



## Oral hygiene habits and prosthodontic treatment needs in younger adolescent population of Pančevo, Serbia

### Oralnohigijenske navike i potrebe za protetskim zbrinjavanjem mlađih adolescenata u Pančevu, Srbija

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#### Abstract

**Background/Aim.** Dental status and oral hygiene habits are poor in young population living in deprived socioeconomic conditions. The aim of this research was to ascertain oral hygiene habits in adolescents attending high schools in urban area, determine the incidence of tooth loss at the age of 15–16 years and the gender difference. **Methods.** The epidemiological cross-sectional study included 234 randomly selected high school students. The research instruments were questionnaire (focusing on socio-demographic characteristics, habits, attitudes and behavior related to general and oral health) and clinical examination (tooth loss, normative need for prosthodontics restorations and presence of restorations). **Results.** Gender-related data comparison revealed that 32.5% of girls and 8.1% of boys had at least one tooth extracted ( $p < 0.05$ ). Also, 56.2% of girls and 75.7% of boys brushed their teeth twice a day. Caries complications were identified as the indication for tooth extraction in 82.8% of participants. The data analysis confirmed the correlation between gender and tooth loss as well as treatment needs. Tooth loss was correlated with oral hygiene habits and reasons for dental visits. Treatment need was also affected by the reasons for tooth extraction and the absence of adequate prosthodontics therapy ( $p < 0.05$ ). **Conclusion.** Sociodemographic conditions significantly influenced the number of participants with extracted teeth. A prosthodontic treatment need was influenced by the reasons for tooth extraction, adolescents' knowledge about the importance of adequate treatment and previous unpleasant experience.

#### Key words:

adolescent; dental care; dental health surveys; dentures; habits; oral hygiene; tooth extraction.

#### Apstrakt

**Uvod/Cilj.** Oralnohigijenske navike i dentalni status su lošiji kod adolescenata koji žive u lošijim socioekonomskim uslovima. Cilj rada bio je da se utvrdi kakve su oralnohigijenske navike adolescenata koji pohađaju srednju školu u gradskoj sredini, odredi incidenca ispitanika kojima je izvađen zub u uzrastu 15–16 godina kao i postojanje razlike u polu između proučavanih grupa ispitanika. **Metode.** U epidemiološku studiju preseka bila su uključena 234 slučajno izabrana učenika srednjih škola u Pančevu. Instrumenti istraživanja su bili upitnik (9 celina, čija su se pitanja odnosila na sociodemografske karakteristike ispitanika, navike, stavove i ponašanje u vezi sa oralnim i opštim zdravljem) i klinički pregled (gubitak zuba, normativne potrebe za protetskim zbrinjavanjem i prisutnim nadoknadama). **Rezultati.** Nađena je značajna razlika u odnosu na pol; kod 32,5% devojčica i 8,1% dečaka izvađen je bar jedan zub; 56,2% devojčica i 75,7% dečaka peru zube dva puta dnevno; 82,8% ispitanika navelo je komplikacije nelečenog karijesa kao razlog za vađenje zuba. Statističkom obradom rezultata potvrđeno je postojanje korelacije između polova i gubitka zuba kao i potreba za zbrinjavanjem. Gubitak zuba je povezan sa oralnohigijenskim navikama, ali i razlozima zbog kojih ispitanici odlaze kod stomatologa. Na potrebu za protetskom nadoknadom uticali su razlozi vađenja zuba i odsustvo adekvatne protetske terapije. **Zaključak.** Sociodemografski faktori značajno utiču na procenat ispitanika kojima su izvađeni zubi. Potreba za terapijom je uslovljena razlozima vađenja zuba, znanjem ispitanika o važnosti tih razloga, ali i prethodnim neprijatnim iskustvom kod stomatologa.

#### Ključne reči:

adolescenti; zubi, nega i lečenje; zubi, ispitivanje stanja; zubna proteza; navike; usta, higijena; zub, ekstrakcija.

