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Influence of gender and social factors on oral health, treatment degree and choice of dental restorative materials in patients from a dental school

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Willershausen B, Witzel S, Schuster S, Kasaj A. Influence of gender and social factors on oral health, treatment degree and choice of dental restorative materials in patients from a dental school.

Abstract: *Objective:* The attitude towards oral health is influenced by gender, the level of education and the social background of the patients The aim of the present study was to determine a possible relationship of gender, the educational level and the oral health as well as the choice of dental restorations. *Methodology:* A total of 2374 outpatients (age: 18–80 years) from a University dental school were assessed. Inclusion criteria were 15 remaining teeth and good general health. In addition to anamnesis data, information concerning educational level and present occupation was collected. The dental assessment included number of teeth, endodontic treatment, type of restorations (root canal fillings, restoration materials) as well as dental panoramic radiographs (OPG). *Results:* The female patients demonstrated a statistically significant higher percentage of restoration, more teeth with crowns and more tooth coloured fillings compared to men ($P < 0.01$). Patients with a higher level of education preferred more expensive restorations, whereas patients with a low level of education exhibited more inexpensive restorations. However, patients with private health insurance showed lower levels of carious lesions. *Conclusion:* The examined patients showed no significant correlation between educational level and type of dental restorations but female patients had a lower number of teeth and more restoration.

Key words: caries lesions; dental restorations; gender; social factor

Introduction

The attitude towards general and oral health is influenced by both the various possibilities of treatment and social factors. People of the lower classes of society tend to have chronic periodontal diseases more often, but they do not regularly visit a dentist especially regarding preventive health measures. Akhter *et al.* (1) demonstrated that the reasons for permanent teeth extractions correlate with socio-demographic factors, education levels, smoking habits and frequency of teeth cleanings. The consequences of social disadvantages or discrimination are very well documented. A study by Chavers *et al.* (2) of adults at the age of 45 plus showed that patients with a lower educational level and a low income have explicitly poorer dental health compared with patients with a university degree and an assured income.

Jamieson *et al.* (3) examined the reasons for untreated dental decay among 1125 Australian participants aged 15–34 years. They found that patients living in rural areas showed more caries lesions; other causes for dental decay were low education, dental fear and the lack of dental insurance.

An association between education level and oral health conditions in elderly habitants of Helsinki could be demonstrated in the study of Siukosaari *et al.* (4). They showed that subjects with a high education level had more remaining teeth.

The research of Cimoes *et al.* (5) in north-east of Brazil supports this hypothesis. In their survey, they found that socio-economic and demographic data are linked to dental health; people with low social classes display significantly higher number of missing teeth because of caries lesions.

Dumitrescu and Kawamura (6) assessed the psychological status in a Romanian adult population and explored the relationship between hopelessness and oral health status. They showed that hopeless people had more untreated dental caries and had experienced a toothache within the last 3 months.

Borrell and Crawford (7) demonstrated in a recent study that inequalities in periodontitis were associated with education, income, race and ethnicity and are still pervasive in the US over the years.

The educational background seems to have greater importance in this correlation than the financial situation of the patients. The study of Krustrup and Petersen (8) revealed that adults at the age of 35–44 and 65–74 years with a low educational background suffer from inflammatory periodontal diseases more often in comparison with those with a higher educational level. In this study, the correlation of the patient's income and the periodontal situation was just below significant levels.

Furthermore, it can be stated that patients with a higher educational level take more care of their dental hygiene, use appointments for prophylaxis more often and they seem to be less afraid of dental treatment (9–11).

The risk of getting diverse diseases is influenced by social components meaning that socially deprived segments of the population show a higher risk of getting these diseases. The influence of racial and ethnicity variations on oral health was examined in the study of Reid *et al.* (12). The authors demonstrated that non-Hispanic blacks and Mexican-Americans displayed an increased risk of untreated caries in comparison with non-Hispanic whites.

