Parents education level and caries status in children with an immigration background in Austria

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Abstract

Background

Education and immigration background are risk factors for the development of caries in children. However, it is unclear whether a high education level can overcome the risks for the development of caries in immigrants.

Methods

The parent’s educational level, the children’s education level and caries status in school children with and without an immigration background was determined. The decayed, missing, and filled teeth (DMFT) index was used to classify caries.

Results

The caries status of the children with migration backgrounds was significantly worse compared to that of the native Austrian population. The education level of the parents had no significant impact on the caries status of children with a migration background. However, the education level of the children with a migration background positively affected their caries status. In the native Austrian population, the parents’ education level had a significant impact on the caries status of their children, but caries status is not influenced by the education level of the native Austrian children.

Conclusion

Our findings suggest that caries prevention should be directed toward all parents with immigration backgrounds independent of their level of education.

Key Words: Caries, DMFT, education level, immigration background
Background

Dental caries is a global health problem. The prevalence of dental caries varies across countries [1-4]. Public health initiatives, educational work and prevention programs have led to a substantial decrease in the prevalence of caries [5, 6]. It is mainly the industrialized Western countries that reach the European Goals for Oral Health of the WHO for 2020, for example for Austria, that children at the age of twelve should have no more than an average of 1.5 DMFT (decayed, missing, filled teeth) [7, 8]. However, industrialized countries are multicultural immigration regions. Children with a migration background usually fail to reach the European Goals for Oral Health. This deficiency has been shown for Spain [9], Italy [10, 11], Germany [12], Sweden [13, 14], Denmark [15] and Greece [16]. In order to improve caries prevention programs, it is important to understand why children with an immigrant background have more caries compared to native children.

The education level of parents is a risk factor for caries development in children. This has been seen in families living in the suburbs of Stockholm [17]. Similar findings were observed for children in Palermo [18], Brussels [19] and nationwide in Poland [20] and in Denmark [21]. Outside of Europe, the education level of parents is a predictor for caries in Hong Kong [22], Brazil [23] and Iran [24]. Thus, the education level of the parents is associated with the oral health of their children.

The education level of children is another risk factor for the development of caries. For example, in Italy, caries distribution was significantly related to the type of school attended [25]. In Istanbul, public-school students have a worse caries status than children in private school [26]. The type of school is also a predictor for caries status in Brazil [27] and Jordan [28]. Overall, the type of school, which at least partially reflects the education level of the schoolchildren, can be considered a risk factor for the development of caries.

There is thus evidence that both the immigration status and the education level of the parents and children are risk factors for caries development. The question arises of whether the immigration status and the education level are dependent or independent risk factors. In other words, what is the children’s risk for the development of caries when their parents are immigrants but have high education levels? Austria has an 11.5 percent share of foreigners, mainly from Eastern Europe and especially from the countries of the former Yugoslavia. Another major group of immigrants were born in Turkey and in Asia [30], so there are some cultural differences and language barriers between people who were born in
Austria and people who have come from abroad to Austria. Hence Austria is a multicultural country with high levels of immigration and, therefore, is appropriate for studying the association of education level of immigrants with the caries status of school children. As well dental checkups and treatments are covered by the national health insurances, which are based on a social insurance model that guarantees equitable access to health services – irrespective of their age, sex, origin, social status or income [31]. This system was ranked by the WHO as one of the world’s top 10 in 2012 [32]. The importance of free access to health care has been shown both in dentistry [29, 33], as well as in the general medical care [34, 35]. Thus the socio economic status should not influence the risk of a lack of dental checkups and treatments. However, there are also a variety of studies stating that free access alone, cannot improve the health-situation of immigrants and that other factors like language barriers and cultural and religious traditions need to be considered as well (33, 34). The objective of this study, therefore, was to evaluate the influence of immigration status and education level on the oral health status of children.

Methods

Study Population

Our cross-sectional study was conducted between 2007 and 2008 on twelve-year-old school children in Vienna. The study was approved by the ethics committee of the Medical University of Vienna. The request for an ethics commission number was not considered necessary by the ethics committee. The epidemiological investigation was carried out after informed consent. We randomly selected 39 out of the 117 cooperating schools across Vienna. No selection according socio-economic status or percentage share of immigrant families was done. The children were matched based on their migration status. Immigrant status was assigned if the child or at least one parent was not born in Austria (35). Non migration background (non-MB) was assigned if the child and both parents were born in Austria. Among the 736 children who were examined, 50.7% had a migration background (MB) and 49.3% were native Austrian children (non-MB). Males and females constituted 44.3% and 55.7% of the sample, respectively. Of the children, 48.2 % attended a Gymnasium (academic level high school); a secondary school mostly preparing the students for higher education at a university) and 51.7 % attended a Hauptschule (elementary level high school); a secondary school in Germany and Austria, starting after 4 years of elementary schooling,
which offers Lower Secondary Education/Level 2 according to the International Standard Classification of Education).

