

Chair and Department of Conservative Dentistry
Students' Research Group at the Department and Chair of Conservative Dentistry
Medical University of Lublin

MONIKA TYMCZYNA, JOANNA BOŻYK, BARBARA TYMCZYNA,
URSZULA KALINOWSKA, EWELINA KISIEL

Nicotinism and dental caries

Nicotinism is the habit of smoking, chewing or sniffing tobacco (5). Nicotine is an extremely toxic alkaloid with a strong affiliation to acetylcholine receptors of the adrenal medulla, neuromuscular plate, and the CNS. Small doses of nicotine stimulate ganglionic cells and facilitate conduction of impulses, but larger doses cause inhibition of impulse conveyance. A number of nicotine effects are caused by increased release of catecholamines from postganglionic sympathetic neuron endings and from adrenal medulla (5).

The effects of nicotine on the CNS include relief of anxiety and tension, attention improvement, shortening of reaction time, and an improvement of fresh memory. Nicotine removes the feelings of fatigue, drowsiness and hunger (5).

From the medical point of view the following are the most important components of tobacco smoke: nicotine, carbon oxide, ammonia, hydrocyanide, aldehydes, phenols, ketones, and volatile acids. They all irritate the oral mucosa.

There has been quite a lot of research recently concerning the influence of cigarette smoking on periodontal tissues. Alexander analysed the results of epidemiological studies on periodontal disease and included nicotine in the 11th position among the factors which cause it. He stated that the severity of a course of gingivitis may be related adversely to the use of tobacco (3).

Periodontal disease has been a current problem in contemporary dentistry due to its wide distribution and social significance. Although the oral health status of our population has improved, compared to that in previous decades, periodontal disease still affects almost all of the public (4).

The study objective was to evaluate a relationship between cigarette smoking and dental caries. In Polish literature this subject is rarely raised.

The influence of cigarette smoking on dental health is not uniform. Yet, it has been widely accepted that tobacco smokers present more missing, carious, or filled teeth (6).

The relatively high temperature of tobacco smoke (about 65 C) may cause the breaking of enamel, especially in the anterior segment. These cracks encourage the development of dental caries. Moreover, precipitation of rhodanates in the smoker's saliva results in the teeth being covered with a specific, difficult to remove, brownish coating (6).

A larger number of bacteria specifically connected with dental caries has been found in the smokers' saliva. No difference between the concentrations of yeasts in saliva has been observed in smokers and non-smokers. Lowered buffer properties of saliva may increase the susceptibility of teeth to the carious process (6).

In a large number of clinical studies it has been statistically confirmed that smokers have a higher level of dental deposit than non-smokers (1). The habit of tobacco smoking may also be the cause of abnormalities in the microflora of dental plaque as a result of the development of conditions encouraging the growth of anaerobic bacteria (6).

The worse oral health status in smokers is due to the fact that hygienic procedures are not performed meticulously enough or too rarely, or to the activity of tobacco smoke components (6).

The aim of the study was to analyse the impact of cigarette smoking on the selected parameters of dentition status in young patients, with regard to the hygienic habits of the studied population.

MATERIAL AND METHODS

The study included 64 patients aged 18–28. Patients were divided into two groups. One group consisted of those who have smoked for at least two years (17 women and 13 men); the other group consisted of non-smokers (23 women and 11 men). A questionnaire study was conducted which contained questions concerning cigarette smoking (the number of cigarettes a person smokes daily, the time period they have been smoking, etc.) The questionnaire survey also aimed at analyzing the methods used to maintain oral hygiene. The questions concerned the techniques and frequency of brushing, the kind of toothbrush and toothpaste, and additional oral hygiene aids. A dental examination was also performed in artificial light with the use of a mirror and probe.

RESULTS

An analysis of surface diagrams obtained after the clinical examination made it possible to count epidemiological indices, i.e. the average DMF number, caries frequency, caries severity, treatment index and oral hygiene index (OHI).

Table 1. The average DMF for the smokers and non-smokers

	DMF	
	smokers	non-smokers
Women	11.47	8.48
Men	9.30	8.82

The results shown in Table 1 point to a difference between the DMF for women and men who smoke and those who do not smoke. The average DMF for the smokers was 11.47 for the women and 8.48 for the men. In the group of non-smokers the average DMF number was lower and equalled 8.48 for the women and 8.82 for the men.

Table 2. Caries frequency in the groups of smokers and non-smokers according to gender

	Caries frequency	
	smokers	non-smokers
Women	76.47%	47.82%
Men	84.61%	63.63%

The calculated index of caries frequency (Table 2) was higher for the smokers and equaled 76.47% for the women and 84.61% for the men. The same index in the group of non-smokers was 47.82% for the women and 63.63% for the men.

