Correlation between Adolescent's Caries Prevalence and Caries Related Factors in Two Hungarian Cities

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Summary

The aim of the study was to assess the caries prevalence and oral hygiene in groups of adolescents living in different Hungarian localities and to establish correlations with socio-economic factors. Examinations of caries and oral hygiene were performed in 586 14-16 year old children. The percentage of caries free children was 5.1%, the DMFT and DMFS values were 6.97±4.67 and 9.95±7.94 respectively. The VPI index was 41.6±32.7% (mean±S.D.), and showed positive correlation with the caries prevalence. The DMFT and DMFS values, as well as VPI decreased as the educational level of the father increased. The number of siblings had a worsening effect on DMFT, DMFS and VPI values. There was some relationship between the previous fluoride prophylaxis and decrease of DMF values, although the difference proved to be statistically non significant. These findings indicate the necessity of organized dental preventive measures.

Key words: *dental caries, oral hygiene, adolescents, social factors, behavioural factors*

Acta Stomat Croat
2001; 313-317

ORIGINAL SCIENTIFIC PAPER
Received: Juny 8, 2001

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Introduction

The prevalence of dental caries in many developed countries has shown a marked decline in the last decade (1,2,3,4). This trend seems to continue, but at a slower rate or may have come to a halt (1) and even for primary dentition an increase in caries prevalence has been reported (5). This process turned the attention of investigators to the conditions of caries in adolescents and young adults (6,7,8). In these age groups the assessment of caries risk factors, and the practice of selected preventive measures are not completely solved and adolescents need more information about oral hygiene and proper diet. Epidemiological data regarding these age groups are also scarce.

In Hungary caries prevalence is still very high compared to western countries(3). These data are primarily based on the evaluation of oral health of younger age groups and no reports are available in the international literature on caries prevalence among Hungarian adolescents.

The present study was undertaken to evaluate caries prevalence and oral hygiene in groups of Hungarian adolescents (14-16 years old) living in different localities, and to establish possible correlations with socio-economic status, education of parents, number of siblings in the family, performance at school and previous fluoride prophylaxis.

Materials and methods

Subjects

The present study was performed on 586 adolescents 14-16 years old, with a mean (± S.D.) age of 15.1±0.8 years. 44.5% of the study group (261 children) were living in the capital (Budapest), and 55.5% (325 children) in Debrecen (the second largest town in Hungary). These areas have a low natural fluoride content in drinking water (0.03 mg/l in Budapest, 0.01 mg/l in Debrecen).They were representative samples from different schools in both towns. The study population was the same as reported in a separate, microbiological study (9).

A questionnaire was given to each adolescent and was filled out under the supervision of their teacher. Socio-occupational categories of parents were classified as employees and workers, managers and semi-professionals, business men (in the public sector), heads of firms, pensioners, others; their educational background was given as primary school (6-14 years, secondary school (14-18 years), high school or university (18-23 years). The number of siblings were registered as none, one or two, more than two. The children's school marks were classified in both towns into four categories: poor, average, good, excellent. Tooth brushing habits were defined as follows: never, irregular, once a day or more. Previous systemic fluoride prophylaxis via tablets was assessed as regular (continuously at least for two years or more), irregular (less than two years), none. Fluoridated toothpaste was used by all participants.

Dental examination and diagnostic criteria

Children were examined by two calibrated operators, according to the WHO guidelines (10). Clinical coronal caries examinations were performed in a dental chair of a unit, using artificial light, dental mirror and probe. (The teeth were dried before examination). The number of M surfaces were calculated with a value of two in the anterior and three in the posterior regions. Extracted teeth due to caries or other reasons (e.g. orthodontic treatment), and fissure sealants were separately registered. Incipient lesions were given different codes. The third molars, unerupted permanent teeth and primary teeth were excluded. A tooth was considered erupted if any part of the crown penetrated the mucosa.

Criteria (codes) adopted were as follows: 0 - sound, 1 - incipient caries, 2 - caries, 3 - filling, 4 - filling + caries, 5 - extracted tooth due to caries, 6 - extracted tooth due to other reason, 7 - fissure sealing, 8 - excluded tooth. Radiographs were not taken in this study. The data of the caries examinations were evaluated according to DMFT and DMFS mean values.