## Introduction

Oral hygiene habits are formed and learnt during the earliest period of child's life and developed and strengthened during the period of adolescence. Parents and the closest surrounding have an important role in the formation of positive health habits in children. Parents' influence is closely related to the existence and persistence of oral hygiene habits, i.e., a positive correlation has been established between socioeconomic status of the family and regular oral health maintenance<sup>1</sup>.

For the adolescents, the main sources of information related to oral health are family and school<sup>2</sup>. The dental status of the parents may define their approach towards oral health and hygiene habits, so their subjective norms determine how much attention parents devote to the formation of positive habits in their children<sup>3</sup>. Parents' knowledge about the hygiene habits is often reflected in their children's oral and dental status<sup>4</sup>. Mother's education was identified as a protective factor for the oral hygiene habits of the adolescents<sup>5</sup>. Fontanini et al.<sup>6</sup> relate the absence of the positive hygiene habits and poor use of oral health care in adolescents to the influence of family, friends and access to material goods. Better socioeconomic conditions in which a young person lives, social support and youth culture affect knowledge and attitude towards oral health, its importance and oral status and hygiene habits. Adolescents who live in better conditions, do better at school and have a large groups of friends, also have better dental status and oral hygiene habits<sup>7</sup>.

Oral health care in Serbia is freely accessible for the sensitive groups including adolescents. According to the data published by the Statistical Office of the Republic of Serbia, 9.2% of Serbian population lives below the poverty line. Dental status and oral hygiene habits are worse in adolescents living in the inadequate socioeconomic conditions. This is particularly related to rural areas, large families and families with a low level of parents' education<sup>8</sup>. The aims of this study were to determine oral hygiene habits in the adolescent population, the frequency and the main reason for dental visits, the effect of oral hygiene habits on tooth loss and normative treatment needs as well as the percentage of adolescents aged 15–16 years with at least one extracted tooth and the percentage of subjects in need of a prosthodontic rehabilitation, the effect of socioeconomic status of parents (education, employment, income) on tooth loss and the need of prosthodontic rehabilitation in adolescents.

## Methods

This epidemiological cross-sectional study included 234 first and second grade high school students in Pančevo, in the period of May–June 2015. The participants were randomly chosen. Only pupils enrolled in public schools were included. All eligible pupils (325) were invited to take part in the study, of which 234 were finally included (response rate was 72%). Their parents gave written consent and the Ethics Committee of the Faculty of Dentistry, Pančevo, approved the study. All questionnaires without information regarding gender, age and dental habits were excluded from the study.

## Research instrument

The research instrument used in this study was the questionnaire. A pilot study was conducted on 20 subjects of the same age. The aims of this pilot study were to verify the questionnaire, evaluate its clarity, introduce changes and simplified formulations if necessary.

The questionnaire comprised 9 thematic parts focusing on sociodemographic characteristics, habits, attitudes and behavior related to general and oral health as well as subjects' self-evaluation regarding confidence and successfulness. Special attention was given to the questions related to the sociodemographic characteristics of each subject and their oral hygiene habits. The questionnaire was designed by the examiners, except Oral health impact on daily performance (OIDP) that was completely included without alteration.

## Dental status examination

The dental status was determined during the clinical examination performed by two calibrated researchers. Prior to the clinical examination, the researchers were trained for consistency of data and uniform assistance to the participants to fill in the questionnaire. The clinical examination was performed in classrooms at daylight, with the participants sitting in school chairs by the window. A dental mirror and probe were used to perform the clinical examination<sup>9</sup>. The following information was gathered: the loss of permanent teeth, the need for prosthodontic restoration, the presence of prosthodontic restorations, dentoalveolar malocclusions, the need for orthodontic treatment and the presence of orthodontic appliances.

