

Prevalence and Associated Factors of Cigarette Smoking Among Medical Students in Wroclaw, Poland

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Objective: The study aimed to evaluate the nicotine addiction syndrome among students of the medical university of Wroclaw.

Materials and Methods: The anonymous self-administered online questionnaire regarding tobacco and e-cigarettes smoking was sent to 5616 students. A total of 407 students from Wroclaw Medical University who fulfilled the questionnaire were enrolled.

Results: One-fourth of the surveyed medical students smoke or have smoked cigarettes in the past. About 75% of students report that there is no information about the harmfulness of smoking and its consequences in the course of teaching in medical studies. The majority of students, 74.5% of women and 62.8% of men, agree that nicotine dependence syndrome should become part of the curriculum of medical universities.

Conclusion: The proportion of smokers among medical students is very high, and their knowledge of smoking is insufficient. It seems necessary to implement urgent education for medical students about the consequences of smoking and the treatment of nicotine dependence syndrome. The knowledge of future doctors about the harmfulness of smoking in the future will allow reducing the number of patients suffering from smoking-related diseases and may help reduce the number of smokers among students. It seems necessary to intensify the antismoking campaigns in Poland and worldwide.

Keywords: tobacco smoking, medical students, addiction syndrome

Introduction

Tobacco smoking has been a persistent and serious global social problem for years. Poland is the second-largest producer of tobacco products in the European Union. 26% of adult Poles smoke cigarettes - one in five regularly, and one in twenty - occasionally. The percentage of smokers is currently the lowest in the history of CBOS research. Thus, there is a downward trend in the number of heavy smokers – since 2011, there are 10% fewer smokers in Polish society. Research shows that men are more frequent smokers than women (24% vs 18%).¹

According to WHO every year, more than 8 million people die from tobacco use, approximately 50% of its users. More than 7 million of those deaths are from direct tobacco use, while approximately 1.2 million result from exposure of non-smokers to second - hand smoke.² It has been established that tobacco smoking constitutes the most common risk factor for the development and premature death from cardiovascular diseases, lung disorders, cancers, diabetes, and hypertension.³

Evaluating smoking behaviors is essential to establish tobacco control strategies to decrease avoidable morbidity and premature mortality, and to reduce health disparities. American Cancer Society states that

clinicians support all attempts to quit the use of combustible tobacco and work with smokers to eventually stop using any tobacco product, including e-cigarettes.⁴

Smoking contributes to health inequalities. Multiple pathways include targeted marketing and ready access for lower educated communities at greater risk, ties to cultural norms around smoking, and the challenges of communicating risks of smoking. Disproportions continue with regard to access to prevention programs and cessation services.⁵

The prevalence of smoking in the health profession around the world varies. In the United States it is close to 7%,⁶ in Europe it is 3.8% in Wales⁷ and reaches 22.1% in Germany.⁸ Among Asian countries smoking prevalence ranges from 2.1% (in Thailand) to 66.9% (China).^{9,10}

There is limited information on smoking behaviors among medical university students in Poland. Compared to the United States, where only 3–5% of medical students smoke cigarettes every day, the percentage of smoking students in Poland is higher.¹¹ Survey conducted in Wrocław Medical University among the students of the Medical Faculty in 2012 revealed that 21% of students smoked cigarettes.¹² Different study showed that the prevalence of smoking among 1st year medical students from Gdańsk, Poland is similar to the prevalence noted in other European Medical Universities – which rates from 21% in France to 26% in Turkey.¹¹ The high smoking rates among the general population of western countries are contrary to rather low smoking rates among medical students in many western countries.^{13,14}

