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DENTAL STATUS OF JUNIOR HIGH SCHOOL STUDENTS IN ŁÓDZKIE VOIVODESHIP*

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ABSTRACT

OBJECTIVE. Dental caries still constitutes a serious health problem in Łódzkie voivodeship. The aim of the article was to evaluate the dental status of 15-year-old adolescents living in Łódzkie voivodeship based on epidemiological studies conducted in 2011.

MATERIAL AND METHODS. The study group was comprised of 177 students at the age of 15 years living in Łódzkie voivodeship, selected on the basis of stratified cluster sampling method. The study was conducted pursuant to WHO recommendations. The dental caries prevalence and intensity among students were calculated as well as the components values (DMFT), dental caries severity, treatment index and SiC index. The study results were analyzed using the statistical methods.

RESULTS. From the study results transpires that dental caries was observed in 93.8% of students. The dental caries severity amounted to 6.18. Having compared urban and rural areas, the statistically higher number of teeth subject to treatment was observed in the latter. The SiC and treatment index were 8.20 and 0.54, respectively.

CONCLUSIONS. On the basis of gathered data, the deterioration of dental status in adolescents aged 15 years from Łódzkie voivodeship was observed. Furthermore, it is strictly related to the place of residence.

Key words: dental caries, 15 year-old adolescents, epidemiological studies

INTRODUCTION

In Poland, studies on dental status of children and adolescents have been conducted for many years. The selection of appropriate groups, predominantly those aged 7, 12 and 18 years provides the opportunity to monitor and observe the differences in the epidemiological rates of dental caries in particular stages of life. The complete dentition among students aged 15 years is present for approximately 3 years. Thus, this group is preferably subject to epidemiological studies. Furthermore, it should not be neglected that targeting the junior high school students is easier than conducting the studies among young adults. Due to the high dental caries rates reported in Łódzkie voivodeship, it is classified to the regions of poor dental status in population (1,2,3,4,5,6).

The study aimed at evaluating the dental status in adolescents aged 15 years from Łódzkie voivodeship on the basis of epidemiological studies conducted in 2011.

MATERIAL AND METHODS

Within the framework of the Nationwide Dental Health Monitoring Program, the dental status of 177 adolescents aged 15 years from two areas in Łódzkie voivodeship, i.e.: Piotrków Trybunalski and the commune in łowicki district was evaluated. The areas were selected based on stratified cluster sampling method. As many as 87 and 90 persons were examined in the city and commune, respectively. Table I presents the profile of study group by the place of residence and gender.

Table I. The number of examined persons aged 15 years by gender and place of residence in Łódzkie voivodeship

Gender	city		commune		Total	
	n	%	n	%	n	%
male	41	47.1	52	57.8	93	52.5
female	46	52.9	38	42.2	84	47.5
Total	87	100.0	90	100.0	177	100.0

The examinations were performed under artificial light and with the usage of standard diagnostic equipment. The dental status was evaluated according to the following indices, i.e.: dental caries prevalence, DMFT index, treatment index and SiC index. The results were subject to statistical analysis, taking into consideration the gender and place of residence of the examined persons. The chi-square test of independence with Yates' correction, Kruskal-Wallis test, Mann-Whitney test were employed. The level of significance was defined as $p < 0.05$.

RESULTS

Figure 1 presents the dental caries prevalence in the analyzed group of adolescents. The dental caries prevalence among the students aged 15 years from Łódzkie voivodeship amounted to 93.8% and was higher in rural (97.8%) compared to urban area (89.7%). No statistically significant differences in the rates regarding the place of residence were observed. The dental caries prevalence in girls was lower in comparison with boys in both areas (city: 87% and 92.7%; commune: 97.4% and 98.1%). Irrespective of the fact that differences in the city were higher than those observed in the commune, they were not of statistical significance.

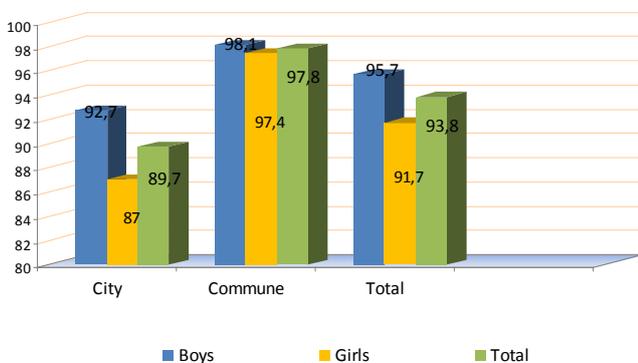


Figure 1. The prevalence of dental caries in the examined group by gender and place of residence in Łódzkie voivodeship

