification were more often female respondents, while the first and the fourth class was significantly represented within the males (US Department of Health and Human Services. US Public Health Service 2000). In our study, the appearance of the toothlessness was significantly higher in the lowest and highest educated group, which could be explained by the better level of information about the significance of the oral health of the more educated population in relation to the population with the lower level of the education.

The financial status of the population in our society probably affected that, although the maintenance of the oral hygiene did not require large material costs.

We proved that the influence on the sociological and psychological status of the patient was most expressed among the groups with the lower material status. The developed countries in the health care programs devote full attention to primary and secondary prevention of the oral health (Stamenković et al. 2003). The president of the American Association for the protection of the oral health Leon Williams (1852-1931) pointed out that "the maintenance of the dental hygiene eliminates the risk of the tooth removal" (Herbert et al. 2008, Stamenković et al. 2003, Žabarović et al. 2008). The toothlessness mainly influenced on the phonation and on the function in the group with the lower socioeconomic status than the others, problems with the chewing, swallowing, in the joint and in the digestion among respondents with the worst material status. "It is widely accepted the fact that there is a connection between socioeconomic inequality and the oral health (Locker 2000, Watt 2007). As a part of the multinational study, the condition of the oral health and the need for the treatment among 19.845 of respondents in the age groups of 55-64, 65-74, and over 74 from Austria, Belarus, Germany, Hungary, Italy, Poland, Slovenia and Czech Republic. A growing number of empirical studies (Sisson 2007) suggest that the socioeconomic gradient in the oral health can be connected with the social, ecological and the political factors that react through the material status, behavior, and psychosocial impact (Sisson 2007, Watt 2007). In our study the appearance of the toothlessness was significantly higher among the older age groups. The risk factors for the complete toothlessness include the lower socioeconomic status, the rural area, and older age which coincide with our research. Prevention is the cheapest." Certainly, the collective culture of the

maintenance of the oral hygiene in this part is behind the western part of the Europe, and the Europe is also behind the USA (where it is colloquially used term "European teeth" for yellow and crooked teeth) (Slade 1990). Unfortunately, in Bosnia and Herzegovina, it is still common for a subject to come late when the interventions are much more complicated, and longer lasting. The availability of the dental care did not impact on of the toothlessness. So, although our study showed significant impact socioeconomic status on toothlessness, there are additional factos such as phobia, lack of collective culture of the maintenance of the oral hygiene and preventive programs The fact is that Bosnia and Herzegovina is one of the poorest countries of the Europe and that it has very low socioeconomic status of which depends the quality of health care of the population. According to the available data from 1999, for the dental care of children they separated 3 BAM, and for the care of adults they separated 1.98 BAM, which showed a clear picture of the situation. In order to determine a possible solution of this important problem, it is necessary to work on the awareness of the population, on preventive action and on the protection of the oral health with the help of preventive programs of the Federal Ministry of Health.

CONCLUSIONS

In the total sample of the subjects the toothlessness was significantly higher represented, also significantly higher in older subjects and male.

Topographic without the classification were with the lowest percentage, and with the first and fourth class in the highest percentage were the respondents of the lowest level of education group.

In the total sample of respondents the dominant was the first and the fourth class of the toothlessness.

The impact on the socioeconomic status of the patient is most expressed in the groups with the lower material status.

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