## Statistical analysis

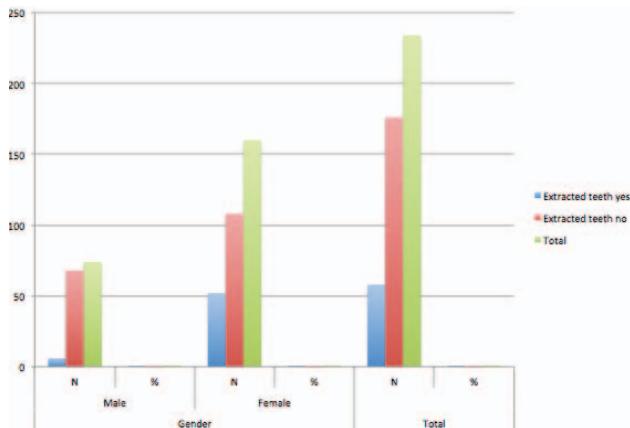
Statistical analysis was performed using the software package SPSS Statistics (version 20.0). The Pearson's  $\chi^2$  test was used in the form of a test of goodness of fit and contingency table. It was tested whether or not differences existed between the frequencies of nonparametric data for one or two parameters. The signed-rank test was used as another nonparametric statistical test. Nonparametric correlation was used to analyze the relationship between the examined characteristics in relation to data distribution.

## Results

There were 234 participants in this study, 74 (31.6%) males and 160 (68.4%) females. Even though the study was conducted in the urban area, more than a half of participants lived in the rural area (57.4%). More than two thirds of participants lived in families where parents had secondary school education (72.9% for mothers and 69.2% for fathers). Similarly, 69.5% of participants stated that their parents were unemployed (although more than two thirds claimed that their family income was above Serbian average).

The gender-related data comparison revealed a significant difference as 32.5% of girls had at least one permanent

tooth extracted compared to 8.1% of boys (Figure 1). Similar results were obtained for the second parameter, as almost one third of girls had normative prosthodontic treatment need (Figure 2). A great orthodontic treatment need was found related to dento-alveolar malocclusions (67.6% of boys and 68.8% of girls) whereas few participants were already involved in the orthodontic treatment (less than 4% in total).



**Fig. 1 – Number of participants with extracted teeth according to gender.**

The data related to oral hygiene habits revealed the following: less than 1% of participants did not brush their teeth at all, 56.2% of girls and 75.7% of boys brushed their teeth twice a day whereas nearly half of the girls brushed them three times a day compared to one fifth of the boys (43.8% vs. 21.6%). The results suggest that more than a half of the surveyed adolescents used accessory hygiene agents (65%), mouthwashes being the most frequently used (55.1%). Although the girls had worse results regarding tooth loss and normative treatment needs, the results of this study indicate that the girls (78.8%) more often than the boys (51.4%) visit dentists.

A majority of participants identified caries complications as the indication for tooth extraction (82.8%) irrespective of gender. When asked why they were not treated adequately following a tooth extraction, most participants of both gen-

ders (69% girls and 50% boys) responded that they were not informed about the importance of prosthodontic treatment. The rest of the boys indicated the lack of financial means compared to 10.3% of girls. The lowest percentage of participants stated that they did not consider prosthodontic treatment important for normal function (6.5% in total). Similar percentage of participants of both genders reported check-up or pain as the main reasons to visit dentists (42.7% and 44.4%) while only 10.3% of participants considered the tooth appearance as the reason for such visits.

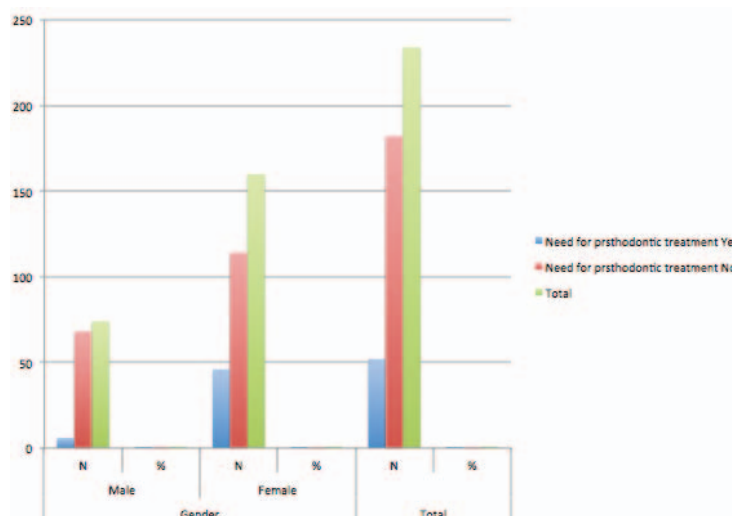
Further data analysis using nonparametric correlation confirmed the correlation between gender and tooth loss as well as treatment needs (Table 1). Beside that, a significant relationship was found between the tooth loss and the parents employment status. Treatment needs were associated with family income (Table 2).

