

SELECTED ASPECTS OF ORAL HEALTH STATE IN SMOKERS

MARTA NAKONIECZNA-RUDNICKA, BARBARA TYMCZYNA-BOROWICZ

Chair and Department of Conservative Dentistry with Endodontics, Medical University of Lublin

Abstract

Introduction. Cigarette smoke contains around 4800 chemical substances which come from the tobacco and substances added to the tobacco in the process of cigarette production. Exposure to the tobacco smoke is related to active smoking, secondhand smoke and thirdhand smoke. Cigarette smoking, oral health care and dietary habits are modifiable lifestyle factors.

Aim. The aim of the study was to review the literature on selected aspects of oral health in smokers.

Materials and methods. From the EBSCO database scientific articles have been searched for the presented literature review.

Results. The lack of regular dental check-ups is a significant factor of the risk of oral diseases in smokers. Environmental exposure to the tobacco smoke and bad dietary and oral hygiene habits are also the risk factors of pathological states in the oral cavity.

Conclusion. Information on health effects related to cigarette smoking and motivation to quit smoking should be passed to patients by the dentists.

Keywords: smoking, mouth, teeth, saliva.

Introduction

Cigarette smoke contains around 4800 chemical substances which come from the tobacco and substances added to the tobacco in the process of cigarette production. Beside toxic substances, 69 carcinogens were identified in the cigarette smoke: polycyclic aromatic hydrocarbons, N-nitrosamines, aldehydes, volatile hydrocarbons, heterocyclic compounds, aromatic amines and other organic compounds [1].

Gas phase of tobacco smoke includes around 400-500 chemical compounds, among others, ammonia, carbon oxide, nitrogen oxide, hydrogen cyanide, acetaldehyde, N-nitrosamines, formaldehyde, while particulate phase includes over 3500 chemical compounds, among others, pyridine alkaloids including nicotine. Trace amounts of lead, arsenic, nickel, cadmium and chromium are present in tobacco smoke [2].

Exposure to the tobacco smoke is related to active smoking, secondhand smoke (SHS) and thirdhand smoke. The expression 'thirdhand smoke' is related to the residue of the tobacco smoke which remains in the house on surfaces e.g. the floor, carpets, curtains and in the dust [3].

Aim of the study was the analysis of the oral health state in smokers conducted on the basis of literature.

The status of cigarette smoking versus oral health check-ups

Regular oral health check-ups are the basis for the prophylactic and therapeutic scheme elaborated individually for the patient. Patient's survey, clinical examination and additional tests enable prophylaxis, early diagnosis and treatment of the oral pathological conditions.

Oral health care, dietary habits and cigarette smoking are modifiable lifestyle factors. Conducting a training on the oral health, analysis of dietary habits and minimal anti-tobacco intervention in a smoker are essential elements of the oral diseases prevention.

The frequency of dental check-ups of the people aged 20-54 is not connected with sex, residence in the urban or rural area or age. Smokers in relation to people who had never smoked, significantly less frequently than every six months report for dental check-ups [4]. Smokers in relation to those who had never smoked, do not brush their teeth properly and less frequently declare brushing their teeth at least twice a day and using dental floss to clean tooth contact surfaces and interdental spaces [5].

The studies conducted in South Florida within 3 years in the group of 1008 (86.2%) non-smokers and 162 (13.8%) smokers revealed that smokers reported to the dentist less frequently between the 2nd and the 3rd year of study and had poorer self-rated oral health in comparison to non-smokers [6]. The studies conducted in England also revealed that smokers in relation to non-smokers, more frequently rate their oral health as being poor and also report to the dentist only when they feel pain. Non-smokers more frequently rate their oral health as being very good or good and report for regular dental check-ups [7].

Studies conducted in Australia revealed that cigarette smoking, reporting to the dentist only because of some problem and brushing the teeth less frequently than twice a day is connected with the increase of untreated root caries [8]. The studies conducted in the group of diabetics – 188 smokers and 1164 non-smokers revealed that smokers less frequently report for dental check-ups compared to non-smokers [9].

Status of cigarette smoking versus the state of mineralized and soft oral tissues

Smokers aged 30, 50- and 65 years have significantly higher percentage of molars with furcation in relation to non-smokers. In smokers who are 65 and 75, a higher percentage of missing mandibular anterior teeth is stated; however, molars are the most frequent missing teeth both in smokers and non-smokers. Smokers in comparison to non-smokers, more frequently consume sugar contained in snacks and soft drinks, while they eat fruit less frequently. The state of dentition in 35-year-old smokers is characterized by larger number of tooth surfaces affected by caries as well as filled teeth compared to non-smokers [10]. Secondary caries is more frequently stated in smokers compared to non-smokers [11].

Results of the studies conducted in Malaysia in the group of 100 smokers and 100 non-smokers aged 18-50 revealed significantly higher concentration of volatile sulphur

compounds (VSCs) in smokers' oral cavities compared to non-smokers [12]. VSCs and amines are one of the reasons of bad breath. They are produced in larger amounts by the bacteria present on the dorsal surface of the tongue and in the patients with periodontal diseases. *Staphylococci* and *Streptococci* may constitute 90% of bacteria mass on the tongue. Cleaning the tongue causes the decrease of bacterial population and bad breath [13].

