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Oral health in the German population: Identifying risk factors for periodontitis and comparative analyses in Germans and migrants

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Bacterial infections, such as periodontitis and gingivitis are common in society and affect personal health. Compared to other diseases, however, the effects and consequences of periodontitis and gingivitis are not directly visible. These consequences range from simple bleeding, deep pockets, loss of attachment to a complete loss of teeth. Previous studies have shown that periodontitis is a risk factor for other chronic diseases, such as ischaemic or haemorrhagic stroke. Another diagnosis in the context of oral health is temporomandibular dysfunction (TMD), which is associated with painful symptoms and can affect the quality of life of a person. So far, there are few studies dealing with oral health parameters in terms of ethnic group comparisons. Especially in Germany, very few studies have been carried out for this purpose. The German National Cohort (GNC) will consider these diseases in more detail and will analyse them with several other variables in terms of oral health. In this thesis selected epidemiological issues were treated with a focus on oral health. In a first part the relationship between oral hygiene and periodontitis has been studied in the context of a systematic review with a further meta-analysis. The second part was based on data from an observational study in the context of the feasibility studies for the GNC.

The systematic review with meta-analysis showed that a lower tooth brushing frequency is associated with only a slightly increased risk of periodontitis. Prior to this study, no literature review with meta-analysis was available that directly investigated the effect size between frequency of tooth brushing and periodontitis in cross-sectional studies and case-control studies. The individual studies were too small to clarify the question with sufficient precision, and several studies had to be excluded because of poor quality or other reasons from the analysis. While most studies showed an increased, albeit not significant association for frequency of tooth brushing with periodontitis, the odds ratio (OR) of the meta-analysis showed a clear and significant effect (OR=1.4).

The overall study population to investigate risk factor patterns and the magnitude of risks for the oral parameters consisted of 428 persons distributed over four centres Augsburg (N=45, m:19, f:26), Berlin (N=64, m:18, f:46), Greifswald (N=104, m:35, f:69) and Heidelberg (N=215, m:92, f:123).

In the study "dental health" P13 the feasibility of detailed dental examinations within the GNC was examined first with the author's direct involvement. Based on the data collected, in this thesis the oral health parameters were compared in general and between ethnic groups. In particular, the pocket depth (PD), bleeding on probing (BOP) and various additional parameters for TMD (such as overbite and overjet) were examined. Periodontitis was determined by the maximum PD in three levels (no/mild, moderate and severe periodontitis) and gingivitis on the

basis of BOP classified in two groups (Yes/No). The selection of independent variables from the study database for analyses was carried out according to recent data from the literature. Factors that may be associated with the disease were selected on the basis of existing studies. The total study sample consisted of N=428 persons including Germans (N=295, m:112, f:183), resettlers (N=62, m:20, f:42) and Turks (N=71, m:32, f:39) distributed over four centres Augsburg, Berlin, Greifswald and Heidelberg.

The study showed differences between the ethnic groups, however, the statements have to be interpreted with caution, taking differences of recruitment processes into account. In general, the periodontal disease prevalence was quite high in all groups, especially in the migrants. The overall mean percentage of sites with BOP for Germans was 12.3%, resettlers 20.3% and Turks 25.8%. In moderate periodontitis a high proportion of mean BOP in all ethnic groups (18.4%) was found. For severe periodontitis ($\geq$6 mm), the average BOP even doubled among the migrants (resettlers: 45.7%, Turks: 42.4%) in contrast to the Germans (21.9%). Multivariate regression analyses based on subsets of selected variables showed a significant higher BOP prevalence for Turks (OR=4.29, 95% CI=1.34-13.76, p=0.01) as compared to the Germans. Further, risk for peridontitis was significantly greater in persons with Turkish background (OR=2.30, 95% CI=1.20-4.40), and higher, however, non-significant in resettlers (OR=1.38, 95% CI=0.72-2.63) compared to Germans. A significant effect was also observed for school education (OR=0.62, 95% CI=0.40-0.97). Compared to non-smokers, current smoking was strongly associated with higher PD for all persons jointly and Germans only (OR=1.79, 95% CI=1.06-3.02; OR=2.44, 95% CI=1.18-5.07). Within the German sample higher BMI (increase of 5 kg/m^2) yielded a more severe periodontitis (p=0.001, OR=1.70, 95% CI=1.26-2.29).

For TMD increased effects for Turks and resettlers in concordance with the literature (maximum unassisted opening and overbite opening of the mouth without assistance and without pain) on various factors in metric measurements were confirmed. Further questions considering the migrant groups more closely should primarily be integrated into the standardized RDC/TMD protocol, in order to make the results comparable with other studies on TMD.

In this study, the response rates of migrants were lower than for the Germans, and the selection processes also included a recruitment via networks, hence, only a limited representativeness is present. This could either be caused by the resulting language barriers, or, due to the generally lower motivation of migrants to participate in such studies. This has to be taken into account when interpreting the results from this study.

In summary, based on this thesis it could be confirmed that poor oral hygiene, increased BMI and current smoking represent risk factors for periodontal disease, and that the prevalence of periodontitis in people of Turkish origin seems to be higher than that of the native German population. Furthermore, it could be shown that a combination of PD and AL are necessary in the clinical examination of periodontal disease, as a progression of periodontal disease is strongly associated with age. For the study population, a high prevalence of PD and BOP was detected and thus dental care programs (with a proportion of migrants) are required with emphasis on the general population. As part of the TMD analysis ethnic differences in the two largest migrant groups in Germany could be found based on various factors. Therefore, the

inclusion of questions on ethnicity in the German version of the RDC/TMD and other clinical research protocols for TMD is recommended.