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Smoking and the level of nicotine addiction in relation to the state of hard dental tissues in young adults

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Abstract

Nowadays, smoking is considered to be one of the unhealthiest human behaviours. The aim of this study was to evaluate the potential influence of smoking, as well as the degree of the addiction, on the health status of hard dental tissues in young adults. The study involved 148 randomly selected young adults. Mean age of the study subjects was 20 years ± 4 months. Questionnaire survey (6-grade Fagerström Nicotine Tolerance Questionnaire) and clinical examination were performed and the obtained results statistically analyzed. The mean value of 6-grade Fagerström Nicotine Tolerance Questionnaire was 2.298±1.992. Of the studied population, 88.06% had no features of biological dependency. Mean DMF and DMFs Indexes were 11.31±5.06 and 16.91±10.65, respectively. It was established that in the study population, over 45% of the subjects smoked. However, there was no correlation found between smoking and gender, and no cause-effect relationship between smoking and hard dental tissues status as defined by DMF, DMFs values and their components. It was observed that in the case of people who began smoking at an earlier age, the degree of nicotine dependency was higher. None of the study subjects demonstrated features of heavy or pharmacological nicotine dependency.

Key words

Cigarette smoking, Fagerström Nicotine Tolerance Questionnaire, DMF index, DMFs index, nicotine dependency

INTRODUCTION

Nowadays, smoking is considered to be one of the unhealthiest human behaviours. The WHO classifies this addiction as a chronic, progressive, recurrent and 'contagious' disease requiring intensive and complex therapeutic management. Smoking is regarded as a neurobiotic addiction. Neurobiotic addictions are disorders characterized by the tendency to use psychoactive substances. In the case of smoking, the addictive alkaloid is nicotine. The addiction can have either a pharmacogenic or psychogenic form. Nicotine addiction does not affect the behaviur or social functioning of the smoker; however, it adversely influences his or her general health status. It should be stressed that it is the only addiction adversely affecting not only the active smoker's health, but also, through the environmental tobacco smoke, the condition of the passive smokers. Smoking adversely affects foetal development, and contributes to the occurrence of tobacco-related diseases of the cardiovascular, respiratory and gastro-intestinal systems, immunological disorders, and oral cavity tissues diseases [1-11].

Thus it seemed purposeful to evaluate the potential influence of smoking, as well as the degree of the addiction, on the health status of hard dental tissues in young adults.

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MATERIALS AND METHODS

The study involved 148 randomly selected young adults – 81 women and 67 men, who were first year (freshman) students of humanities from the Maria Curie-Skłodowska University in Lublin, southeast Poland. Mean age of the study subjects was 20 years ± 4 months, in the range from 19 years – 20 years and 11 months, Me = 20 years. With prior explanation of its purpose, a questionnaire survey was conducted and clinical examination performed. The obtained results were statistically analyzed. The questionnaire survey utilized a 6-question version of Fagerström Nicotine Tolerance Questionnaire [10]. The questions included in the questionnaire concerned:

- How soon after you wake up do you smoke your first cigarette? (up to 5 min. – 3 points; 6-30 min. – 2 points; 31-60 min. – 1 point; after 60 min. – 0 points)
- Do you find it difficult to refrain from smoking in places where smoking is not allowed? (yes – 1 point; no – 0 points)
- Which cigarette would you be the most unwilling to give up? (the first one – 1 point; any of the others – 0 points)
- How many cigarettes do you smoke per day? (10 or less – 0 points; 10-20 – 2 points; 21-30 – 2 points; 31 and more – 3 points)
- Do you smoke more during the first hours after waking than during the rest of the day? (yes – 1 point; no – 0 points)
- Do you smoke even when you are very ill? (yes – 1 point; no – 0 points)

The obtained results were summed up. It was assumed that if the sum of points scored by a patient was in the range of 0-4 points they had low level of nicotine dependency. The

score of 5-8 points meant that the patient showed features of nicotine dependency, and the score of 9 and more points confirmed biological addiction to nicotine. It should be stressed that when a study subject declared that they had their first cigarette within 5 minutes after waking up they were considered to be heavily addicted to nicotine. At the same time, patients smoking more than 30 cigarettes were regarded as pharmacologically dependent on nicotine.

