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EVALUATION OF ORAL CAVITY CONDITION WITH REGARD TO DECAY IN 18-YEAR OLDS FROM URBAN AND RURAL AREAS IN PODKARPACKIE PROVINCE, POLAND

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ABSTRACT

INTRODUCTION. The studies have indicated the necessity to intensify dental health care in certain Polish provinces. The purpose of study was to evaluate dental condition and establish dental health needs in the population of 18-year old youth from urban and rural region in Podkarpackie Province, Poland.

MATERIAL AND METHOD. Mean DMFT index (D-decayed, M-missing and F-filled teeth) was calculated as a key measure of dental decay and dental health needs identified.

RESULTS. The results found the highest percentage of teeth affected by active decay (D) in the second molars, both upper and lower (>20%), the highest F score in the first and second maxillary and mandibular molars (>50% and >40% respectively), and the highest M score was observed in the first upper and lower molars. Mean DMFT score was 7.13. Higher scores were observed among the urban teenagers (DMFT=7.72 and D=2.86) compared to the teenagers from rural areas (DMFT=6.42 and D=1.37). The analysis of DMFT index with regard to gender found almost the same DMFT in males and females (males 7.15, females 7.12), and D, M and F scores differed slightly. No dental health needs were found in 36.67% examined, however 63.33% teenagers needed dental treatment.

CONCLUSIONS. Professional prophylactic activities should be intensified in the group of children and teenagers living in Podkarpackie Province. A scheme of refunded fissure sealing of teeth should cover second molars as well. Professional dental health care should be extended in the group of teenagers attending vocational schools.

Key words: 18-year olds, dental condition, dental decay, dental health needs

INTRODUCTION

In Poland oral diseases affecting young population constitute a complex health issue (1). Research reports have suggested improvement in the condition of dental and periodontal structures, however the goals set by WHO remain unattained (2). The studies have indicated the necessity to intensify dental health care in certain Polish provinces (3). The results have indicated still big dental health needs among children, teenagers and adults in the area of dental education and prophylaxis (4). Considering that, the quality of dental care among children and teenagers can be evaluated on the basis of current state of dental health assessed in the population of 18-year olds. The state of dental health in 18-year olds is a starting point for pathological changes observed later (5). Therefore all activities undertaken to maintain

dental health should be targeted specifically at children and teenagers under 18 year of age (6).

The purpose of study was the evaluation of dental health and establishing dental health needs with regard to dental decay among 18-year olds living in the urban and rural areas in Podkarpackie Province.

MATERIAL AND METHOD

Clinical examination was carried out in a group of 240 participants (18-year old students of comprehensive, technical and vocational high schools in Stalowa Wola (a town in Podkarpackie Province) and Brzozów (a small village in Podkarpackie Province) in Poland.

The teeth were clinically examined with a mirror in artificial head light.

Dental health state was evaluated and expressed as mean DMFT index, its D, M and F components, and dental health needs identified with regard to dental decay treatment. The needs were divided into three groups, i.e. no dental health needs, teeth that needed filling on 1 surface, and teeth that needed fillings on 2 or more surfaces.

The results were statistically analyzed and presented in 3 tables.

The examined parameters were expressed as numbers and percentages, or means and SD. Normal distribution for measurable parameters was evaluated by Shapiro-Wilk test.

Chi² test was applied to establish differences between unconnected qualitative features between two groups, U Mann-Whitney test for continuous variables to establish differences between the groups, and Kruskal-Wallis test was used for the variable of age; 5% conclusion error was assumed and p<0.05 considered statistically significant. Statistical analysis was done by computer software STATISTICA 10.0 (StatSoft, Polska).

RESULTS

Dental conditions are presented in Figure 1 and Tables I - III.

The analysis of decay frequency in 18-year olds revealed the highest percentage of teeth affected by active decay in the group of the second molars, both upper

and lower, the biggest- 25% in tooth 37, 22% in teeth 17 and 47 and 21% in tooth 27. The proportion was a little lower in the first molars ranging from 17% to 20%.