Medical studies increase negative smoking-related attitudes. However, they are not a sufficient source of knowledge of and attitudes towards tobacco control and education/training on tobacco-related issues. Zarobkiewicz et al¹⁵ revealed high-frequency tobacco products use, including alternative tobacco products, among medical university students. There is a high need to introduce intensive preventive measures to limit and reduce the popularity of tobacco products along with alternative tobacco products. Janik-Konieczny et al revealed that the level of knowledge about the diagnosis and treatment of tobacco dependence among the Wrocław medical students is low, and requires improvement through educational activities at both facultative and compulsory study level with special attention focused on pharmaceutical treatment of the nicotine dependence syndrome.¹²

Tobacco product use education should be added to medical school curricula. A worrying percentage of medical students use tobacco products, including alternative tobacco products, and the inadequate knowledge, education, and cessation counseling skills to ensure precise guidance to patients. As future caregivers, medical students will play an important role in health promotion and disease prevention.¹⁶ There is a need for the construction of a medical school curriculum on cigarettes and alternative tobacco products as there is little information about medical student's knowledge or are taught about them and extensive variations in attitudes about e-cigarettes together with an unsatisfactory education of tobacco products use.¹⁷ It particularly concerns students due to the fact that habits and health behaviors are formed during studies. Medical students are a future doctors who will influence the health attitudes of patients and play a crucial role in tobacco control decision-making at various levels from community to nation by offering a cessation counseling option.^{18,19} It was also revealed that although students support tobacco cessation training, the majority believe that they are not adequately trained and are not comfortable providing tobacco cessation education to patients. A formal evaluation of the curriculum is necessary so a profound tobacco prevention and cessation program can be created and introduced.²⁰ Students highlight and the level of knowledge about the diagnosis and treatment of tobacco dependence is low, and requires improvement through educational activities at both facultative and compulsory study level with special attention paid to pharmaceutical treatment of the tobacco dependence syndrome.¹²

Aim of the Study

The study aimed to assess the current prevalence and patterns of tobacco and e-cigarette smoking evaluate attempt whether studies deliver training in tobacco prevention and treatment skills control in medical students in Wrocław, Poland.

Method

This research included data from a survey study conducted at Wrocław Medical University in Poland. Wrocław Medical University has 5616 students and consists of four faculties: medicine, dentistry, health sciences, pharmacy, both for Polish (PL) and English-speaking students (English Division, ED).

The anonymous self-administered online questionnaire regarding tobacco and e-cigarettes smoking was sent to 5616 students. A total of 407 students from Wrocław Medical University who fulfilled the questionnaire were enrolled. Data were collected in December 2020, during the winter semester of the academic year. In the online route, the project was advertised in an e-mail sent to the e-mail address assigned by the University. The students were informed about the study's purpose and received detailed explanations and definitions of certain terms. The response rate was 7.24%.

A questionnaire on smoking behavior and smoking-related knowledge was distributed online after sending it and completed by students. The questionnaire consisted of ten questions: five regarding demographic information (gender, age, year of study, smoking status, and exposure to passive smoking). The other five questions were used to assess knowledge about the harmful effects of tobacco smoking, smoking-related diseases, and medicines used in tobacco dependence treatment. The questionnaire was created by employees of Wrocław Medical University and was not validated. All study participants completed a questionnaire regarding demographic information (age, gender), smoking habits. Smoking was defined as smoking at least one cigarette per day or smoking at least 100 cigarettes in a lifetime.

Material

The study was conducted on 344 Polish students, including 250 women and 94 men, and a group of 63 ED students, including 36 women and 27 men. The characteristics of the studied students are presented in Table 1.

Results

10.3% of the surveyed students are active smokers of traditional cigarettes and 8.6% of e-cigarettes at the Medical University of Wrocław. 17.7% of students smoked traditional cigarettes in the past, and 8.4% e-cigarettes (Table 2). 59.1% of non-smoking students have smoked a cigarette in their lifetime. Most of the students (59.7%) started smoking in high school, and 14.9% during their medical studies. 77.1% of students noticed that while studying at the Medical University, there was no information about the harmfulness of smoking. According to the survey data, 74.4% of students at social gatherings are exposed to secondhand smoke, and 32.4% at the University.