The questionnaire additionally included questions concerning the following issues:

- Where did you live before beginning your studies?
- Do you ever smoke before breakfast?
- Do you ever smoke at night without any particular reason?
- Does smoking influence the frequency of your dental visits and, if yes, how?
- How long have you smoked cigarettes?

In course of clinical examination, the state of dentition was evaluated by calculating the DMF and DMFs Indexes, as well as the values of their individual components. Dental Treatment Index (DTI) was also calculated. The state of oral cavity hygiene was evaluated using Plaque Test on the basis of OHI-S (Oral Hygiene Index Simplified) [12]. The state of the periodontium and oral mucosa were also evaluated. The obtained results were statistically analyzed. For qualitative (immeasurable) features, the results were summarized in contingency tables (cross tabulation) calculating percentages. In the case of quantitative features, statistical means and measures of results dispersion were calculated. In results comparison, statistical methods based on Kruskal-Wallis test and Mann-Whitney test were used. In the case of low numbers in the summarized correlation tables, the analysis was conducted using methods based on Log-Linear Analysis. Statistical significance was established at the level of $p < 0.05$. The calculations were performed using Statistica 8 software.

RESULTS

In the study population, 81 subjects (54.72%), 45 women and 36 men, did not smoke, while 67 subjects (45.27%), 36 women and 31 men, smoked cigarettes. No statistically significant correlation was found between smoking and gender (H=0.048; p=0.825). In the study population, 78 subjects (52.70%) lived in Lublin, a city with more than 100,000 inhabitants, before beginning their studies; 42 subjects (28.37%) lived in small towns with less than 100,000 inhabitants, and 28 subjects (18.91%) lived in the countryside. No statistically significant correlation was found between the place of residence and beginning smoking (Z=0.757; p=0.48).

It was established that 21 persons (31.34%) smoked cigarettes before breakfast. At the same time, it was observed that 19 subjects (28.35%) smoked cigarettes at night without any particular reason.

It should be stressed that none of the subjects smoked within 5 minutes after waking up, which would be considered a symptom of heavy addiction to nicotine. 19 women (52.78%) smoked their first cigarette after 6-30 minutes after waking up, 10 women (27.77%) after 30 minutes and 7 women (19.44%) after 60 minutes after waking up. In the case of men, this concerned, respectively, 15 males (48.38%), 10 young adults (32.26%) and 6 subjects (19.35%). The correlation was not statistically significant (Z=-0.800; p=0.432).

Regarding smoking in places where smoking was forbidden, it was found that women less frequently – 7 persons (19.44%) had problems with refraining from smoking than men – 4 persons (12.90%). The correlation was not statistically significant (Max Likelihood χ^2=0,465, p=0,495).

In the case of women (16 persons (44.44%), it was more difficult for them compared to men (12 persons 38.70%) to refrain from smoking their first cigarette of the day than any of the other cigarettes. The correlation was not statistically significant (Z=-0.406; p=0.684).

On the basis of the study, it was established that 33 women (91.67%) smoked up to 10 cigarettes a day, 2 (5.56%) women smoked 10-20 cigarettes a day, 1 woman (2.77%) smoked 21-30 cigarettes a day. In the case of the men, the respective numbers were as follows: 22-10 cigarettes a day (70.98%), 8 young adults – 10-20 a day (25.80%), and 1 man – 21-30 cigarettes a day (3.22%). None of the subjects smoked over 30 cigarettes a day which would mean heavy pharmacological nicotine dependency. The correlation was not statistically significant (Max Likelihood χ^2=5.275, p=0.071).