The biggest number of fillings was found in the first molars, both upper and lower (57% in tooth 26, 55% in tooth 16 and 54% in teeth 36 and 46 each), and in the second molars, upper and lower ranging from 43% to 48%.

The analysis of missing teeth revealed that the first molars, both upper and lower were most frequently extracted teeth due to decay (2% in tooth 16 and 36 and 1% in teeth 26 and 46).

Table I presents mean DMFT index and its components D, M, and F in the examined group, mean DMFT=7.13. The highest mean value was noted for F=4.86, for D=2.19, and the lowest was M=0.08.

Table I illustrates mean DMF index with regard to place of living. Mean DMFT and D values were statistically significantly different. The DMFT and D were higher in the youth from urban area (DMFT=7.72 and D=2.86) in comparison to the teenagers from the rural areas (DMFT=6.42 and P=1.37). In the group of teenagers from town, M was 0.15 compared to the group of rural teenagers M=0.00. In the group living in town F was 4.71 and in the village F=6.42; the differences are not statistically significant.

Table II presents mean DMFT index and its D, M, and F component with regard to gender. In the male group mean DMFT=7.15 and is almost the same as in the group of females DMFT=7.12. Also D, M and F scores differ slightly. Females have bigger number of

Table I. Mean DMFT and D, M and F and dental health needs in the examined group with regard to place of living.

| Parameters | | Town | | | Village | | | Statistical analysis | |
|--------------------------------|------|-------|--------|------|---------|--------|------|----------------------|------------|
| | | Mean | Median | SD | Mean | Median | SD | Z | p |
| Mean index | D | 2.86 | 2.00 | 2.91 | 1.37 | 1.00 | 1.72 | 4.8 | 0.00002* |
| | M | 0.15 | 0.00 | 0.60 | 0.00 | 0.00 | 0.00 | 1.21 | 0.23 |
| | F | 4.71 | 4.00 | 3.47 | 5.05 | 5.00 | 2.85 | -1.38 | 0.17 |
| | DMFT | 7.72 | 8.00 | 3.91 | 6.42 | 6.00 | 2.43 | 3.02 | 0.003* |
| Ne needs | | 28.28 | 29.0 | 3.36 | 30.66 | 31.00 | 1.74 | -6.02 | <0.000001* |
| fillings on 1 surface | | 1.58 | 1.00 | 1.74 | 0.82 | 0.00 | 1.27 | 3.65 | 0.0003* |
| fillings on 2 or more surfaces | | 1.18 | 0.00 | 1.97 | 0.43 | 0.00 | 0.85 | 2.80 | 0.005* |
| fillings on 1 or more surfaces | | 2.76 | 2.00 | 2.82 | 1.25 | 0.00 | 1.70 | 4.67 | 0.000003* |

* statistically significant differences

Table II. D, M, F and DMFT and dental health needs in the examined group with regard to gender.

| Parameters | | Males | | | Females | | | Statistical analysis | |
|--------------------------------|------|-------|--------|------|---------|--------|------|----------------------|------|
| | | Mean | Median | SD | Mean | Median | SD | Z | p |
| Mean index | D | 2.24 | 1.00 | 2.45 | 2.15 | 2.00 | 2.62 | -0.64 | 0.52 |
| | M | 0.04 | 0.00 | 0.25 | 0.11 | 0.00 | 0.55 | 0.42 | 0.67 |
| | F | 4.88 | 4.00 | 3.27 | 4.85 | 4.00 | 3.17 | 0.15 | 0.88 |
| | DMFT | 7.15 | 7.00 | 3.55 | 7.12 | 7.00 | 3.27 | -0.32 | 0.75 |
| Ne needs | | | 30.00 | 2.67 | 29.29 | 30.00 | 3.20 | 0.28 | 0.78 |
| fillings on 1 surface | | | 1.00 | 1.65 | 1.16 | 1.00 | 1.55 | -0.83 | 0.41 |
| fillings on 2 or more surfaces | | | 0.00 | 1.62 | 0.86 | 0.00 | 1.60 | 0.18 | 0.86 |
| fillings on 1 or more surfaces | | | 1.00 | 2.43 | 2.02 | 1.00 | 2.54 | -0.83 | 0.41 |