Bad breath and tooth discolorations, gingivitis, periodontal problems, dry mouth, tongue discolorations dental caries are complaints self-reported by smokers [14,15].

The studies conducted in South Korea among 18,488 adults above 19 years of age revealed that in the group of smokers the prevalence of periodontitis was 35%. Among subjects smoking less than 15 cigarettes daily, the prevalence of periodontitis has the value of 25.7%, among those smoking 15 or more cigarettes daily it is 41.9%. In the group of non-smokers, the prevalence of periodontitis is 27%. The subject qualified to the group of smokers had smoked more than five packets of cigarettes throughout her/his lifetime (100 cigarettes) and at the time of the interview smoked more than 1 cigarette daily. The state of periodontium was assessed with the use of Community Periodontal Index (CPI). Subjects with the CPI value of 3 or more belonged to the group with periodontitis, whereas, the subjects with the CPI<3 belonged to the control group [16].

The studies indicate that the status of cigarette smoking reported by the respondents has no essential influence on their use of the whitening toothpastes, strips, splints or professional teeth whitening procedures [17].

The status of cigarette smoking versus the selected biochemical parameters of the saliva and blood serum

IgG, IgM, IgA immunoglobulins and the secretory immunoglobulin IgA (sIgA) in the saliva act as the defence against microorganisms present in the oral cavity, among others, by the agglutination of bacteria, reduction of microbial adhesion, preventing penetration of foreign antigens into the mucous membrane [18].

Giuca *et al.* [19] conducted studies in the group of 30 smokers and 30 non-smokers, the mean age of the subjects was 25.3 ± 3.8 . The level of IgA, IgG, IgM immunoglobulins in non-stimulated saliva was significantly lower in smokers compared to non-smokers.

The studies conducted in the group of 70 people aged 19-45 revealed higher sIgA level in non-smokers in comparison to smokers, and in the group of non-smokers with no dental caries in comparison to smokers with caries. Higher sIgA level was also noted in non-smokers with dental caries compared to smokers with or without caries [20].

The studies conducted in the group of 24 smokers and 21 non-smokers reveal no statistically significant differences in the mean values of IgG, IgA and IgE concentration in the saliva between the investigated groups. IgM concentration in the saliva was significantly lower in smokers in relation to non-smokers [21].

The analysis of *Streptococcus mutans* and *Lactobacillus* cariogenic bacteria in the saliva of 124 subjects – 58 smokers and 66 those who had never smoked aged

20-54. The number of *S. mutans* and *Lactobacillus* colonies is not related to the status of smoking – smoker, non-smoker, duration of smoking, number of cigarettes smoked daily [22].

One of the reasons of the development of oral cancer is cigarette smoking and the content of such substances as N-nitrosamines, formaldehyde, acetaldehyde and polycyclic aromatic hydrocarbons in the tobacco smoke. Nicotine and carbon oxide are, among others, responsible for changes in cardiovascular system [23].

Environmental exposure to the tobacco smoke

Clinical studies conducted in Japan in the group of 1801 children aged between 36 and 47 months, as well as survey studies conducted among their parents or carers of children, revealed correlation between early childhood caries (ECC) and environmental exposure to the tobacco smoke (environmental tobacco smoke, ETS) at home. The number of smokers in the family was significantly related to the risk of ECC and cigarette smoking, especially by mothers, what was connected with higher prevalence of dental caries in children [24]. The state of dentition and concentration of cotinine in urine was assessed in the group of 405 children aged 3-6 from nursery schools in Japan. Children's parents answered the questions included in the survey questionnaire which concerned, among others, cigarette smoking by the parents and other family members living with the child (46% of children lived with people who were currently smoking). Environmental exposure to the tobacco smoke at home and the level of cotinine in urine is related to dental caries in children [25]. Majorana *et al.* [26] presented study results elaborated basing on the clinical study of 2395 children aged 24-36 months and the survey questionnaire filled by their mothers. Children of the mothers who smoked 5 or more cigarettes daily during their pregnancy reveal higher risk of the development of dental caries.

Smoking cigarettes by pregnant women may be related to a delayed tooth formation. Exposure of the developing teeth to chemical agents included in SHS, e.g. nicotine and heavy metals, may impair tooth mineralization [3].

Conclusion

The lack of regular dental check-ups is a significant factor of the risk of oral diseases in smokers. Environmental exposure to the tobacco smoke and bad dietary and oral hygiene habits are also the risk factors of pathological states in the oral cavity. Information on health effects related to cigarette smoking and motivation to quit smoking should be passed to patients by the dentists.

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Corresponding author

Marta Nakonieczna-Rudnicka
Chair and Department of Conservative Dentistry with Endodontics
Medical University of Lublin
Karmelicka St. 7, 20-081 Lublin
e-mail: marta1717@op.pl