In case of women, more subjects – 31 persons (86.11%) smoked more cigarettes during the first hours after waking up compared to men – 23 persons (71.19%). The correlation was not statistically significant (Z= -1.054; p=0.291).

28 women (77.78%) did not smoke when ill, compared to 21 men (67.74%). The correlation was not statistically significant (Z= -0.792; p=0.428).

In the study population, it was found that 31 women (86.45%) and 28 men (90.32%) did not have features of pharmacological nicotine dependency, or the degree of their dependency was very low. In the case of 13.89% smoking women and 9.68% of smoking men, there occurred features of nicotine dependency. No statistically significant correlation was found between gender and the degree of nicotine dependency (Table 1).

Table 1. Nicotine dependency according to 6-grade Fagerström Nicotine Tolerance Questionnaire and gender in studied population

Gender	Nicotine dependency according to 6-grade Tolerance Questionnaire				Total	Fagerström Nicotine Statistical analysis
	No features of biological dependency		Features of nicotine dependency			
	Number	%	Number	%		
Women	31	86.11	5	13.89	36	Max Likelihood
Men	28	90.32	3	9.68	31	χ^2= 1.248
Total	59	88.06	8	11.94	67	p= 0.535

Mean value of 6-grade Fagerström Nicotine Tolerance Questionnaire was 2.298±1.992 (2.166±2.144 and 2.451±1.822 in women and men, respectively).

On the basis of the performed study, it was established that 6 subjects (8.95%) had smoked cigarettes for over 5 years, therefore they must have started smoking at the age of 14-15 years. 14 subjects (20.90%) had been smoking for over a year, and the other smokers in the study group – 47 subjects (70.15%) had only smoked for several months, which means they must have started smoking in their senior year at high school, or soon after the beginning of their studies.

Statistical analysis showed that there was a significant correlation between the moment of initiation of smoking and thus the duration of smoking and the degree of nicotine

Table 2. Evaluation of the state of dentition in relation to gender and smoking among studied students

Studied feature	Non-smokers n=81		Smokers n=67		Total N = 148 M ± SD	Statistical significance
	Women n=45	Men n=36	Women n=36	Men n=31		
	M ± SD	M ± SD	M ± SD	M ± SD		
D Index	3.80±3.47	5.52±5.27	4.80±3.83	5.19±3.35	4.75±4.06	(1) Z=-1.384; p=0.166
						(2) Z=-1.226; p=0.219
M Index	0.17±0.53	0.05±0.23	0.13±0.38	0.29±0.82	0.16±0.54	(1) Z=0.088; p=0.929
						(2) Z=-0.227; p=0.820
F Index	6.93±3.72	5.52±4.23	6.50±4.04	6.87±4.85	6.39±4.19	(1) Z=1.361; p=0.173
						(2) Z=-0.527; p=0.597
DMF Index	10.91±4.85	10.80±4.92	11.44±4.06	12.35±5.89	11.31±5.06	(1) Z=-0.433; p=0.664
						(2) Z=-0.714; p=0.474
Ds Index	4.88±5.58	6.19±5.83	5.08±4.14	6.22±5.89	5.53±5.10	(1) Z=-1.550; p=0.121
						(2) Z=-1.032; p=0.301
Ms Index	0.88±2.67	0.27±1.16	0.69±2.43	1.45±4.12	0.81±2.73	(1) Z=0.088; p=0.929
						(2) Z=-0.227; p=0.820
Fs Index	11.77±8.81	7.72±6.24	10.27±7.79	12.45±10.65	10.56±8.56	(1) Z=1.294; p=0.195
						(2) Z=-0.753; p=0.451
DMFs Index	17.55±10.99	14.19±7.30	16.05±9.18	20.12±14.04	16.91±10.65	(1) Z=0.028; p=0.976
						(2) Z=-0.387; p=0.698

Z – test function value using Mann-Whitney test
(1) – comparison between women and men
(2) – comparison between smokers and nonsmokers

dependency (Z= -2.446; p=0.014). Subjects who smoked for a long time period were the ones who presented features of nicotine dependency.