**Table 1  
Nonparametric correlation between gender, tooth loss and normative prosthodontic treatment need**

Variable	Gender
Extracted teeth	Ro -0.263
	<i>p</i> <b>0.000</b>
Prosthodontic treatment need	Ro -0.231
	<i>p</i> <b>0.000</b>
Presence of prosthodontic restorations	Ro -0.063
	<i>p</i> 0.336
Presence of orthodontic anomalies	Ro -0.012
	<i>p</i> 0.857
Presence of orthodontic appliances	Ro -0.128
	<i>p</i> <b>0.051</b>

**Number of participants = 234.  
Ro – coefficient of correlation.**

The tooth loss was correlated with the oral hygiene habits and reasons for dental visits. Unpleasant experience during previous dental treatment(s) significantly affected prosthodontic treatment need. Furthermore, treatment need was also affected by reasons for tooth extraction and the absence of adequate prosthodontic therapy ( $p < 0.05$ ) (Table 3).



**Fig. 2 – Number of participants with need for prosthodontic treatment according to gender.**

**Table 2**  
**Nonparametric correlation between sociodemographic factors, tooth loss and treatment need**

Variable	Living environment	Mother's education	Father's education	Parents' employment	Family income	Lives with:	Lives in:	Family vacation	Number of family members	Do they own a computer	Do they own a car
Extracted teeth	Ro	0.021	-0.074	0.122	0.070	-0.087	-0.180	-0.099	0.002	-0.047	-0.202
	<i>p</i>	0.751	0.257	<b>0.062</b>	0.286	0.182	<b>0.006</b>	0.131	0.978	0.472	<b>.002</b>
	<i>n</i>	236	234	236	236	236	236	236	236	236	236
Prosthodontic treatment need	Ro	0.092	-0.009	-0.003	0.142	0.015	-0.132	-0.042	0.013	-0.063	-0.204
	<i>p</i>	0.157	0.886	0.963	<b>0.030</b>	0.814	<b>0.043</b>	0.520	0.838	0.334	<b>.002</b>
	<i>n</i>	236	234	236	236	236	236	236	236	236	236
Presence of prosthodontic restorations	Ro	0.017	0.034	-0.140	-0.187	0.051	0.028	-0.066	-0.017	0.021	.059
	<i>p</i>	0.790	0.605	<b>0.032</b>	<b>0.004</b>	0.432	0.667	0.313	0.791	0.744	.368
	<i>n</i>	236	234	236	236	236	236	236	236	236	236
Presence of orthodontic anomalies	Ro	-0.007	0.138	-0.249	-0.073	-0.125	-0.140	0.313	-0.075	0.010	-0.107
	<i>p</i>	0.920	<b>0.035</b>	<b>0.000</b>	0.266	<b>0.054</b>	<b>0.031</b>	<b>0.000</b>	0.249	0.880	.100
	<i>n</i>	236	234	236	236	236	236	236	236	236	236
Presence of orthodontic appliances	Ro	-0.029	-0.025	-0.181	-0.085	-0.003	0.057	-0.062	-0.035	0.043	.016
	<i>p</i>	0.589	0.704	<b>0.005</b>	0.195	0.966	0.383	0.342	0.592	0.507	.810
	<i>n</i>	236	234	236	236	236	236	236	236	236	236

Number of participants = 234.  
Ro – coefficient of correlation.