Figure 2 demonstrates the dental caries severity and its components. From the data transpires that in the study group the DT component, i.e. teeth affected by active dental caries is higher than FT component, i.e. filled teeth. In the rural area, these differences are even more noticeable. In urban area, the number of teeth with filling exceeds the number of decayed teeth. In the analyzed group of adolescents, the average number of missing teeth (MT) was slightly lower in the city (0.11) than commune (0.19), with the average value in both places of residence amounted to 0.15. The number of teeth missing due to the complications of dental caries was higher in boys

(MT=0.23) than girls (MT=0.07). The comparison of both areas revealed that the MT component was higher in the group of both genders living in rural area. However, no difference was of statistical significance.

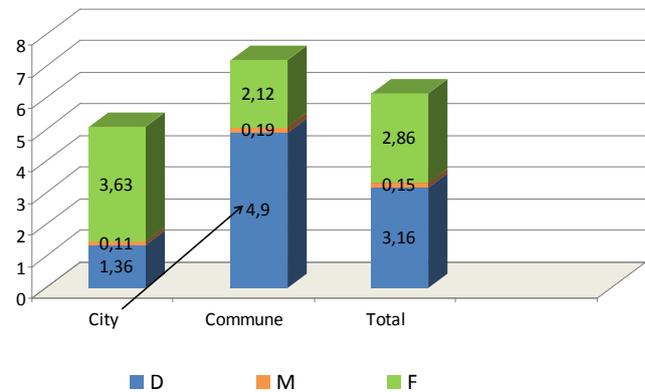


Figure 2. The components of DMFT index in adolescents aged 15 years by gender and place of residence in Łódzkie voivodeship

The severity of dental caries is significantly higher in commune than city (7.21; 5.10). The statistically significant differences are observed in both genders depending on the place of residence, i.e. dental caries severity in girls and boys living in the city was lower than the one observed in their peers from commune (girls: 4.63; 6.71, boys: 5.63; 7.58). The average dental caries severity for all analyzed students amounted to 6.18 and was slightly higher in boys than girls (6.72; 5.57) (Fig.3).

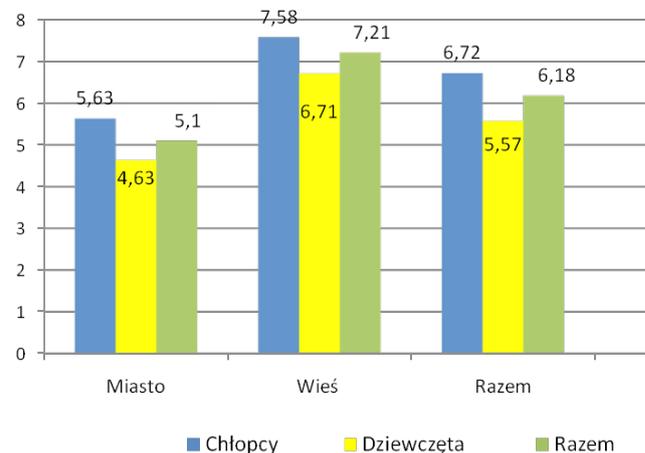


Figure 3. The average DMFT index values by gender and place of residence in Łódzkie voivodeship

The average DT component value of dental caries severity amounted to 3.16. However, the significant differences in urban and rural areas (1.36; 4.90), girls and boys (2.58; 3.68) and in both genders in urban area (girls: 1.04; boys: 1.71) were observed. Similarly, the number of decayed teeth (DT) was significantly lower in the city than commune among the girls (1.04; 4.45) and boys (1.71; 5.23) (Fig.4).

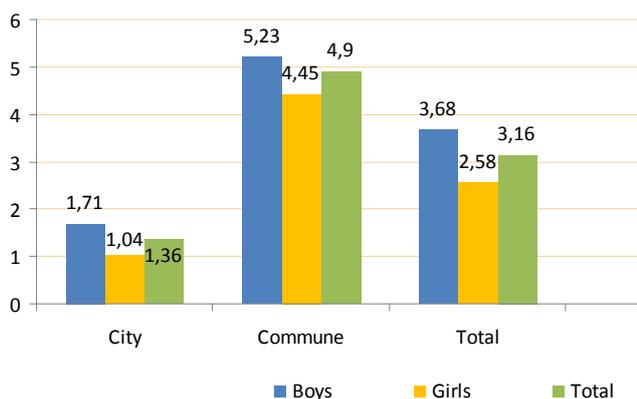


Figure 4. The average D component value by gender and place of residence in Łódzkie voivodeship

The average FT component value was 2.86. Having compared the genders, the girls had higher number of filled teeth than boys. However, the differences were not statistically significant. These differences were observed while the place of residence was analyzed. All examined students from the city had significantly higher number of filled teeth (3.63) than their peers from commune (2.12). Similar results were achieved when the gender of the examined students from the city and commune was analyzed, i.e. FT component was statistically higher among girls and boys from the city (Fig. 5).