The clinical examinations did not reveal the presence of any pathological changes in the oral mucosa of any members of the study group. Results of the evaluation of the state of dentition in the study population are presented in Table 2. Statistical analysis did not reveal any correlation between subjects' gender or cigarette smoking and DMF, D, M, F, DMFs, Ds, Ms, Fs values.

Statistical analysis revealed a correlation between subjects' gender and the Higher Oral Hygiene Index-Simplified (OHI-S) – Z= -2.282; p=0.022, was found in women more than in men (0.760±0.758 and 1.072±0.897, respectively). Statistical analysis also revealed a correlation between cigarette smoking and the OHI-S – Z= -3.004; p=0.002). A higher OHI was found in smokers than in non-smokers – 1.121±0.910 and 0.720±0.725, respectively.

Evaluation of the state of dentition in the smoking population relative to nicotine dependency, according to the 6-grade Fagerström Nicotine Tolerance Questionnaire, produced the results presented in Figure 1.

The values of M, F, DMF, Ms, Fs, DMFs indices were higher, and the D, Ds indices were lower in students with features of nicotine dependency, although the correlations were not significant.

4 subjects, constituting 2.70% of the whole study group, thought that smoking made them visit their dentist more frequently. The others did not consider that smoking had any influence on the frequency of their dental visits.

The Dental Treatment Index in the group of students with no features of biological dependency on nicotine was lower (0.54±0,28) than in the group of students with features of nicotine dependency (0.69±020). Statistical analysis showed that there was no significant correlation between DTI and degree of nicotine dependency (Z=-1.457; p=0.144).

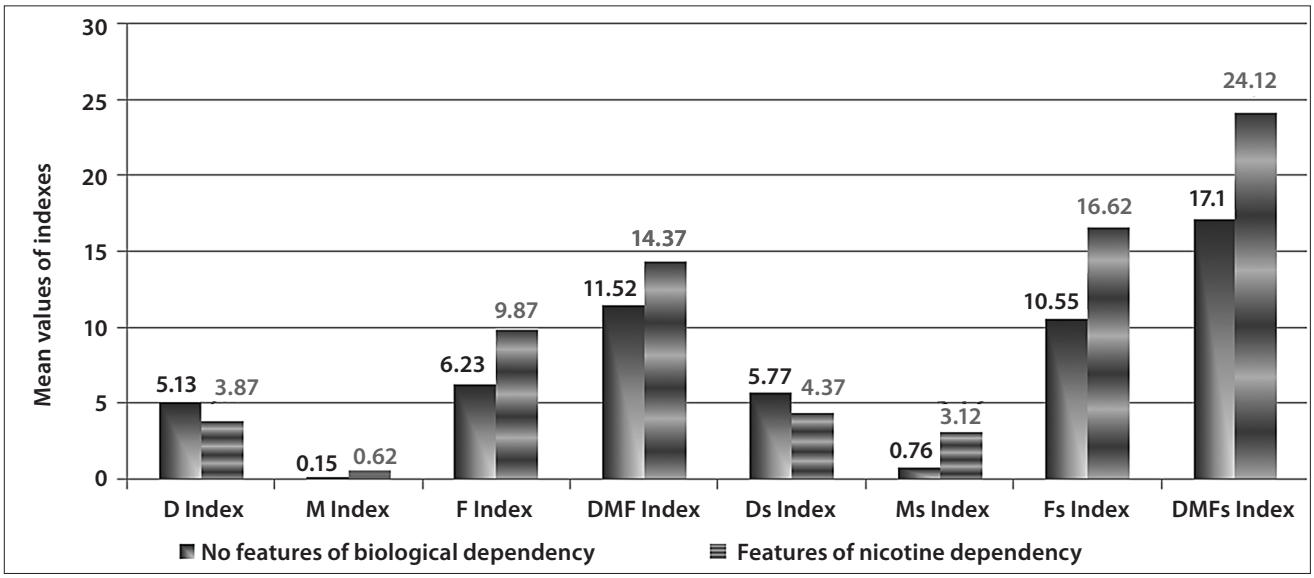

Figure 1. DMF, DMFs and their individual component values and degree of nicotine dependency

