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

Małgorzata H. J. Sikorska-Jaroszyńska¹, Maria Mielnik-Błaszczak¹, Dorota Krawczyk¹, Alicja Nasiłowska-Barud²

¹ Chair and Department of Paedodontics Medical University of Lublin, Poland
² Department of Clinical Psychology Medical University of Lublin, Poland

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 behaviour 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.

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)
• Which cigarette would you be the most unwilling to give up? (the first one – 1 point; any of the others – 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
obtained results were statistically analyzed. For qualitative
not statistically significant (Z=-0.800; p=0.432).

beginning smoking (Z=0.757; p=0.48).

The calculations were performed using Statistica 8 soft ware.

of OHI-S (Oral Hygiene Index Simplifi ed) [12]. Th e state of

cavity hygiene was evaluated using Plaque Test on the basis

regarded as pharmacologically dependent on nicotine.

same time, patients smoking more than 30 cigarettes were

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

• Does smoking infl uence 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. Th e state of oral
cavity hygiene was evaluated using Plaque Test on the basis
of OHI-S (Oral Hygiene Index Simplifi ed) [12]. Th e state of
the periodontium and oral mucosa were also evaluated. Th e
obtained results were statistically analyzed. For qualitative
(inmeasurable) 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 signifi cance was established at the level of p < 0.05.
The calculations were performed using Statistica 8 soft ware.

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 signifi cant

correlation was found between smoking and gender (H=0.048;
p=0.825). In the study population, 78 subjects (52.70%) lived
in small towns with less than 100,000 inhabitants, and 28 subjects
(70.15%) had only smoked for several months, which means
therefore they must have started smoking at the age of 14-
year, and the other smokers in the study group – 47 subjects
hence they must have started smoking in their senior year at high
school, or soon aft er the beginning of their studies.

It was established that 21 persons (31.34%) smoked
within 5 minutes after waking up, which would be considered
a symptom of heavy addiction to nicotine. 19 women (52.78%)
smoked their fi rst cigarette after 5-30 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%). Th e correlation was
not statistically signifi cant (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%). Th e correlation was not statistically
signifi cant (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 fi rst cigarette of the day than any
of the other cigarettes. Th e correlation was not statistically
signifi cant (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. Th e correlation was not statistically
signifi cant (Max Likelihood χ 2=5.275, p=0.071).

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

28 women (77.78%) did not smoke when ill, compared to 21
men (67.74%). Th e correlation was not statistically signifi cant
(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 signifi cant

correlation was found between gender and the degree of
nicotine dependency (Table 1).

<table>
<thead>
<tr>
<th>Table 1. Nicotine dependency according to 6-grade Fagerström Nicotine Tolerance Questionnaire and gender in studied population</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
</tr>
<tr>
<td><strong>Number</strong></td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>Women</td>
</tr>
<tr>
<td>Men</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

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 signifi cant

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

<table>
<thead>
<tr>
<th>Studied feature</th>
<th>Non-smokers</th>
<th>Smokers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=81</td>
<td>n=67</td>
<td>N=148</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td></td>
<td>n=45</td>
<td>n=36</td>
<td>n=36</td>
</tr>
<tr>
<td>M ± SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D Index</td>
<td>3.80±3.47</td>
<td>5.52±5.27</td>
<td>4.80±3.83</td>
</tr>
<tr>
<td>M Index</td>
<td>0.17±0.53</td>
<td>0.05±0.23</td>
<td>0.13±0.38</td>
</tr>
<tr>
<td>F Index</td>
<td>6.93±3.72</td>
<td>5.52±4.23</td>
<td>6.50±4.04</td>
</tr>
<tr>
<td>DMF Index</td>
<td>10.91±4.85</td>
<td>10.80±4.92</td>
<td>11.44±5.06</td>
</tr>
<tr>
<td>Ds Index</td>
<td>4.88±5.58</td>
<td>6.19±5.83</td>
<td>5.08±4.14</td>
</tr>
<tr>
<td>Ms Index</td>
<td>0.88±2.67</td>
<td>0.27±1.16</td>
<td>0.69±2.43</td>
</tr>
<tr>
<td>Fs Index</td>
<td>11.77±8.81</td>
<td>7.72±6.24</td>
<td>10.27±7.79</td>
</tr>
<tr>
<td>DMFs Index</td>
<td>17.55±10.99</td>
<td>14.19±7.30</td>
<td>16.05±9.18</td>
</tr>
</tbody>
</table>

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±0.20). 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%) of eastern Poland aged 18-30 were smokers, 56.3% were women and 43.7% were men [19].

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 far 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.

REFERENCES