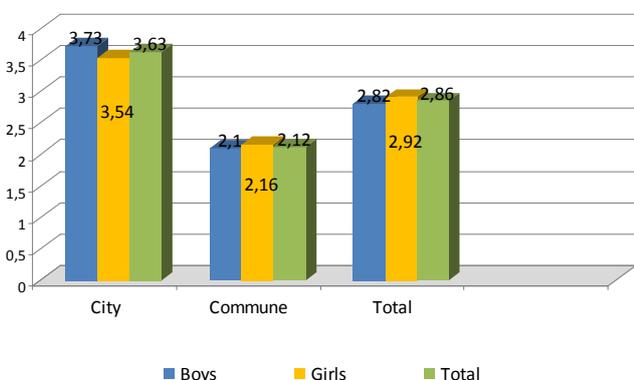


Figure 5. The average F component value by gender and place of residence in Łódzkie voivodeship

The average treatment index in the study group accounted for 0.54 (Fig. 6). The significantly higher value was achieved in the city (0.71) compared to commune (0.38). As in the case of girls (city: 0.75; commune: 0.37), the dental treatment index in boys was statistically higher in the city (0.68) than commune (0.39).

The average SiC index in the study group was estimated at 8.20 (Fig. 7). There were statistically significant differences in both areas. The average index value was higher in the commune (9.42) than city (6.93) and in the group of boys from rural (10.00) compared to urban area (7.39). The SiC index was higher in boys (8.89) than girls (7.45) without any statistically significant differences. The average DMFT index in the remaining 70%

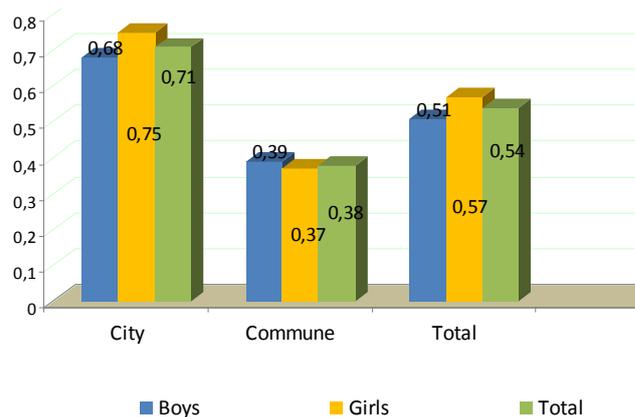


Figure 6. The treatment index for examined adolescents by gender and place of residence in Łódzkie voivodeship

of persons amounted to 2.12. The remarkable variation of dental caries severity is observed.

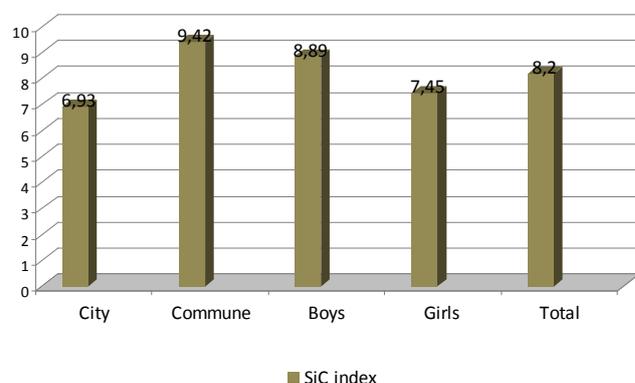


Figure 7. SiC index for examined population by gender and place of residence in Łódzkie voivodeship

DISCUSSION

Table II portrays the changes of dental caries severity in adolescents from Łódzkie voivodeship. In 1977 in Łódź, the 1st phase of International Collaborative Study on Oral Health Care Systems ICS I under the auspices of WHO was conducted. The severity of dental caries in adolescents aged 13-14 years was estimated at 6.94 (1).