Table III. D, M, F and DMFT and dental health needs in the examined group with regard to place of education.

| Parameters | | Vocational school | | | Comprehensive high school | | | Technical high school | | | Statistical analysis | |
|--------------------------------|------|-------------------|--------|------|---------------------------|--------|------|-----------------------|--------|------|----------------------|--------|
| | | Mean | Median | SD | Mean | Median | SD | Mean | Median | SD | H | p |
| Mean index | D | 2.93 | 2.00 | 3.16 | 1.92 | 1.00 | 2.29 | 2.25 | 1.00 | 2.58 | 3.00 | 0.22 |
| | M | 0.22 | 0.00 | 0.85 | 0.07 | 0.00 | 0.35 | 0.03 | 0.00 | 0.17 | 2.70 | 0.26 |
| | F | 4.17 | 4.00 | 2.95 | 4.81 | 4.00 | 3.33 | 5.38 | 5.50 | 3.06 | 3.90 | 0.14 |
| | DMFT | 7.32 | 8.00 | 4.08 | 6.80 | 6.00 | 3.54 | 7.66 | 8.00 | 2.43 | 4.30 | 0.12 |
| No needs | | 28.39 | 28.00 | 3.58 | 29.59 | 30.00 | 2.85 | 29.47 | 30.50 | 2.80 | 4.63 | 0.10 |
| fillings on 1 surface | | 1.07 | 1.00 | 1.27 | 1.15 | 1.00 | 1.47 | 1.50 | 1.00 | 1.94 | 0.52 | 0.77 |
| fillings on 2 or more surfaces | | 1.83 | 1.00 | 2.58 | 0.66 | 0.00 | 1.19 | 0.60 | 0.00 | 1.34 | 12.34 | 0.002* |
| fillings on 1 or more surfaces | | 2.90 | 2.00 | 3.16 | 1.81 | 1.00 | 2.17 | 2.10 | 1.00 | 2.55 | 3.68 | 0.15 |

extracted teeth M=0.11 compared to males M=0.04; the differences are not statistically significant.

Table III presents DMFT index and D, M and F with regard to place of education. The students attending technical high school have the highest DMFT=7.66, in the vocational school DMFT=7.32 and the lowest DMFT=6.80 is in the group from comprehensive high school. The biggest number of decayed teeth is in the group from vocational school (D=2.93) and the smallest in the group from comprehensive high school (D=1.92). The biggest number of missing teeth is in the group from vocational school (M=0.22) and the smallest in the group from technical high school (M=0.03). The biggest number of filled teeth is noted in the group from technical high school (F=5.38) and the smallest in the group from vocational school (F=4.17). The differences are statistically insignificant.

The examination found 36.67%, (n=88) examined had no dental health needs identified, however 63.33%, (n=152) needed treatment on 1 or 2 tooth surfaces (Fig. 1).

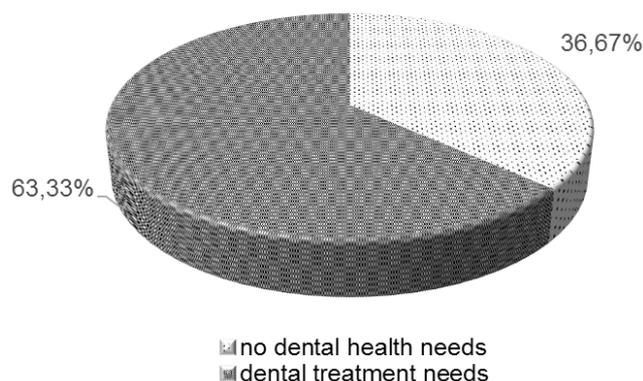


Fig. 1. Dental health needs in the examined group (%).