Oral hygiene

Oral hygiene was assessed by using the Visible Plaque Index (VPI) as described by Ainamo and Bay in 1975 (11). The index was calculated as the percentage of teeth with visible plaque on the buccal or lingual surface of each tooth.

Statistical analysis

Means, standard deviations or frequencies were calculated for variables. Caries experience of the two groups was compared using the Student's t-test. Caries prevalence was tested for correlation using Pearson correlation coefficient.

Evaluating questionnaires comparison of a quantitative variable was carried out using the method of variance analysis for one factor. For a qualitative variable (e. g. school marks, socio-economic category of parents etc.) the χ^2 independence test was used. All statistical analyses were performed using multivariate analysis), SPSS for Windows statistical software version 8.0.

Results

The percentage of caries free children in the investigated population was 5.1% (6.9% in Budapest and 3.7% in Debrecen $p<0.05$).

Since no statistically significant differences were found in DMF values according to age and gender, the results generally represent the total examined group (data not shown).

In the 586 examined adolescents, the mean value of DMFT (including precavitation lesions) was 6.99±4.67. Caries prevalence was significantly higher in Debrecen than in the capital (the DMF-T mean values were 7.61±4.67 in Debrecen and 6.17±4.57 in Budapest, $p<0.05$) (Table 1). Table 1 shows the DMFT values and its components in the examined populations of the two towns. The mean values (±S.D.) of D component did not differ in the two examined towns (3.35±3.24 in Debrecen and 3.23±2.83 in Budapest, $p>0.05$). The mean MT and FT values were significantly lower in the capital than in Debrecen [for the MT 0.16±0.48 and 0.63±1.12 ($p<0.001$) and for the FT 2.78±2.85 and 3.65±3.41 ($p<0.05$) respectively].

The DMFS mean values were 9.95±7.94 in the whole population (7.96±6.76 in Budapest, and 11.55±8.46 in Debrecen, $p<0.01$) (Table 2). The distribution of the carious or filled surfaces (DFS) in the anterior and posterior regions was also similar in the two towns (Table 2).

Table 3 shows the basic distribution of the examined population for the selected social and behavioural characteristics. (In the case of question 1. and 2. just the father's answers are depicted, because in the case of mothers there were no significant differences in answers between the possible categories.) Regarding the distribution of answers between the two towns, there was no difference in proportions of the different professions, educational levels of fathers, tooth brushing habits. There was a statistically significant difference in answers between the two towns so that the capital was better than Debrecen regarding the school marks, number of siblings and previous fluoride prophylaxis ($p<0.05$).

The DMFT and DMFS values, as well as VPI decreased as the educational level of father increased (Table 4). The number of siblings had a worsening effect on DMFT and DMFS, and VPI values. Previous systemic fluoride prophylaxis was mentioned very rarely (just in 23.3% of the whole population.) There was a high tendency between previous fluoride prophylaxis and decreasing DMFT and DMFS values, although the difference was not statistically significant ($p>0.05$) (Table 4). The school marks and the father's profession had no influence on oral health.

The number of teeth (mean±S.D.) with fissure sealants was very low (0.04±0.33) in both towns (0.06±0.37 in Budapest and 0.03±0.35 in Debrecen).

The oral hygiene of the examined adolescents was poor, 41.66±32.7% of the teeth (45.07±30.87% in Budapest, and 39.27±32.02% in Debrecen) were covered by plaque. The difference between the two towns proved to be statistically non-significant ($p>0.05$). The values of VPI showed positive correlation with caries prevalence ($r=0.2475$, $p<0.001$).

Discussion and Conclusion

The present study describes the dental conditions of 586 Hungarian adolescents living in the capital and in an eastern town of the country regarding dental caries, oral hygiene and possible correlations with some socio-economical factors.

The proportion of caries free persons was extremely low (nearly negligible), compared with the results reported from other countries. Vehkalahti et al. in 1997 reported 26 % of adolescents with

zero DMF scores in Finland (8), Larsson et al. in 1992 also found 19 % of Swedish adolescents to be free of caries (12), whose results are nearly four-five times lower than those of the Hungarian population. In Greece 13.2% of examined persons in the same age group were caries free (13) at the same time the number of the caries free children aged 16 years was zero in a small Icelandic group (14). Nearly eight per cent of the 12-16 year old children in Bangkok were caries free compared with 52.4% of the children in a rural area in Thailand (15).

