

Awareness and health-enhancing behavior of oral cancer among high school students

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Introduction. An increase in head and neck cancers has been observed. Recent findings show an association between those cancers and *Human Papillomavirus* (HPV) infection. It is known that HPV infections lead to oral cancers, especially among adolescents.

Material and methods. An author-delivered questionnaire was carried out among 774 high school students. The survey covered questions about epidemiology, lifestyle, dental behavior, and oral cancer prevention and risk factors.

Results. 29.1% of students smoke or vape. 34.9% of respondents think that HPV infections can cause oral cancer. It is believed that transmission occurs through sexual activity (72.2%), vertical (47.5%), horizontal (23.8%), and auto-transmission (14.6%). 20.4% of interviewees noticed changes in their oral mucosa and 20.0% perform mouth self-examination.

Conclusions. Students do not have adequate knowledge of oral cancer. Smoking and drinking are still at a high level. The lack of knowledge prevailed in technical schools. Participants attending classes with an advanced curriculum in science had better lifestyle habits than others. There is a need to improve head and neck cancers education and awareness among youth attending technical schools and schools with non-scientific curriculums.

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Introduction

Oral tumors belong to a large group of cancers occurring within the head and neck. According to the data from the National Cancer Registry, there has been an increase in the incidence of oral, lip, and throat cancers among men, while in women the incidence rate has decreased slightly. In 2016, there were 1138 cases among women and 3201 among men. These tumors constituted 1.4% of all cancer cases in females and 3.9% in males (increase of 0.1% compared to 2015) [1].

Development of oral cancer is influenced by tobacco smoking, excessive alcohol consumption, viral infections (HPV), chronic irritation, and poor oral hygiene [2]. There is an increase in the incidence of head and neck cancers (HNCs) caused by

HPV infections, which is mainly associated with cervical cancer, among adolescents. What is more, in 2015 in Poland there were 4080 new cancer cases caused by HPV infection, which constituted 2.5% of all malignant tumors. Oral cancer caused by HPV infections was diagnosed in 21 women and more than twice as many in men ($n = 48$) [3].

Tobacco use behaviors have been changing over the past years – the percentage of smokers is decreasing, while the percentage of vapers is increasing. There are also people who declare interchangeable use, called dual users [4]. E-cigarettes are also catching on among adolescents. Research shows that students more often start vaping or become dual users [5]. This trend is worrisome. There is a misleading impression that

e-cigarettes are healthier than smoking, which may lead to serious consequences in the future. There are no studies confirming that e-cigarettes are less harmful than tobacco products. Moreover, many reports indicate they are just as dangerous [6]. Additionally, research shows that tobacco use, as well as alcohol consumption, among youth remains at a high level. It was estimated that in 2017 tobacco smoking was responsible for the loss of 17.2% of healthy life years, while in 2016 alcohol consumption corresponded to a 14% loss for men and a 2.4% loss for women (DALY) [4, 7].

In 2017 Poland implemented a pilot prophylactic program *Don't Lose Your Head! Program on Prevention and Early Detection of Head and Neck Cancers in Poland in the Years 2017–2019*. The Program is co-financed by the European Union from the European Social Funds within the Operational Programme Knowledge Education Development 2014–2020. Its main objective is to raise the awareness of HNCs risk factors in Polish society, increase knowledge about HPV – an infection that plays a key role in oral cancer development [8].

Material and methods

The survey was carried out at randomly selected high schools in Warsaw between March 1 and April 30, 2018. Of the 774 participants, 53% were women. Participants were aged between 16 and 20 (average age 18.2±0.9 years, mean age 18 years). The study was performed in 5 standard high schools, including one private (n = 541) and 3 technical schools (n = 233). Participants attended classes with the advanced curriculum in:

- I – science (228 respondents),
- II – humanities (134 respondents),
- III – mathematics and physics (179 respondents),
- IV – gastronomy (143 respondents),
- V – geodesy (90 respondents).

Permission to conduct the study was obtained from the management of each school. The students were informed that the results of the research would be used for scientific purposes only. Each respondent was obliged to be a high school student and at least 16.