As many as 30 years before, children aged 7-15 years were subject to dental examinations in Bełchatów and the commune Łęka in Łódzkie voivodeship (2). In the group of 15-years-olds, the prevalence of dental caries was estimated at 98.5%. All girls had a history of dental caries and only 3% of boys did not experience problems with decayed teeth. Among persons aged > 12 years, all first permanent molars were affected by dental caries. Each 15-year-old adolescent had 8 teeth affected by dental caries on average. Furthermore, more than ¼ of examined persons had missing teeth.

Since many years, the results of epidemiological and clinical studies indicate that the remarkable increase in

Table II. The changes of DMFT index in adolescents in Łódzkie voivodeship

Year of study	Age of examined persons (years)	Place of residence: U-urban area R- rural area	DMFT index	Remarks
1977	13-14	U	6.94	1st phase of International Collaborative Study on Oral Health Care Systems (Łódź)
1982/84	15	U/R	7.55	Bełchatów and Łęka
1993	14	U	10.91	adolescents visiting the Institute of Dentistry of Medical University of Lodz
1994	13-14	U	3.70	adolescents subject to prophylactic programme in schools in Łódź
2008	15	U/R	6.60	Nationwide Dental Health Monitoring Program
2011	15	U/R	6.18	Nationwide Dental Health Monitoring Program

dental caries severity in 12-14-years-olds is observed. The study of *Wochna-Sobańska et al.* performed on children aged 6-14 years implied that the highest annual increase of dental caries severity is present in 14- years-olds. In this group, the DMFT index was estimated at 10.91. The authors emphasized the importance of sealing fissures of first permanent molars at the age of 6 years and second permanent molars at the age of 12 years (3).

The satisfactory results of dentition status in children aged 13-14 years in Łódź were achieved in 1994. In the oral cavity of each examined person, less than 4 teeth with the history of dental caries were reported. Compared to the studies conducted 15 years earlier, the remarkable improvement of dental health status was demonstrated (4). The examined children participated in the prophylactic programme which certainly affected the study results.

In 2005, the pilot study among 15-years-olds from Mazowieckie voivodeship was initiated within the framework of monitoring oral health status and three years later it was continued on adolescents aged 15 years from 16 voivodeships. The number of persons with no history of dental caries in Mazowieckie voivodeship was comparable to the country's average level in 2008. The severity of dental caries was lower mainly due to the

fewer number of teeth affected by active dental caries. A total of 74% of teeth were treated. Compared to the rest of group, the increase of dental caries in 1/3 of the persons with the highest DMFT was nearly 6 teeth (5).

In 2008, 4.8% of the examined persons from Łódzkie voivodeship did not have dental caries, which was worse result than the country's average level, amounting to 6%. Similarly, the severity of dental caries was higher there than in Poland (6.60; 5.95). The results were dictated by higher number of filled teeth. Furthermore, the treatment index exceeded the country's results – 77% of teeth were treated (6).

The current studies indicated that the prevalence of dental caries amounts to 93.8%, which ranked Łódzkie voivodeship over the country's average (91.8%), with higher percentage of persons free from dental caries in city than commune. In Poland and Łódzkie voivodeship, the percentage of persons free from dental caries is nowadays higher than it was in 2008 (6). Compared to the results obtained from the pilot study conducted in Mazowieckie voivodeship in 2005, the ones for Łódzkie voivodeship are almost identical (5).

In Łódzkie voivodeship, the severity of dental caries, expressed by the average DMFT index, achieved slightly lower value than in 2008 (6.18; 6.60). However, each junior high school student still had more than 6 teeth affected by dental caries on average. Compared to the country's results (6.12), the differences in the index value has been reduced in Łódzkie voivodeship (6.18). Nowadays, the value is almost the same as the country's average. The alarming tendency in the severity of dental caries should be noted. Nowadays, the D component is higher than F component, which suggests deterioration of oral health care of the examined children. In 2008, the majority of decayed teeth with cavities were filled whereas in the present time most of them were not subject to treatment. Indisputably, the dental status of adolescents from rural area affected the results, where in each oral cavity slightly more than 7 teeth were affected by dental caries on average, of which 5 were diagnosed with active dental caries and only two of them were filled. Since many years, the dental status is worse in rural compared to urban area also in other voivodeships (7,8,9,10) as well as in the group of young adults. This is confirmed by the studies conducted in: 1995 (11), 1999 (12), 2001 (13) and 2004 (14). Probably, the economic situation and the access to dentist's office in the smaller areas are still worse. The M component value at the age of 15 years, especially in rural area, is comparable to the results obtained in monitoring program of persons aged 18 years in 2008. The data implies that having complete dentition by 18-years-olds would not still be feasible in Łódzkie voivodeship in 2014.