The caries prevalence reported in this study appeared to be high in comparison with data of similar age groups in Europe (3). In Greek adolescents (16-17 yrs old) the DMFT mean value was 5.9±0.4 whereas the mean DMFS value was 9.9±0.9 (16). In another study the dental status of Finnish teenagers was evaluated, where the baseline DMFT value was 5.7 and this value increased to 6.7 at the end of the 31-38 month study (8). Weissenbach et al. in 1995 found even lower caries prevalence in 12-14 year-old children in France (3.5±3.8 DMFT, 6.1±7.4 DMFS mean values), however this was a small population (112 persons) (16). Results of Bjarnason et al. (17) in 15 year-old Icelandic children (DMFT 7.0±4.5, DFS 11.3±9.8, mean±S.D.) were very similar to our data. Children in Bangkok aged 12-16 years had an average DMFT of 4.74±2.97 (mean±S.D.) which was significantly higher than the average DMFT of 2.35±2.22 for the children from the rural area (15).

Data of Poulsen (5) show very low DMFS values (3.25, 4.03) among 14 and 15 year-old Danish children. Sundin (18) found even lower values in 15 year-old Swedish adolescents (DFS values were between two and three at the base examination). Raitio et al. in 1996 (7) found 2.8±4.2 and 2.6±4.1 DFS values in 11 and 14 year-old Finnish children. Evaluating DMFS mean values, the Hungarian results are higher compared to those of Poulsen, Larsson et al. (5,12) and just comparable with the Icelandic data: DMFS: 11.6 in 16 year-old children, the number of caries free person was 0 in the Icelandic group (17).

In the present study the differences between the two towns in social and behavioural aspects were revealed by the questionnaire. The effects of these aspects on oral health were also examined. The higher educational level of the fathers had a beneficial effect on caries prevelance, and there was no significant difference between the two towns from this aspect. The number of families with one child was higher in the capital where the situation provides a better financial background. The number of siblings provided a negative effect on DMFT and DMFS values. Our results confirm those of Astrom (19) and Mandall et al.(20) indicating that parental influences and familiar circumstances are important factors in oral health. Examining the school marks, children living in Debrecen showed significantly better school achievement, although the school marks had no relationship with caries prevelance. These results are in contrast with those of Weissenbach et al. (16) who found a correlation between school marks and dental status.

The fluoride prophylaxis was strikingly more frequent in the capital than in Debrecen. However, about 76.7% of the whole examined population received no systemic fluoride supplementation. Although DMFT and DMFS values of groups receiving fluoride tablets regularly were much lower than those with no fluoride supplementation, but the difference was not statistically significant. The possible reason for this is the small ratio of positive answers.

In our study the frequency of fissure sealants was very low, which shows a lack of operative preventive measures similar to the Greek population (13) although our results are in contrast to those of Iceland (17), where this method is used more widely.

The oral hygiene of the studied population was very poor. About forty percent of children had plaque covered tooth surfaces, and VPI correlated with caries prevalence of the studied group. In a previous Hungarian study oral hygiene conditions were also generally poor in younger age groups (6-11 year-old), only 26% of children had acceptable oral hygiene (21). Raitio et al. (7) found good oral hygiene among Finnish adolescents, only 31% of the examined Finnish population had higher value of VPI than 25%. In accordance with our results, visible plaque had a significant association with caries prevalence.

The VPI was influenced by the educational level of the father and number of siblings, which also

stresses the importance of family in caries prevention of adolescents. Numerous studies have shown that among the many factors oral hygiene performance is associated with aspects of the parent-child relationship, such as parental support, parental control of the youngsters (22,23). Adolescents previous behaviour is the best predictor for future behaviour (24). At the same time Kay and Locker in 1996 (25) published a review of current evidence for the effectiveness of dental health education.

These findings indicate the necessity of organized dental preventive measures, the need to improve general oral hygiene and access to inexpensive dental treatment.

***Acknowledgement*:** *The authors gratefully acknowledge the support of GABA International Ltd. Switzerland, and of the Medical Scientific Council (grant N°: T-13452/96), Hungary.*