Caries severity was calculated according to the formula:

Caries severity = $\frac{\text{mean DMF number}}{x}$

x

where x means patients with DMF above 0.

Table 3. Caries severity in the studied groups according to gender

	Caries severity	
	smokers	non-smokers
Women	0.88	0.77
Men	0.85	1.26

Caries severity (Table 3) in the group of smokers was 0.88 for the women and 0.85 for the men. The non-smoking women had a lower index of 0.77 and in the non-smoking men it was higher and equaled 1.26.

Table 4. The oral hygiene index in the studied groups according to sex

	OHI	
	smokers	non-smokers
Women	0.77	0.64
Men	1.24	0.54

Table 4 presents the values of oral hygiene index (OHI). It is higher for the smoking group and equals 0.77 and 1.24 for women and men, respectively. In the group of non-smokers it was calculated as 0.64 for the women and 0.54 for the men.

Table 5. Treatment index in the studied groups according to sex

	Treatment index	
	smokers	non-smokers
Women	0.71	0.86
Men	0.47	0.64

The treatment index (Table 5) calculated for the smoking women and men was lower than for the group of non-smokers.

Table 6. Incidence of gum bleeding according to sex

	Incidence of gum bleeding			
	smokers		non-smokers	
	women	men	women	men
No brushing	9 (52.94%)	13 (100%)	10 (43.48%)	8 (72.73%)
On brushing	6 (35.29%)	0	13 (56.53%)	3 (27.27%)
Idiopathic	2 (11.77%)	0	0	0

The questionnaire survey aiming to evaluate the frequency of gum bleeding (Table 6) showed that idiopathic bleeding occurred in only 11.77% of smoking women, bleeding on brushing in 35.29% of women from this group, whereas 52.94% of woman smokers and 100% of man smokers did not observe any gum bleeding at all.

The questionnaire also revealed that the majority of the surveyed, both smokers and non-smokers, brush their teeth twice daily. 64.70% of smoking women use several brushing methods at

the same time: circular, sweeping, or rubbing motions; whereas the majority of smoking men (61.53%) prefer the rubbing method. Among the non-smokers, 52.17% of women and 45.45% of men use Fones's method of circular motions.

The majority of the surveyed reported the use of a moderately soft brush, whereas 61.53% of smoking men use a brush with hard bristles. Replacing brushes every 3 months is reported by 58.82% of women and 69.23% of men who smoke, and 60.86% of non-smoking women. Among the non-smoking men, 72.73% replace a brush every 6 months. Only 23.07% of smokers use toothpastes which act against tartar. Women, both smoking (64.70%) and non-smoking (78.26%), declare the use of dental floss as an additional hygienic measure, whereas men (69.23% smokers and 45.45% non-smokers) use unsweetened chewing gum most often for this purpose.

52.94% of smoking women and 73.91% of those who do not smoke arrange dental check-ups every 6 months. Men who smoke attend a dental surgery mostly in the case of pain (69.23%).

Table 7. Frequency of appointing for hygienic procedures at a dental surgery in the studied group with reference to gender

	Frequency of hygienic procedures at a surgery			
	smokers		non-smokers	
	women	men	women	men
Never	23.52%	69.23%	56.52%	54.54%
Once a year	52.94%	30.76%	43.47%	18.18%
Twice a year	17.64%	0	0	18.18%
More often	5.88%	0	0	9.09%

Table 7 shows that 69.23% of the smoking women and 56.52% of the non-smoking ones, as well as 54.54% of the non-smoking men never make appointments for hygienic procedures at a dental surgery. Hygienic procedures were conducted at a dentist's surgery once a year in the case of 52.94% of the smoking women.

On the basis of the conducted study we can say that smokers present a worse oral health status than non-smokers. In the group of smokers a worse dentition status was revealed. The smokers showed fewer symptoms of gum bleeding (6).

The present study concerns a problem which is seldom referred to in the literature. Analysing this particular issue was meant to broaden the knowledge of the impact of tobacco smoking on dental tissues. It is undoubtedly negative. Dental practitioners should actively participate in the Health Educational Programme for the non-smoking status; they should be aware of the effect this habit has on dental health (1). Elimination of nicotine dependence should become one of the vital tasks of a dental surgeon.

CONCLUSIONS

1. The DMF index is higher in smokers.
2. Smokers have a higher frequency of caries.
3. The severity of caries compared to that in non-smokers is higher in the smoking women and lower in the smoking men.
4. The oral health index (OHI) is higher in the smokers.
5. Smokers have a lower treatment index.