## Discussion

During the past two decades, a major portion of industrial facilities in Pančevo, Serbia, were closed resulting in higher unemployment and lower financial status of the local population leading to changes in the population structure with the majority of families having high-school educated, unemployed parents. Irrespective of the statement related to parents' employment status, two thirds of participants stated that their family income exceeded Serbian average. The inconsistent statements may be due to the misinformation about the real family financial status or shame to state the true information. Jung et al. 1 recommended that surveying the adolescent population regarding socioeconomic status should be done indirectly by using sets of questions that would indicate the true financial status.

The effect of socio-demographic factors on the oral health and oral status was confirmed in a number of studies based on the Decayed, Missing, Filled Teeth (DMFT) score<sup>10-14</sup>. The same was confirmed in the present study, although the studied parameters were extracted teeth and prosthodontic treatment need. This result was expected because the lower education levels and income of parents affect primarily their attitude towards oral health and hygiene habits in the adolescents but also the ability to afford treatment not covered by insurance.

The results from this study indicated that girls had worse dental status and greater need for prosthodontic treatment, which was rather unexpected in light of the fact that girls pay more attention to health in general and oral health. Beside that, the girls are more concerned with their appearance and better informed about the importance of oral health than boys<sup>15</sup>.

The present literature contains limited information about normative treatment needs of adolescents. Some Brazilian authors reported that the percentage of participants in this age group in need of rehabilitation decreased<sup>16</sup>. Vazquez et al.<sup>17</sup> reported that 13.7% of participants in a national survey aged 15–17 years were in a need of prosthodontic treatment. The difference between their study and the present results may be explained by the fact that the whole population sample, irrespective of gender, was analyzed. The girls showed better results related to the oral hygiene habits, the use of accessory hygiene agents and the frequency of dental visits, all being in accordance with similar studies which focused on the oral hygiene habits and gender differences<sup>18, 19</sup>. Worse dental status and greater treatment needs in girls may partly be explained by the sample structure itself, with more than two thirds of participants being female.

Numerous studies focused on the hygiene habits, dental check-ups and family economic status. It was reported that the adolescents from the lowest economic strata exploited the oral health care least (even when it is free), visited dentists only in the case of an acute problem and did not have a permanent dentist<sup>10, 11</sup>. Vazquez et al.<sup>17</sup>, who reported a positive correlation between the low socioeconomic status and the number of untreated teeth, saw the same trend in a study. An average DMFT score was higher in the families with unfavorable living conditions. The authors explained this finding by

standard of living, parents' focus on existence and access to oral health care. Most authors who studied poor population groups agreed that adolescents visited dentists irregularly<sup>13, 14</sup>, went for check-ups less than once every two years and Bhola and Malborta<sup>20</sup> found that, on average, the first visit to the dentist was at the age of 12 years.

The research into oral hygiene habits showed that most participants maintained good oral health and had regular dental check-ups. These results differ from previous studies showing that the adolescents irregularly visit dentists, i.e., only when there is a problem<sup>11, 20, 21</sup>. The difference in these results may be due to the differences in the sample because the authors focused on the rural population of a lower socioeconomic status. Better results in the surveyed adolescents could be related to the effect of youth culture, access to information at school and through various media, indicating the importance of environment and social support for young people's attitude towards general and oral health.

Most participants came from the low economic class, but the effect of the sociodemographic factors on oral hygiene habits was not crucial. A great effect of the sociodemographic factors was found in categories such as tooth loss and prosthodontic treatment need. This may be explained primarily by parents' education that defines their attitude towards oral health in general but also family income where participants opt for tooth extraction as the cheapest treatment option compared to the endodontic and prosthodontic treatments. The parents' education may define adolescents' relationship to oral health and their interest, knowledge and attitudes<sup>22</sup>.