Table 1 Survey Participant Characteristics

	n (%)
Students:	
Polish	344 (84.5)
English Division	63 (15.5)
Gender:	
Female	286 (70.3)
Male	121 (29.8)
Age:	
<i>M</i> ± <i>SD</i>	21.6 ± 2.1
<i>Me</i> (Q1; Q3)	22 (20; 23)
<i>Min</i> - <i>Max</i>	18–38
Faculty:	
Health sciences	31 (7.6)
Pharmacy	48 (11.8)
Medicine	233 (57.2)
Dentistry	61 (15.0)
No information	34 (8.4)

Notes: Q1 –lower quartile (25%); upper quartile (75%); n – cardinality; % - structure pointer.

Abbreviations: M, mean; SD, standard deviation; Me, mediana (50%).

Table 2 Survey Participant Results in Different Gender Groups

	Total	Female (%)	Male (%)
Do you smoke traditional cigarettes?			
No, I do not smoke	254	201 (80%)	53 (56%)
No, but I smoked in the past	56	32 (13%)	24 (26%)
Yes	35	18 (7%)	17 (18%)
Did you give up smoking while studying?			
No	61	46 (74.2%)	15 (55.6%)
Yes	28	16 (25.8%)	12 (44.4%)
If you are a non-smoker at the moment, have you ever smoked a cigarette before?			
Yes, only one cigarette	60	47 (19.8%)	13 (15.1%)
A few cigarettes	157	105 (44.3%)	52 (60.5%)
I have never had a cigarette in my mouth	106	85 (35.9%)	21 (24.4%)
When did you start smoking?			
In elementary school	2	2 (1.7%)	0 (0%)
In junior high	45	30 (24.8%)	15 (23.8%)
In senior high	109	72 (59.5%)	37 (58.7%)
During studies	28	17 (14%)	11 (17.5%)
Do you currently smoke e-cigarettes?			
Yes, but only one e-cigarette, occasionally	30	17 (6.8%)	13 (13.8%)
A few cigarettes	287	224 (89.2%)	63 (67%)
I have never had an e-cigarette in my mouth	28	10 (4%)	18 (19.1%)
Did you quit e-cigarettes during your studies?			
Yes	7	3 (21.4%)	4 (28.6%)
No	21	11 (78.6%)	10 (71.4%)
If you are a non-smoker at the moment, have you ever smoked an e-cigarette before?			
Yes, but only one e-cigarette, occasionally	68	57 (24.6%)	11 (14.3%)
A few cigarettes	77	41 (17.7%)	36 (46.8%)
I have never had an e-cigarette in my mouth	164	134 (57.8%)	30 (39%)
When did you start smoking e-cigarettes?			
In elementary school	0	0	0
In junior high	25	15 (19.7%)	10 (20%)
In senior high	69	42 (55.3%)	27 (54%)
During studies	32	19 (25%)	13 (26%)

(Continued)

Table 2 (Continued).

	Total	Female (%)	Male (%)
Do you use other forms of nicotine administration, such as IQOS currently?			
Yes	29	19 (7.8%)	10 (11%)
No, I do not smoke	290	215 (88.5%)	75 (82.4%)
No, but I smoked in the past	15	9 (3.7%)	6 (6.6%)
If you are a non-smoker at the moment, have you ever used other forms of nicotine administration such as IQOS?			
Yes, but only once	45	33 (14.7%)	12 (15%)
Yes, a few to a dozen times	34	19 (8.4%)	15 (18.8%)
No, never	226	173 (76.9%)	53 (66.3%)
When did you start using the other forms of nicotine administration, such as IQOS?			
In elementary school	0	0	0
In junior high	0	0	0
In senior high	12	7 (13.5%)	5 (18.5%)
During studies	67	45 (86.5%)	53 (81.5%)
Do you use other forms of nicotine administration?			
Pipe	0	0	0
Chewing gum	4	3 (15.8%)	1 (7.7%)
Hookah	24	15 (78.9%)	9 (69.2%)
Snuff	4	1 (5.3%)	3 (23.1%)
Are you exposed to passive smoking?			
At the University			
Yes	105	81 (32.3%)	24 (25.5%)
No	240	170 (67.7%)	70 (74.5%)
At work			
Yes	33	18 (7.2%)	15 (16%)
No	312	233 (92.8%)	79 (84%)
At home			
Yes	52	41 (16%)	11 (12%)
No	293	210 (84%)	83 (88%)
In the dormitory			
Yes	17	12 (5%)	5 (5%)
No	328	239 (95%)	89 (95%)
During classes			
Yes	6	5 (2%)	1 (1%)