The III and IV German Micheelis health study from 1999 and 2006 (13, 14) affirmed the correlation of dental health and social background. Caries, periodontal diseases and edentulous were more distinct in the lower social classes than in the middle and upper social classes. In accordance with other social surveys, this study showed that people with a higher education take more care of dental health compared with persons with a lower level of education. The use of dental services correlated with educational level, and the people with a higher education went to see a dentist more often for checking purposes. It should be noted that the insured persons with lower financial capacities chose the cheaper dental solutions to avoid financial burden. According to the political discussion about the present health system and the possible effects of the health care reform on socially disadvantaged segments of the population, it was the aim of this study to look for a possible discrepancy in the dental health care system determined by gender and social background using ambulant patients of the university hospital.

Materials and methods

Outpatients of the Dental School (Johannes Gutenberg University Mainz) were chosen for this study. All patients gave informed consent to participate in this study and the data gathered were analysed anonymously. The patients came to the Dental School because of acute pain, usual dental treatment or routine examination. From each patient a digital panoramic radiograph (OPG) was available; a clinical indication was given because of treatment need, pain or oral searching for chronic apical lesions and the study was conducted in confirmation with the guidelines issued in the Declaration of Helsinki. The criteria for inclusion were at least 15 remaining own teeth, age between 18 and 80 years and no severe systemic diseases. Besides the anamnesis data, generalized diseases, height and weight (BMI) as well as medication were registered.

Furthermore, the patients were asked for the level of education and current job and were allocated into four different social categories.

Persons with elementary school (after 9 years of school) were assigned into category I, persons with secondary school (after 10 years of school) into category II, persons who graduated from high school but did not go to any university belonged to category III and the last category, IV, was formed by those patients who went to a university.

The dental documentation covered the number of missing teeth, decayed teeth, teeth that were not worth preserving as well as the degree of dental restoration. Concerning the latter point, it was important to document the materials of the restorations, which are as follows: composite-resin or amalgam fillings, ceramic or gold inlays, root-canal treatments, crowns (metal, ceramic), partial crowns (metal or ceramic), endodontic treatments as well as dental implants.

All restorative measures were listed for each tooth, and for different materials used in one tooth, they were listed separately.

Statistical analysis

The patient's clinical data were collected and statistically analysed by means of the SPSS®, 15.0 for Windows software (SPSS Inc., Chicago, IL, USA). Missing values were registered with suitable so-called 'missing values'. The descriptive analysis of metrical data was covered by statistical measures of the average value and the standard deviation (SD). Categorical criteria were described by using absolute and relative frequencies. The evaluation of the study was of an explorative character. For capturing statistical differences depending on certain factors, the Mann–Whitney *U*-test was being used for two variables (e.g. gender), and if there were more than two variables present (e.g. groups of age, social groups, etc.), the Kruskal–Wallis test was applied. In all test procedures, a significance level of $P < 0.05$ was considered statistically significant.

Results

The present study of ambulant patients from the Department of Restorative Dentistry included 2374 patients, among whom 1152 were women (average age: 43.3 years, SD: 14.8) and 1222 were men patients (average age: 42.7 years, SD: 14.1 years).

The majority of the patients had an obligatory health insurance (80.3%, mean age: 42.9 years; 49.8% female patients) and only 19.7% had a private health insurance (mean age: 45.9 years; 43.9% female patients). The number of missing teeth significantly increased according to expectations with the rising age ($P < 0.001$); compared with aged matched males, female patients showed a lower number of teeth (Table 1). Furthermore, the patients of the study were put into different social categories (categories I–IV) according to their jobs and educational level (Table 2).