The positive hygiene habits and regular check-ups reduce the need for normative dental treatment. Despite extensive education and preventive programs, teeth are often extracted early, in childhood or adolescence. The loss of a tooth in early period of life affects the morphology of dental arches, function of masticatory apparatus as well as physical appearance, self-esteem and quality of life of a young person. The most frequent reasons for extraction of permanent teeth in the adolescent population are caries, its complications and orthodontic indications<sup>21, 23, 24</sup>. Various studies report different data on the percentage of subjects with extracted teeth in the period of adolescence, from 17.4% in Argentina, 32.3% in Turkey, 44.8% in Brazil up to 50% in a national study in Argentina<sup>16-18, 25</sup>.

Tooth loss in adolescents is a problem that may influence all aspects of life. Beside masticatory dysfunction, the esthetic appearance, self-confidence and overall quality of life of young people are affected. In the present study, 24.6% of participants had at least one permanent tooth extracted and 22% were in need of prosthodontic rehabilitation. As two thirds of the patients had dentoalveolar malocclusion, it is possible that the percentage of participants with normative treatment needs would be lower if they were included in some sort of orthodontic treatment, which would close the gaps following tooth extraction with fixed orthodontic appliances. The authors of similar studies reported different results with the percentage between 21.9% and 38.9%<sup>17, 18</sup>. The present results cannot be compared to other studies because of the

different sample structure and study design. A high percentage of participants with extracted teeth suggests that despite good hygiene habits and regular check-ups, sociodemographic factors significantly affect dental status and attitude of the adolescents towards oral health.

Only a few studies focused on the normative needs of adolescents for prosthodontic rehabilitation irrespective of the reason(s) for tooth loss both in international and national scientific literature. The available data suggest that there is a high percentage of untreated adolescents. Vazquez et al.<sup>17</sup> reported that 13.7% of adolescent subjects need some kind of prosthodontic treatment. Barbato and Peres<sup>15</sup> stated that girls were presented with more extracted teeth, which was explained in part by girls' better oral care leading to more frequent dental visits which sometimes may negatively affect the survival of teeth (overtreatment).

It is important to mention a present statistical relationship between prosthodontic treatments need and previous unpleasant dental experience, indicating that previous dental treatment itself is an important factor influencing adolescents' knowledge, attitudes and behaviour towards oral health. Previous unpleasant experience may contribute to the increased dental fear, postponing dental visits and leading consequently to tooth loss. This is corroborated with the finding that most participants had their teeth extracted due to caries complications (82.8%), which could have been prevented with adequate and timely treatment.

An important finding of this study is that the importance of an adequate treatment was not explained to the majority of adolescents with extracted teeth, which is a failure of the dental healthcare system aimed both at prevention and treatment. A lack of awareness of the consequences of tooth loss at such an early age and failure to minimize those consequences are the signs of inadequate healthcare system that should provide not only dental service but also information on the importance and ways to maintain and improve oral health.

The limitation of the present study is primarily a small number of participants, though it was representative for Pančevo. However, the survey offers a useful insight into the

dental status of an average adolescent in an urban area. It would be beneficial to enlarge this study and include a larger sample of the same age groups in various regions in Serbia. This would enable more accurate determination of the factors influencing tooth loss and treatment needs as well as their direction. The results of such a comprehensive study would be useful for planning education and preventive programs aiming at a specific age group and some specific recommendations to the dental healthcare system on how to reduce the incidence of teeth extraction at an early age and how to educate young population on the importance of timely treatment.

### Conclusion

The loss of permanent teeth in adolescence is a problem that may influence all aspects of life, because it affects the aesthetic appearance, self-confidence and overall quality of life and not just the masticatory dysfunction. In the present study every fourth participant aged 15–16 years had at least one tooth extracted and every fifth participant had some prosthodontic treatment need.

Sociodemographic conditions, such as parents' employment, family income and financial status, significantly influenced the number of participants with extracted teeth. Prosthodontic treatment need was more influenced by the reasons for a tooth extraction, adolescents' knowledge about the importance of adequate treatment as well as by previous unpleasant experience.

Girls had worse dental status and greater need for prosthodontic or orthodontic treatment despite having better hygiene habits.

Girls also had more extracted teeth and higher normative treatment needs but they visit dentists more frequently and regularly.

### Conflicts of interests

The authors have no conflict of interest to declare.

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