**Clinical Examination**

After obtaining informed parents’ consent, the clinical examinations were performed in the school with a dental probe and a mouth mirror under natural light, according to the recommendations of the World Health Organization (WHO) for epidemiological surveys (36). The schoolchildren were clinically examined always by the same investigator, who has been specially trained. To assess dental status and caries experience of the children, the DMFT and DMFS indices (WHO 1997 criteria) were used whereby only the permanent dentition has been included in the study. Decayed (D), missing (M) and filled (F) teeth (T) or tooth surfaces (S) were counted in every child. Missing teeth were only counted if they were missing as a consequence of caries. The SiC Index (Significant Caries Index), the mean DMFT of the one-third of the group with the highest DMFT scores, and the necessity of treatment because of dental decay (DT score) were subsequently calculated using these values. These indices were additionally used in this study, as the mean DMFT value does not correctly reflect the distribution, leaving high caries groups to remain undiscovered in the population. One European Goal for Oral Health is that the SiC Index should be less than 3 DMFT among 12-year-olds by the year 2015 (37).

Additionally, the migration background of the children and their parents, the highest level of education attained by the parents, and former dental treatments and experiences were recorded by means of a questionnaire by the parents. Regarding the parent’s educational level it was distinguished between low education level (no education or compulsory schooling) and high/medium education level (apprenticeship training, vocational school, high school or higher education).

**Statistical Analysis**

The data were analyzed using SPSS version 17.0 (SPSS Inc., Chicago, Ill., USA). An ANOVA model applying the Tukey’s post-hoc test was used for data that were normally distributed. The Kruskal Wallis test was used if the data were not normally distributed. The level of significance was defined as p < 0.05.
Results

Impact of migration background on caries status

Overall, oral health status was significantly worse in children with a migration background (MB, 373 children) compared to native Austrian children (non-MB, 363 children) (Table 1). The mean DMFT score of MB children was significantly higher than that of non-MB children, with values of 2.3 and 1.5 being obtained, respectively (p=0.00). The mean DMFS score revealed similar results regarding the migration background: the mean was 3.5 in MB children and 2.2 in non-MB children (p=0.00). The same finding was obtained for the SiC Index with means of 4.9 and 3.5 for MB and non-MB children, respectively (p=0.00).

Only 29.8% of the children with migration backgrounds were caries-free compared to 40.5% of non-MB children. In the MB group, 156 out of 373 individuals had a DMFT score ≥ 3 (41.8%). In non-MB children, 86 out of 363 individuals had a DMFT score ≥ 3 (23.7%). A DMFT score less than 3 already was a goal of the WHO for the year 2000 (38). The need for treatment, demonstrated by the DT score, was 2.4 times higher in MB children than in non-MB children. Additionally, tooth loss as a result of caries was observed 3.5 times more frequently in children with a migration background (Fig. 1).

Impact of education level of parents on caries status

The DMFT Index score was associated with the education level of the parents in non-MB children (p=0.03) but not in MB children (p=0.41) (Fig. 2). The DMFS Index reflects this association in non-MB children (p=0.05) but not in MB children (p=0.37). The SiC Index was not associated with the education level of the parents in either non-MB children (p=0.85) or MB children (p=0.26) (Table 1).

Impact of education level of children on caries status

School type had a significant effect on the DMFT Index in MB children (p=0.04) but not in non-MB children (p=0.34). These results are also supported by the DMFS Index. When considering the DMFS Index, the type of school also had a significant effect on non MB children (p=0.04) but not in MB children (p=0.00). The SiC Indices were, interestingly, contrary to these findings. With regards to school type, p-values were 0.47 in MB children and 0.01 in non-MB children. Furthermore, significant differences in the DMFT and DMFS Indices were found between children with and without migration backgrounds regardless of
Discussion

Our data demonstrate that the caries status of children with migration background was not associated with the education level of the parents. This result is in contrast to the factors affecting the caries status of native Austrian children. The caries status of children with migration background was, however, associated with their education level (according to the quality of high school), again in contrast to native Austrian children. These results suggest that, at least in the urban areas of Austria, we cannot expect the parents of children with immigration background to be motivators for good oral health, even if they have a high education level. Whether the causes for this outcome are lower socioeconomic status, language barriers, social standing factors, dietary habits or others, we cannot answer with the results of this study. However, children with immigration background can achieve oral health knowledge at school. Attending to the results of this study this only occurs if they attend an academic-performance high school. This information can provide the scientific basis for the planning of oral health care programs specifically designed for the populations with the poorest caries status (MB children).

Our findings are in agreement with epidemiologic studies reporting on the prevalence of caries in school children with immigration background in Spain (9), Italy (10), Germany (11), Sweden (12) and Denmark (13). However, our findings only partially support reports on the impact of the parents’ education level on the prevalence of caries in children, although the children were younger, in some studies, than in our study (15-17, 19, 20). We found that parents’ education level is correlated with children’s caries in native Austrians but not in immigrant families. Interestingly, children’s education level was correlated with caries in immigrant families but not in native Austrian families, which only partially reflects the tenor of the existing studies (22, 23, 25). Thus, more profound insights and investigations are necessary to understand the role of parents’ and children’s education on caries status.