REFERENCES

1. Arden G. et al.: A Smoking Cessation Program for the Dental Office. Indiana University School of Dentistry. June 4, 1988.
2. D u c k a D.: Wpływ używania nikotyny na jamę ustną. Prot. Stomat., 4-5, 203, 1993.
3. J a ń c z u k Z.: Choroby błony śluzowej jamy ustnej i przyzębia. PZWL, 1995.
4. J a ń c z u k Z.: Stan narządu żucia polskiej populacji. Nowa Stomat., II, 3, 1997.
5. L a t a l s k i M.: Zdrowie Publiczne, 100, 1999.
6. M i ł a n o w s k i J.: Wpływ palenia tytoniu na zdrowotność jamy ustnej In: J. Milanowski. Palenie tytoniu. Wpływ na zdrowie i program walki z nałogiem. BiFolium, Lublin 2001.

SUMMARY

The aim of the study was to analyse the impact of smoking on the chosen parameters of the state of dentition in 18–28 years old patients with regard to hygienic habits of the studied population included. The study comprised 64 patients at the age range of 18–28 who were divided into 2-groups: smokers who have been smoking for at least 2 years (17 women and 13 men) and non-smokers (23 women and 11 men). The questionnaire study was conducted with the questions concerning smoking cigarettes, gum bleeding occurrence, the methods of oral cavity hygiene, the techniques and frequency of tooth brushing; the kind of toothpaste and the toothbrush used and additional ways of oral hygiene (care). A clinical examination in artificial light and with the help of a mirror and dental probe was conducted. An analysis of surface diagrams allowed for calculating epidemiological indicators. These included the following findings: the average PUW number was higher for smokers (women 11.47, men 9.30) in relation to non-smokers (women 8.48, men 8.82); the frequency of caries: higher for smokers (women 76.47%, men 84.61%) in relation to non-smokers (women 47.82%, men 63.63%); the intensity of caries: higher for smoking women (0.88) as compared to non-smoking women (0.77), lower for smoking men (0.85) as compared to non-smoking men (1.26); treatment indicator lower for smokers (women 0.71, men 0.47) compared to non-smokers (women 0.86, men 0.64); the indicator of the oral cavity hygiene (OHI) higher for smokers (women 0.77, men 1.24) compares to non-smokers (women 0.64, men 0.54). The following study is concerned with a problem rarely discussed in the literature. Undertaking this subject aimed to broaden the knowledge of the impact of smoking on dental tissues. Elimination of the addiction widespread in the world should be one of the most important tasks in dental practice.

Wpływ palenia tytoniu na próchnicę zębów

Celem pracy była analiza wpływu palenia tytoniu na wybrane parametry stanu uzębienia u pacjentów w wieku 18–28 lat z uwzględnieniem nawyków higienicznych badanej populacji. Badaniami objęto 64 pacjentów w wieku 18–28 lat, których podzielono na dwie grupy: palących co najmniej od 2 lat (17 kobiet i 13 mężczyzn) oraz niepalących (23 kobiety i 11 mężczyzn). Przeprowadzono badanie ankietowe zawierające pytania dotyczące palenia papierosów, występowania krwawienia z dziąseł, metod dbania o higienę jamy ustnej, technik i częstości szczotkowania zębów, rodzaju szczotki i pasty do zębów oraz dodatkowych sposobów higieny jamy ustnej. Przeprowadzono również badanie kliniczne w oświetleniu sztucznym za pomocą lusterka i zgłębnika. Analiza diagramów powierzchniowych pozwoliła na obliczenie wskaźników epidemiologicznych. Były to: średnia liczba PUW: wyższa dla palących (kobiety 11,47, mężczyźni 9,30) w stosunku do niepalących (kobiety 8,48, mężczyźni 8,82); frekwencja próchnicy: wyższa dla palących (kobiety 76,47%, mężczyźni 84,61%) w stosunku do niepalących (kobiety 47,82%, mężczyźni 63,63%); intensywność próchnicy: wyższa dla palących kobiet (0,88) w stosunku do niepalących (0,77); niższa dla palących mężczyzn (0,85) w stosunku do niepalących (1,26); wskaźnik leczenia: niższy dla palących (kobiety 0,71, mężczyźni 0,47) w stosunku do niepalących (kobiety 0,86, mężczyźni

0,64); wskaźnik higieny jamy ustnej OHI: wyższy dla palących (kobiety 0,77, mężczyźni 1,24) w stosunku do niepalących (kobiety 0,64, mężczyźni 0,54). Praca dotyczy problemu rzadko poruszanego w piśmiennictwie. Podjęcie tego tematu miało na celu poszerzenie stanu wiedzy o wpływie palenia na tkanki zęba. Eliminacja tak rozpowszechnionego na świecie nałogu powinna być jednym z istotnych zadań lekarza stomatologa.