The study was based on an author-delivered paper questionnaire consisting of 7 questions, including demographic questions. Closed-ended, semi-open, and table questions were applied. The questionnaire contained mainly one-choice answers, 10 questions were multiple choice and in 4 questions the Likert scale was used [9]. The questions were divided into four different topic areas:

- I – epidemiology (3 questions),
- II – youth lifestyle, including physical activity, nutrition, and use of drugs (7 questions),
- III – dental behaviors (13 questions),
- IV – oral cancer prevention and risk factors and mouth self-examination (14 questions).

The chi-square test of independence (χ^2) in SPSS was used to determine statistically significant differences in the level of knowledge and typical behaviors between standard high school and technical school students. In the chi-square test of independence (χ^2), the significance level of $p \leq 0.05$ was assumed.

Results

The research showed that 225 of 774 high school students (29.1%) smoked or vaped. Moreover, technical school students smoke more often (43.3%) than standard high school students (22.9%) (Pearson's chi-square = 33.919, df = 2, $p < 0.001$). The highest percentage of smokers attend classes with an advanced curriculum in geodesy (48.9%) and gastronomy (39.9%), while the lowest was in science (17.5%) (Fig.1).

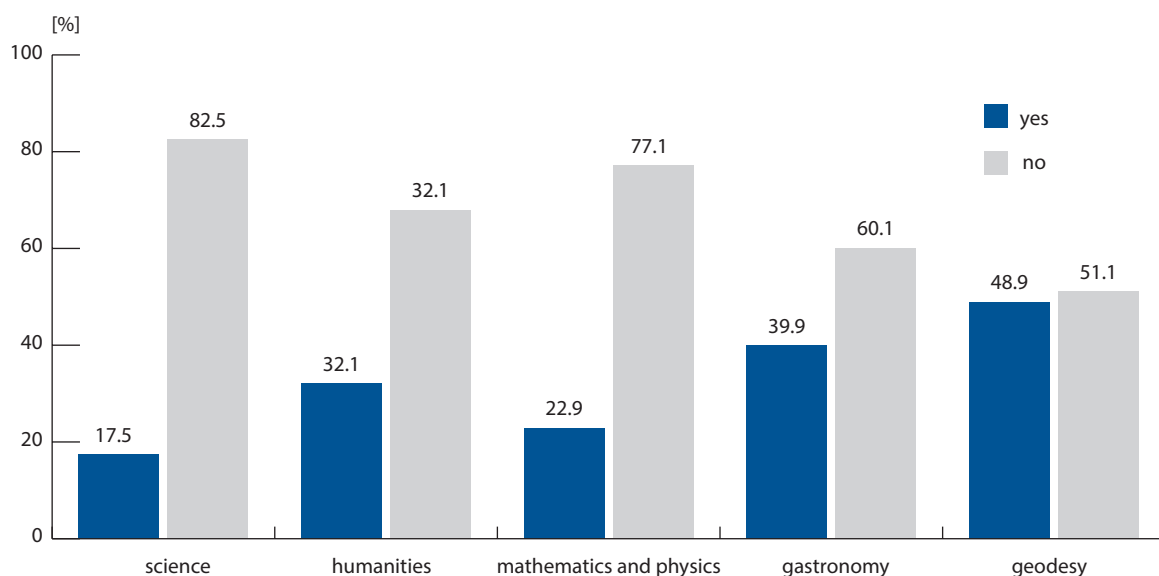


Figure 1. Percentage of daily and occasional smokers by curriculum (n = 225)

The study population uses various tobacco products, including dual use (Fig. 2). A higher percentage of exclusive tobacco cigarettes smokers occurred in standard high schools (47.6%), compared to technical schools (28.7%). Conversely, technical school students usually use e-cigarettes (Pearson's chi-square = 11.619, df = 4, p = 0.04).

More than twice as many students attending classes with an advanced curriculum in geodesy smoke more than 5 times a week (74.4%), compared to those who attend the science curriculum (32.5%). Those, additionally, show the lowest

smoking prevalence (30%). Smoking once a week is the most common among humanities students (Fig. 3). The chi-square test of independence showed that a higher percentage of students who smoke more than 5 times a week attend technical schools than standard high schools (64.4% / 39.5%) (Pearson's chi-square = 24.664, df = 5, p = 0.01).