The question remains as to the explanation for the poorer dental health status of children with migration background in families with highly educated parents. One possible explanation is culturally influenced dietary habits. Living conditions in the country of origin
often affect the behavior in the country of immigration (39, 40). This hypothesis is supported by others; however, these studies also considered the financial background of the immigrant families and the length of stay in the new country (41). Another explanation for these results might be that it takes longer for parents to be integrated in a new culture compared to their children. This would explain why the educational level of the parents has no influence on the caries status of their children, whereas the educational level of the children has influence on their caries status. However this can also be the case apparently. Because children with poor oral health status naturally benefit more from health programs at the school, than children with better oral health status. One major conclusion of the present study is that even highly educated immigrant parents need to be informed about the risk of caries development and prophylaxis regarding their school-aged children.

Together, our findings point to the need for healthcare programs for immigrants. Tooth brushing programs, educational work, distribution of flyers and lectures on dental hygiene should not be restricted to schools and kindergarten; rather, they should also be included in religious centers and cultural establishments where parents and children can participate together at the programs (42). In addition, regularly performed dental checkups for all Austrian citizens might help to sensitize immigrants and parents with low educational level to the oral health of their children. This dental checkup could be executed for example in connection with the mother-child-pass examination, an Austrian health preventive program. Especially early oral healthcare promotion might improve oral health of the children, regardless of their origin (43). Parents of native Austrian children with a low educational level might also benefit from these healthcare strategies.

Among the limitations of this study is that the oral health of nonparticipant children may be worse than that of participant children. Fear of dental examination or embarrassment over poor teeth may have discouraged participation in the study. Another bias is that usually there are correlations between the types of schools attended by the children and the socioeconomic status of their family. We have tried to minimize this bias by selecting the schools from all districts of Vienna, because the living situation is mostly a larger indication of for the socioeconomic status. Moreover, in future studies, the birth country of immigrant children should be taken into account in order to compare their caries scores to that of children living in their birth countries. It would also be interesting if a difference in the oral health exist between children with immigration background born in
Austria and those born abroad. It would also be of interest to know how long the MB families already live in Austria and to gain DMFT scores from children who belong, by definition, the non-MB group, although they are mostly under custody of their foreign-born grandparent. Furthermore, a possible connection between caries of the children with immigration background and the parents’ income respectively the socioeconomic status might be of interest. Thus, the present study can serve as a primer to reveal further the association between education level and dental caries in school children.

**Conclusion**

These findings support the existing knowledge concerning a connection between caries and immigration background. Detailed analysis of children with immigration backgrounds revealed that the type of school attended but not the educational level of the parents has an influence on their oral health status. Caries-preventing programs, oral health education and motivation are needed, especially for children with immigration backgrounds and their parents, regardless of the educational level of parents.

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**Conflict of Interest**

The authors declare no potential conflicts of interest with respect to the authorship and/or publication of this article.

All authors read and approved the final manuscript.

**Authors’ contributions**

BC: Analyzed the data, wrote the paper
GHP and PD: Performed the clinical examination
RG: Wrote the paper, contributed substantially to discussion
AM and AN: Contributed substantially to discussion

References


Figure legends

Figure 1 Impact of immigration background on caries status
A comparison of the mean DMFT score, SiC Index and necessity of treatment is shown between MB children and non-MB children. Children with migration background (MB) showed significantly higher DMFT, SiC and DT values. A significant difference was defined to be $p < 0.05$ (* $p < 0.05$, ** $p < 0.01$).

Figure 2 Impact of education level of parents on caries status
Education level of the parents has a statistically significant effect on the investigated indices but only in the group of Austrian born children with Austrian born parents. A significant difference was defined to be $p < 0.05$ (* $p < 0.05$, ** $p < 0.01$).

Figure 3 Impact of education level of children on the caries status
The calculated DMFT scores have also been linked to the type of school attended by the children. Attendance of different types of schools has a statistically significant effect on the investigated indices but only for the children with migration background. A significant difference was defined to be $p < 0.05$ (* $p < 0.05$, ** $p < 0.01$).
Figure 1
Figure 3

The figure shows a box plot comparing DMFT scores for two groups: those with and without migration background. The data is segmented into academic and elementary level high-school categories.

- Academic level high-school with migration background has the lowest median score, followed by academic level high-school without migration background.
- Elementary level high-school with migration background has a higher median score than academic level high-school without migration background.
- Elementary level high-school without migration background has the highest median score.

Significance levels are indicated by asterisks: * for p < 0.05 and ** for p < 0.01.
Additional files provided with this submission:

Additional file 1: Table.docx, 12K
http://www.biomedcentral.com/imedia/161637181107493/supp1.docx