(Continued)

Table 2 (Continued).

	Total	Female (%)	Male (%)
No	339	246 (98%)	93 (99%)
During social meetings			
Yes	261	189 (75.3%)	72 (76.6%)
No	84	62 (24.7%)	22 (23.4%)

Comparison of Results According to Gender

Women more often than men believe that the treatment of nicotine dependence syndrome should become part of the curriculum of Medical Universities (74.5% vs 62.8%; $p = 0.024$). Men smoke traditional cigarettes more often than women (16.5% vs 7.7%; $p < 0.001$). The situation is similar with e-cigarettes (12.4% vs 7.0%; $p < 0.001$). Women who do not smoke at the moment have smoked an e-cigarette less frequently than men (15.3% vs 30.2%; $p < 0.001$). They also use other forms of nicotine administration less frequently (9.4% vs 19.8%; $p = 0.009$). Men are more likely than women to be exposed to secondhand smoke in the workplace (18.1% vs 9.1%); $p = 0.015$). These data are presented in [Tables 3](#) and [4](#).

Comparison of Results According to Nationality

The answers to the questions about the tobacco addiction syndrome in the groups of students completing the questionnaire in Polish and English and the results of statistical tests are presented in [Tables 5](#) and [6](#).

Students who filled out the questionnaire in Polish less frequently than those who filled in it in English stated that in the course of education, there was information about the harmfulness of smoking (17.4% vs 52.4%; $p < 0.001$) and that the treatment of tobacco addiction syndrome was the topic of some classes in the course of the previous teaching (17.4% vs 34.9%; $p = 0.003$). Polish-speaking students who are now non-smokers, in the past, smoked more often (64.4% vs 35.4%; $p < 0.001$) and started smoking earlier (before university) than English-speaking students (84.7% vs 67.4%; $p = 0.036$). It is the same with e-cigarettes. Polish-speaking students who are now non-smokers in the past have smoked more often (42.4% vs 17.2%; $p < 0.001$) and started smoking e-cigarettes earlier (before studies) than English-speaking students (81.0% vs 34.2%; $p < 0.001$). Polish-speaking students are now less likely to use other forms of nicotine administration, such as IQOS (8.1% vs 11.1%; $p < 0.001$). They also use other forms of nicotine administration less frequently (9.3% vs 30.2%; $p < 0.001$). English-

Table 3 Number (Percentage) of Responses to the Survey Questions on the NDS as a Part of the Curriculum Teaching Methods in Different Gender Groups

Question	Women N = 286	Men N = 121	W vs M p
Should the treatment of NDS become part of the curriculum of Medical Universities?			0.024
Yes	213 (74.5%)	76 (62.8%)	
No	73 (25.5%)	45 (37.2%)	
If so, what should be the method of teaching?	n = 213	n = 77	0.917
Obligatory	68 (31.9%)	25 (32.5%)	
Optional	102 (47.9%)	35 (45.5%)	
Mixed	43 (20.2%)	17 (22.1%)	

Table 4 Number (Percentage) of Responses to the Questionnaire on Nicotine Dependence Syndrome in Different Gender Groups