Compared to the studies conducted in 2003 and 2008, the prevalence of dental caries also increased

in Mazowieckie voivodeship. In 2003, it achieved the lowest value and was estimated at 90.5% on average in three areas. In 2008, it raised to 95.9% and nowadays to 96.8%, which is worse than the result achieved in Łódzkie voivodeship. Comparably, the severity of dental caries increased in these years from 5.86 and 5.96 to 8.45, respectively (7,9,15). The treatment index declined from 0.63 (2008) to 0.53 (2011). Undoubtedly, the results were affected by dental status in rural area, which was proved by the studies conducted in siedlecki district in 2002 (10). The prevalence of dental caries, its severity and treatment index were 98.6%, 8.06 and 0.44, respectively.

In Małopolskie voivodeship, the improvement of dental status in adolescents was observed in the years 2002/2003. The prevalence of dental caries was 95.3% and nowadays it is estimated at 92.3%. The severity of dental caries declined from 7.09 to 6.44 and the treatment index increased from 0.44 to 0.55. Irrespective of the observed improvement, the statistics in Małopolskie voivodeship are still worse than the ones in Łódzkie voivodeship (16).

The improvement of dental status was reported in Lubelskie voivodeship (17), where the decrease in dental caries prevalence was assessed at 1.7%, its severity was reduced from 7.23 to 5.68 and the treatment index increased from 0.65 to 0.78. Due to these statistics, the dental status is nowadays better in Lubuskie than Łódzkie voivodeship.

The fluoride prophylaxis is of high importance when the improvement of dental status of population is considered. It was confirmed by the observation in Lubelskie voivodeship, where in the group of adolescents aged 15-17 years who have not been subject to regular prophylactic procedures, the prevalence of dental caries was estimated at 99.7% (18). The situation was similar in Wielkopolskie voivodeship, where the dental status of population was better than the one observed in Łódzkie voivodeship for many years. In 2008, the examinations of adolescents who did not undergo fluoride prophylaxis procedures revealed the prevalence of dental caries at 92.5% (19). In the present time, more than 12% of the junior high school students aged 15 years in this voivodeship are free from dental caries.

Nowadays, the average SiC index in Łódzkie voivodeship amounts to 8.20. Its value is better than the country's average, accounting for 10.80. In Łódzkie voivodeship, the significant differences were observed in relation to the places of residence. The lower value was present in the city, in which the index was statistically significantly lower than in commune (6.93; 9.42). In the nationwide studies, no significant differences in relation to the places of residence were observed: SiC index in the urban and rural areas was estimated at 10.82 and 10.77, respectively. The values of SiC index

are lower than the ones obtained in siedlecki district in 2002 – 12.68, Mazowieckie voivodeship in 2005 – 8.70 and in country in 2008 – 10.08 (5,6,10).

From surprisingly low value of treatment index, it may be concluded that slightly over half of the cavities in teeth were filled only. Furthermore, significant differences in the treatment index values were observed in relation to the places of residence, i.e. disparities between city and commune amount to 33%. The statistics from Łódzkie voivodeship rank it at the country's average level, which constitutes the worse position compared to the one in 2008. In that year, Łódzkie voivodeship was over the country's average. The wielkopolskie podkarpackie, lubelskie and śląskie voivodeships reported better results. From the analysis of treatment index observed in previous years transpires that nowadays it has been deteriorated (0.54). The values of treatment index noted in 2005 and 2008 were 0.74 and 0.77, respectively.

The results of currently conducted studies in which the junior high school students from Łódzkie voivodeship were enrolled suggest that there is an alarming relation between the dental status and place of residence. The higher values of dental caries indices were reported, which indicates that gradual improvement of dental status among adolescents in Łódzkie voivodeship, which was observed in previous years, would not be remained. The poorer dental status is still observed in adolescents living in rural areas. Łódzkie voivodeship and Łódź per se changed their position in the ranking from the areas of the poorest health care rates to the country's average level.

SUMMARY

Only 6.2% of adolescents aged 15 years from Łódzkie voivodeship are free from dental caries.

Each adolescent aged 15 years has 3 teeth affected by dental caries (dental cavity stage) on average.

Compared to 15-years-olds living in urban area, the average values of dental caries severity are significantly higher among their peers living in rural area.

Having analyzed the degree to which the needs of conservative treatment are met, the significantly higher values are observed in city than commune.

CONCLUSION

The dental status of adolescents aged 15 years from Łódzkie voivodeship has been deteriorated. Furthermore, it is strictly related to the place of residence.

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