It was essential to determine the number of teeth that needed dental treatment. The results found 1.24 teeth mean needed filling on 1 tooth surface, 2.08 teeth mean needed filling on 1 or more surfaces, and 29.35 teeth had no need for treatment.

Table I illustrates dental health needs with regard to place of living. No needs were observed in 28.28% among the examined town youth and 30.66% among the rural youth. Filling on 1 tooth surface was necessary in 11.58% town youth and 0.82% rural youth, filling on 2 or more tooth surfaces in 1.18% and 0.43% cases respectively, and mean number of fillings on 1 or more surfaces was necessary in 2.76% and 1.25% respectively; the differences were statistically significant.

Table II presents statistical analysis of dental health needs with regard to gender. The results are not statistically significantly different. Fillings on 1 tooth surface was necessary in 1.35% males and 1.16% females. Similarly, small differences were observed in the number of teeth that required filling on 2 or more surfaces in 0.81% and 0.86% respectively. Mean number of fillings was required on 1 or more surfaces in 2.16% males and 2.92% females, and no dental needs were found in 29.43% and 29.29% respectively.

The study evaluated dental health needs with regard to type of school (comprehensive high, technical high and vocational). Table III presents the results. The biggest proportion of teeth requiring filling on 1 tooth surface was in the group attending technical high school (1.50%), followed by the students from comprehensive high school youth (1.15%) and the smallest was in case of vocational school (1.07%). Fillings on 2 or more surfaces were necessary in 0.60% students from technical high school, 0.66% from comprehensive high and 1.83% students from vocational school; the correlations were statistically significant. Mean number of teeth requiring filling on 1 or more surfaces was 2.10%, 1.81%, and 2.90% respectively. No needs were detected in 29.47% students attending technical high school, 29.59% comprehensive high and 28.39% vocational school. The differences were not statistically significant.

DISCUSSION

The analysis of decay frequency in 18-year olds from Podkarpackie Province found that the first molars, both maxillary and mandibular, were most frequently extracted teeth due to decay. The highest percentage of fillings was observed in the first and second molars (>50%) and second molars (>40%). The finding is not surprising and confirms the need to extend prophylaxis of decay affecting pits and fissures in the molar teeth by application of sealants, which has been postulated by many authors (7, 8). The proportion of children covered by prophylactic schemes varies in different parts in Poland, in certain places being very weak (9, 10). Our study found most frequent active decay in the second molar teeth, both upper and lower (>20%). The data confirm the necessity to intensify prophylaxis of decay by application of fissure sealants. Moreover, other authors have noticed that the application of sealants on the second molar teeth is often neglected (11, 12). Also, the first molar teeth are the ones most frequently extracted. The facts prove that prophylaxis of those teeth has been insufficient. Thus it seems particularly important to apply fissure sealants, the procedure whose effectiveness has been confirmed many times (13). It would certainly contribute to the reduction of DMFT scores in those teeth. The studies have indicated that the proportion of sealed molar teeth remains low in various parts of Poland. *Jodkowska* noted 15.4% fissure sealed teeth in 18-year olds (14). However, fissure sealants are advantageous at any age, especially in puberty, and can be applied disregarding the span of time from tooth eruption (15).

Mean DMFT index and its components in the examined group is high (DMFT=7.13), but high score of F=4.86 seems advantageous and proves that a considerable number of teeth have been treated. The treatment index (TI=F/F+D; F-filled teeth, D-decayed teeth) was 0.68. Other authors have also emphasized high D scores and low TI scores (16). *Hilt* et al. have observed systematic improvement of dental condition in the group of 18-year olds in the region of Łódź. They found TI range 0.7-0.8 (17). However, high F score confirmed insufficient prophylaxis of decay. Other authors' observations were similar (18, 19). The fact that more than 1/3 examined (36.6%) had no dental need detected provided evidence of positive results of dental health care. It also proved positive correlation between the awareness and knowledge on dental prophylaxis and health behaviors among youth, which was also observed by other authors (20, 21).