Figure 1 shows the number of remaining teeth in connection with the patient's age and their social category and in Fig. 2, the relationship between the types of various restorations in different education levels is demonstrated. The number of

Table 1. **Number of missing teeth in male and female patients and different age groups**

Age group (years)	Male patients	Female patients
18–25	2.4	2.9
26–30	3.4	3.5
31–40	4.2	4.9
41–50	6.3	7.1
51–60	7.0	8.0
61–70	7.9	8.8
71–80	10.0	11.0

Table 2. **Relative frequency and age and gender distribution in patients with different education levels**

Education level (I–IV)	Frequency (%)	Mean age (years)	Male patients (%)	Female patients (%)
Category I	15.8	38.5	45.6	54.4
Category II	48.8	49.6	49.7	50.3
Category III	18.2	41.7	50.7	49.3
Category IV	17	40.0	55.3	44.7

Category I (elementary school), category II (secondary school), category III (high school), category IV (university degree).

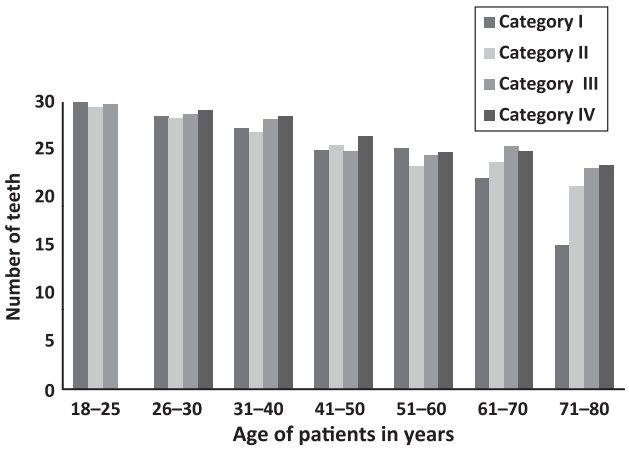

Fig. 1. Correlation between the number of remaining teeth and age in patients with different education levels (categories I–IV). Category I (elemental school), category II (secondary school), category III (high school), category IV (university degree).

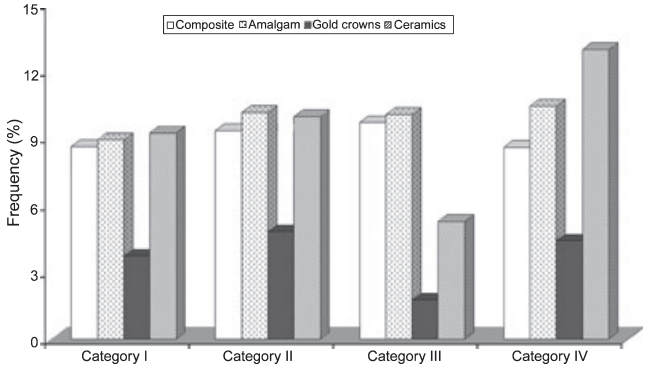

Fig. 2. Relationship between various types of restorations in patients with different education levels (categories I–IV).

decayed teeth showed a correlation with the patient's social class, i.e. the higher the social class the lower the number of decayed teeth. The number of carious lesions within category I patients averaged 1.1 (SD: 2.7); an average of 1.2 carious teeth was listed in category II (SD: 2.1), patients in the third category showed an average of 1.1 decayed teeth (SD: 1.7), whereas patients with the highest educational level had merely 0.8 decayed teeth (SD: 1.4). A considerable decline in the number of teeth was noticeable within the patients of the categories I and II and patients aged 60–80 years. Figure 3 demonstrates the number of all the listed dental restorations such as fillings, endodontic treatments, crowns and implants in correlation with the different age categories.

Up to an age of 40 years, a general increase in dental filling measures was observed, whereas from the age of 41 years, a steady decrease in those measures could be noticed. With the reduction of direct filling measures, the number of prosthodontic measures rises.