Almost half of standard high school students and 33% of technical school students do not consume alcohol at all (Fig. 4). The study showed a statistically significant relationship between the prevalence of drinking alcohol and the type of

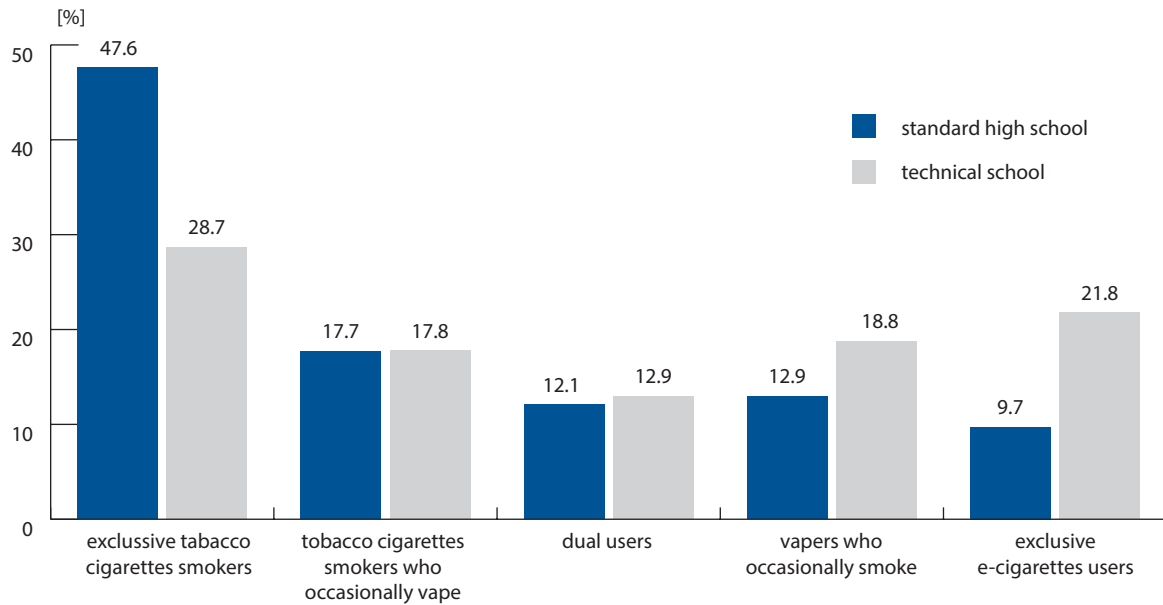


Figure 2. Tobacco and electronic cigarettes smoking among standard high school and technical school students (n = 225)