The scores of DMFT index and its D component are surprising. The results turned out to be better in the group of youth from the rural areas. Considering that, we

can conclude that advantageous environmental conditions must have been involved, including better healthy nutritional habits and lesser access to the consumption of sweets. In addition to that, other components (M and F) scored better in the group from the rural areas, although they are statistically insignificant. That may indicate slowly blurring cultural differences between town and country. Greater than ever access of children from rural areas to cities, easier commute, getting education in the city, socializing with urban youth, as well as easier access to a dentist, oral hygiene aids have certainly played a big role in achieving such results.

Herman et al. examined a group of 18-year olds in Wrocław and found mean DMF=6.5 (22). Our study found a higher DMF=7.12. The comparison of DMF index between males and females found it is gender independent, which may indicate even differences between genders in that respect.

Our results observed mean DMFT=7.32 in the group attending vocational school. The score was higher than in the group from comprehensive high school - 6.80 and lower compared to the group attending technical high school - 7.66. Considering better DMFT scores in the rural areas compared to town, those differences between schools are only slight and not so surprising. *Ścibak-Boroch* examined a group of students attending a vocational school in Lublin and found even higher DMFT=12.3 (2).

Our results found higher proportion of rural youth without dental health needs. In addition to that, in that group we found lower dental needs, i.e. smaller number of fillings on 1, 2, and 1 or 2 tooth surfaces. In either case the differences are statistically significant. It is not surprising in the context of the results quoted above. Higher DMFT and D scores were observed in the group of town youth (DMFT=7.72 and D=2.86) than in the rural youth (DMFT=6.42 and D=1.37).

The analysis of needs with regard to gender found almost no differences, which complies with previous results and DMFT scores. Similarly small differences were observed between particular type of schools. The needs concerning fillings on 2 or more surfaces were the highest in the group attending vocational school and they were statistically significant. Moreover, small differences in dental health needs between males and females and between school types proved similar awareness of oral care, knowledge on processes involved in dental decay and responsibility for oral health. *Miernik* and *Paszkiwicz* have come to similar conclusions (21).

Frequency and intensity of dental caries in the world is rather varied. The lowest frequency of dental caries were observed: in Japan - 27.4%, in Norway - 59.7%, Italy - 59.1%, in the United States - 67.49%, and in China - 55.3% (22).

Similar to results of own research, the high value of DMFT index in adolescents 18-year old was observed in the countries of Central and Eastern Europe. In Hungary in people under 19-years old of age the value of the number of DMFT was - 11.79. In the Czech Republic the average value of DMFT was - 6.22, Latvia - 8.20, Albania - 5.70. Equally high values were observed in Mexico - 7.10, Brazil - 6.20 and Australia - 7.75 (22,23,24). In terms of the mean DMFT index in Moscow in group 24-year old, the data in 2012, were = 6.98 (25).

In Western Europe, the United States the value of DMF index in adolescents 18 years old was much lower. In Sweden, the value of DMFT was low - 2.8, in Norway was only 1.66. However, in the US the average number of DMFT was 3.31 (22,23,24). Among 18-year olds from Denmark, the average number of DMFS / decayed, missing and filled surface teeth/ was 3.92 and 33.6% of adolescents were free of tooth decay (DMFS=0) (23).

CONCLUSIONS

1. Dental condition among 18-year olds from Podkarpackie Province is not completely satisfactory.
2. Professional prophylactic activities should be intensified in the group of children and teenagers living in Podkarpackie Province.
3. A scheme of refunded fissure sealing of teeth should cover second molars as well.
4. Professional dental health care should be extended in the group of teenagers attending vocational schools.

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