There was a gender-specific distribution of each dental filling (composite, amalgam) and restoration material (ceramic, precious metal) related to the different age categories. Likewise, the female patients had a lower number of teeth, a higher number of restorations and consequently a significantly lower rate of carious lesions ($P = 0.001$). In addition, the number of composite restorations was significantly higher ($P = 0.001$) in women compared with men. The amount of amalgam fillings did not show any relevant clinical differences within the particular age groups and gender. Patients with obligatory health insurance showed similar restoration materials in comparison with patients with private insurance. Tooth-coloured resin-based materials were found in obligatory health assurance in 2.9 cases (SD: 3.0) and amalgams with a mean value of 3.4 (SD: 3.5); patients with private insurance showed in 3.1 cases resin-based restoration materials (SD: 3.0) and in amalgams in 2.9 cases (SD: 3.3). It was equally noticeable that the amount of metal-ceramic crowns was significantly higher in women as well. Regarding the various social classes, there were minimal differences in the filling measures, neither were there statistical distinctions concerning the total number of dental fillings ($P = 0.131$) nor the use of ceramic restorations ($P = 0.779$) or amalgam fillings ($P = 0.231$).

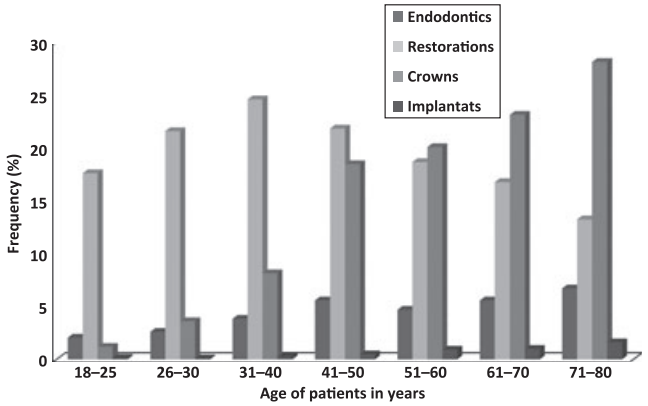

Fig. 3. Amount of dental restorations for the different age groups.

Discussion

In the present study, a connection between the degree of dental restoration, the choice of restoration materials, restoration measures, and the age and educational level of patients in a dental university hospital was examined. The screening showed a correlation between the level of education and the number of teeth present, which had already been confirmed by several other studies (14, 15). The test patients with a university degree averaged 1.5 more teeth compared with those patients with a low or no real school education (26.1 versus 24.6).

However, so far, there were no distinct connections between the level of education and the used dental materials or the number of root canal treatments. More expensive restorations could be found in both educated and less educated persons. Looking at these results, it still has to be kept in mind that only patients from a dental university hospital had been included. These patients have already been treated there for several years, have been taking part in other studies also, or they came to the university hospital to obtain a more affordable treatment from dental students. These aspects may represent a special selection of patients, which cannot be seen as a representative sample for the dental care within the population of Germany. A differentiated and critical review is necessary regarding the thesis that women generally tend to have better oral health and dental restoration. The analysis of the data

shows a lower amount of carious lesions in women as well as a higher percentage of tooth-coloured dental restorations, which could be traced back to the fact that women place more value on aesthetics and that they use the offered measures of dental prophylaxis more often (16). Furthermore, a higher number of restorations could be found in women unaffected by their educational level compared with the total number of teeth and according restorations found in men at the same age.

A connection between the patient's social class and oral hygiene could not be verified in this study, neither was there any significant differences concerning the value of the different dental restorations or the general oral and dental condition (2, 8, 11, 17). There was only a little but not significant influence of social components on the selection of dental restorations. In conclusion, it can be stated that social differences have minimal effects on oral health (17, 18). Nevertheless, studies comparing different educational levels revealed that social differences are associated with differences in oral health (19). The attitude towards oral health also depends on social classes (20–22). These findings also indicate that patients from lower social classes tend to see a dentist less frequently, and thus their teeth are therefore in a worse condition (9). The results of our study pointed out that the patients of the dental university hospital did not show any notable differences with respect to oral health; hence, dental care is practised primarily and successfully by dental standards.

Conclusion

The results of this study show a clear relatedness between the number of teeth and the patient's educational level. However, the examined patients from the dental school showed no significant correlation between educational level and type of dental restorations, but female patients had a lower number of teeth and more restorations.

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