DISCUSSION

Smoking constitutes one of the best known factors adversely affecting the health status of society in general, but it is also the factor which can be largely prevented by the introduction of appropriate preventive measures. It is estimated that there are about 10 million adult smokers in Poland, 40% of all men and 28% of all women. Based on the results of a study performed in 2004, West *et al.* stated that in Poland 41.8% of people aged 15 and above can be classified as smokers defined by cotinine concentration. It is worth emphasize that the prevalence of smoking defined in terms of self-report, or an elevated cotinine level was 43.6%. Other sources claim that the percentage is 50% of all men and 26% of women. In the countries of the European Union, the average number of smokers in society is 29%: 35% of men and 22% of women smokers [13, 14, quoted after 15, 16].

Pirogowicz *et al.* conducted a study of 289 high school students aged 17.24 ± 1.45 years and found that 19.7% of the subjects were self-declared smokers [17].

In studies carried out by Tabak *et al.* it was observed that 26.9% of young adults aged 18 smoked cigarettes every day [18].Studies performed by Borzęcki *et al.* involving students aged 19-20 years – 379 women and 130 men – showed that smokers constituted 22% of the subjects. Among active smokers, 56.3% were women and 43.7% were men [19]. In studies carried out by Panasiuk *et al.* it was observed that the percentage of smokers from eastern Poland aged 18-30 was 24% [20]. In the study population, 81 subjects (54.72%) did not smoke – 45 women and 36 men, while 67 subjects (45.27%) smoked – 36 women and 31 men.

Environmental Tobacco Smoke (ETS) occurs as a result of spontaneous cigarette burning, and constitutes the consequence of environment pollution by side-stream tobacco smoke, as well as smoke exhaled by active smokers. In the literature, there are few papers concerning the influence of smoking on hard dental tissues. However, there are reports claiming that ETS adversely influences the state of dental tissues. It was stated that smoking was a predictive factor for the occurrence of caries in the permanent dentition of the children of smokers. It was also demonstrated that smoking during pregnancy is also a risk factor for dental caries in children [1, 4, 21].

As already stated, smoking adversely affects the tissues of the oral cavity. The reasons for this can be tar included in tobacco smoke, cigarette burning temperature, and mechanical irritation of the tissues. There are also reports that environmental tobacco smoke influences the progression of caries in children and adolescents [22]. In own studies, we did not find any relationship between smoking and caries. However, it should be stressed that the study group consisted of young people who did not show any symptoms of biological addiction. What is more, only 10% of them had smoked for more than 5 years, and most of them had been smoking for only a few months.

Considering the fact that the moment when children and adolescents begin smoking occurs at an ever earlier age, some researchers claim that smoking can be regarded as a pediatric disease. The reasons for the initiation of smoking can vary. Some people treat smoking as a kind of 'consoler' in difficult situations, it facilitates social contacts and, to some extent, it even helps in gaining social acceptance (so called 'social smoking'), for others it is a way of problem solving, [11, 14, 17, 18]. In own studies, it was found that 8.89% of subjects began smoking at the age of about 14-15 years. At the same time, it was observed that long-term smokers demonstrate features of nicotine dependency.

CONCLUSIONS

In our study it was established that:

1. In the study population, over 45% of subjects smoke; however, there is no correlation between smoking and gender.
2. No cause-effect relationship was found between smoking and status of hard dental tissues, as defined by DMF, DMFs values and their components.
3. It was observed that in case of people who began smoking at an earlier age, the degree of nicotine dependency was higher.
4. None of the study subjects demonstrated features of heavy or pharmacological nicotine dependency.

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