Question	Women N = 286	Men N = 121	W vs M p
Do you use other forms of nicotine administration?			0.009
A. Pipe	4 (1.4%)	2 (1.6%)	
B. Chewing Gum	16 (5.6%)	10 (8.3%)	
C. Hookah	7 (2.4%)	10 (8.3%)	
D. Other (snuff)	0 (0.0%)	2 (1.6%)	
E. No	259 (90.6%)	97 (80.2%)	
Are you exposed to passive smoking?			
At the University	94 (32.9%)	38 (31.4%)	0.863
At work	26 (9.1%)	22 (18.2%)	0.015
At home	46 (16.1%)	16 (13.2%)	0.560
In the dormitory	14 (4.9%)	11 (9.1%)	0.166
During classes	6 (2.1%)	2 (1.6%)	1.000
During social meetings	212 (74.1%)	91 (75.2%)	0.917

speaking students are more often exposed to passive smoking at the University (44.4% vs 30.2%; $p = 0.039$), in the workplace (23.8% vs 9.6%); $p = 0.003$) and in a dormitory (12.7% vs 4.9%; $p = 0.038$).

Discussion

The study aimed to evaluate the nicotine addiction syndrome among students of the Medical University of Wrocław. Their smoking habits were analyzed, as well as the knowledge they received during their studies about the harmfulness of tobacco smoking. Our experience has found many important results worth discussing.

One-fourth of the surveyed medical students smoke or have smoked cigarettes in the past, which seems to be in line with the overall population. Many studies show an upward trend in smoking among medical students, which seems to be very disturbing.^{21–24} In assessing the results in terms of nationality, smoking in Poland begins at an earlier age, but this does not affect the percentage of smoking among students. A similar percentage of smokers is shown in works.²⁵ According to the study from Berlin,²⁴ the number of smoking men and women studying medical science is comparable, which is not in line with our results, where men significantly dominate. On the other hand, Monteiro et al²⁶ show that the number of smoking men is decreasing, and women are increasing, but there are still more men smoking than women worldwide. The results of a study conducted in 2019 in Poland that estimated the prevalence of tobacco and e-cigarette use indicate a steady decrease in the frequency of smoking in Poland.²⁷

Unfortunately, 75% of students report that there is no information about the harmfulness of smoking and its consequences in the course of teaching in medical studies. The majority of students, 74.5% of women and 62.8% of men, agree that nicotine dependence syndrome should become part of the curriculum of Medical Universities. Due to such a high percentage of smoking students, it seems necessary to introduce teaching about the addiction syndrome, as well as possible therapies for smoking cessation. This knowledge should be implemented from the earliest stages of medical studies, and the topic continued throughout the study.²⁸ According to other studies, students do not associate smoking with mortality and chronic diseases like lung cancer or chronic obstructive pulmonary disease.^{24,29} Kusma et al²⁴ also noted the need for changes in education on tobacco addiction at Medical Universities. Tessier et al³⁰ presented

Table 5 Number (Percentage) of Answers to the Survey Questions on Tobacco Addiction Syndrome in Groups with Different Language Versions of the Survey

Question	Polish Version N = 344	English Version N = 63	P vs E p
Was there any information about the harmfulness of smoking in the course of teaching?			<0.001
Yes:	60 (17.4%)	33 (52.4%)	
No	284 (82.6%)	30 (47.6%)	
Was the treatment of nicotine addiction syndrome a topic during the study?			0.003
Yes:	60 (17.4%)	22 (34.9%)	
No	284 (82.6%)	41 (65.1%)	
If you are a non-smoker at the moment, have you ever smoked a cigarette before?			<0.001
I have never had a cigarette in my mouth	110 (35.6%)	40 (64.6%)	
Yes only 1 cigarette	58 (18.8%)	11 (17.7%)	
A few cigarettes	141 (45.6%)	11 (17.7%)	
When did you start smoking?			0.036
In primary school	2 (1.1%)	1 (2.2%)	
In middle school	44 (24.0%)	6 (13.0%)	
In high school	109 (59.6%)	24 (52.2%)	
At University	28 (15.3%)	15 (32.6%)	
If you are a non-smoker at the moment, have you ever smoked an e-cigarette before?			<0.001
I have never had a cigarette in my mouth	181 (57.6%)	48 (82.8%)	
Yes, only 1 e-cigarette	67 (21.4%)	8 (13.8%)	
A few e-cigarettes	66 (21.0%)	2 (3.4%)	
When did you start smoking e-cigarettes?			<0.001
In middle school	14 (24.1%)	2 (5.3%)	
In high school	33 (56.9%)	11 (28.9%)	
At University	11 (19.0%)	25 (65.8%)	

in their works that the knowledge of students about the consequences of smoking is comparable to that of students of other fields.

Lack of proper knowledge of students regarding nicotine dependence syndrome may result in the lack of a competent approach to patients in the future. The knowledge of students and future doctors will not promote smoking cessation. A non-smoker up to the age of 90 is six times more likely to survive than a smoker.³¹ Reid et al³¹ also mention that 70% of smokers visit GP every year, most of them receive no advice or help to quit smoking.

Limitations of the Study

Anonymous and voluntary survey, so it can be assumed that the answers were reliable. The study is cross-sectional and gives a picture of the situation in only one Medical University, but its results are in line with the work of other medical

Table 6 Number (Percentage) of Responses to the Survey Questions on Nicotine Addiction Syndrome in Groups with Different Language Versions of the Survey

Question	Polish Version N = 344	English Version N = 63	P vs E p
Do you use other forms of nicotine administration, such as IQOS today?			<0.001
Yes	28 (8.1%)	7 (11.1%)	
No, but I have used it in the past	15 (4.4%)	12 (19.1%)	
No	301 (87.5%)	44 (69.8%)	
Do you use other forms of nicotine administration?			<0.001
A. Pipe	0 (0.0%)	2 (3.2%)	
B. Chewing Gum	4 (1.2%)	13 (20.6%)	
C. Hookah	24 (7.0%)	2 (3.2%)	
D. Other (snuff)	4 (1.2%)	2 (3.2%)	
E. No	312 (90.7%)	44 (69.8%)	
Are you exposed to passive smoking?			
At the University	94 (32.9%)	38 (31.4%)	0.863
At work	26 (9.1%)	22 (18.2%)	0.015
At home	46 (16.1%)	16 (13.2%)	0.560
In the dormitory	14 (4.9%)	11 (9.1%)	0.166
During classes	6 (2.1%)	2 (1.6%)	1.000
During social meetings	212 (74.1%)	91 (75.2%)	0.917
Are you exposed to passive smoking?			
At the University	104 (30.2%)	28 (44.4%)	0.039
At work	33 (9.6%)	15 (23.8%)	0.003
At home	52 (15.1%)	10 (15.9%)	0.970
In the dormitory	17 (4.9%)	8 (12.7%)	0.038
During classes	6 (1.7%)	2 (3.2%)	0.358
During social meetings	260 (75.6%)	43 (68.2%)	0.285

schools. In subsequent works, it is necessary to consider extending the questionnaire with the knowledge of students transferred during medical studies about the harmfulness of smoking and methods of its treatment.

Conclusions

The proportion of smokers among medical students is very high, and their knowledge of smoking is insufficient.

It seems necessary to implement urgent education for medical students about the consequences of smoking and the treatment of nicotine dependence syndrome.

The knowledge of future doctors about the harmfulness of smoking in the future will allow reducing the number of patients suffering from smoking-related diseases and may help reduce the number of smokers among students.

It seems necessary to intensify the antismoking campaigns in Poland and worldwide.

Ethics Statements

The study protocol was approved by the ethic committee of Wrocław Medical University and followed the Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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The authors declare that they have no conflicts of interest in this work.

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