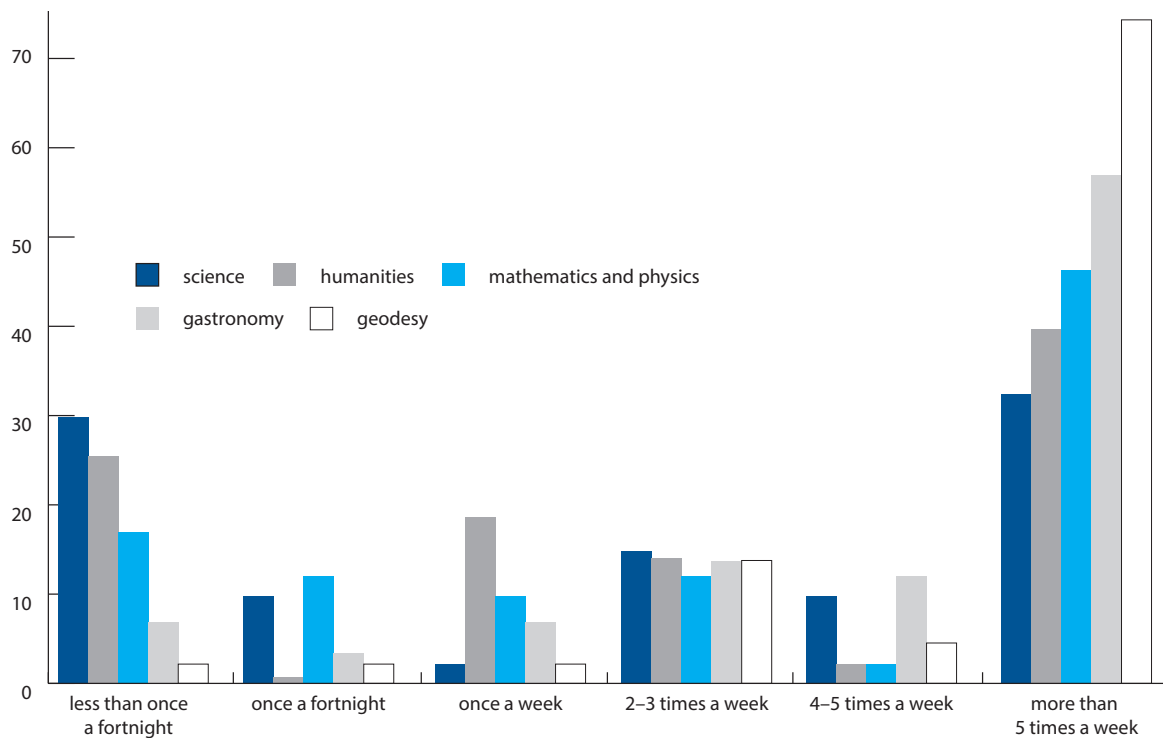


Figure 3. Smoking prevalence in the study population (n = 225)

school (Pearson's chi-square = 22.415, df = 4, $p < 0.001$). In general, technical school students consume alcohol more often than standard high school students. 4.3% of technical school students drink alcohol more than 5 times a week, compared to 1.7% in standard high schools.

The research showed a difference in the alcohol consumption among students depending on the curriculum. Students receiving an advanced education in geodesy drink most frequently (more than 5 times a week) (4.4%), while alcohol consumption appears the least often among students from science classes (1.3%). The highest percentage of students who drink 4–5 times a week occurred in the classes with an advanced curriculum in gastronomy (4.9%), while the lowest appeared among students receiving science education (0.4%). The percentage of non-drinking students was 53.9% in the classes with an advanced curriculum in science, 47.5% in mathematics and physics, 36.6% in humanities, 33.6% in gastronomy, and 32.2% in geodesy. On the other hand, a similar percentage of participants responded that they consumed alcohol once a week in the classes – geodesy (47.8%), humanities (43.3%), gastronomy (42.7%), mathematics and physics (41.3%), and science (39.9%). The highest percentage of respondents who drink alcohol 2–3 times a week appeared among students attending classes with an advanced curriculum in gastronomy (14.7%), and then in geodesy (13.3%). In the standard high school classes, this percentage was 12.7% in the humanities, 7.85% in mathematics and physics classes, and 4.4% in science.

High school students were asked about the risk factors that, in their opinion, could lead to oral cancer development. The percentage of chosen answers is presented in Table I. There was a statistically significant association between the percentage of stated risk factor and the type of school attended.

The Likert scale was used to evaluate what students thought about the possibility that HPV infections could also lead to oral cancer. 34.9% of students' answers were positive (definitely: 6.5%, probably: 28.4%). The majority of respondents were not sure (hard to say: 42.2%), but 22.9% of them were skeptical (probably not: 20.9%, definitely not: 2.0%).

A difference in awareness of the association between HPV infections and oral cancer among participants has been shown. The highest percentage of "definitely not" answers occurred among students attending classes with an advanced curriculum in geodesy (3.3%). In the classes with an advanced curriculum in mathematics and physics, the majority of students stated that HPV infections definitely led to the development of oral cancer (7.8%). Also there, only 0.6% of respondents indicated that HPV infections definitely could not contribute to HNCs (Fig. 5).

Students were also asked about the possibilities of HPV transmission. The answers were as follows: sexual contact (72.2%), vertical (47.5%), horizontal (23.8%), and auto-transmission (14.6%). The statistical analysis showed a significant dependence. Standard high school students marked correctly vertical transmission ($p = 0.02$) and sexual contact ($p < 0.001$) in comparison to technical schools students (Fig. 6).

The research showed a statistically significant difference in the prevalence of dental visits depending on the type of school attended (Pearson's chi-square = 30.815, df = 7, $p < 0.001$); 14.6% of standard high school students visit a dentist once every quarter, compared to 11.6% of technical school students; 34.5% of standard high school students visit a dentist twice a year, in comparison to 22.7% of technical school students (Fig. 7).

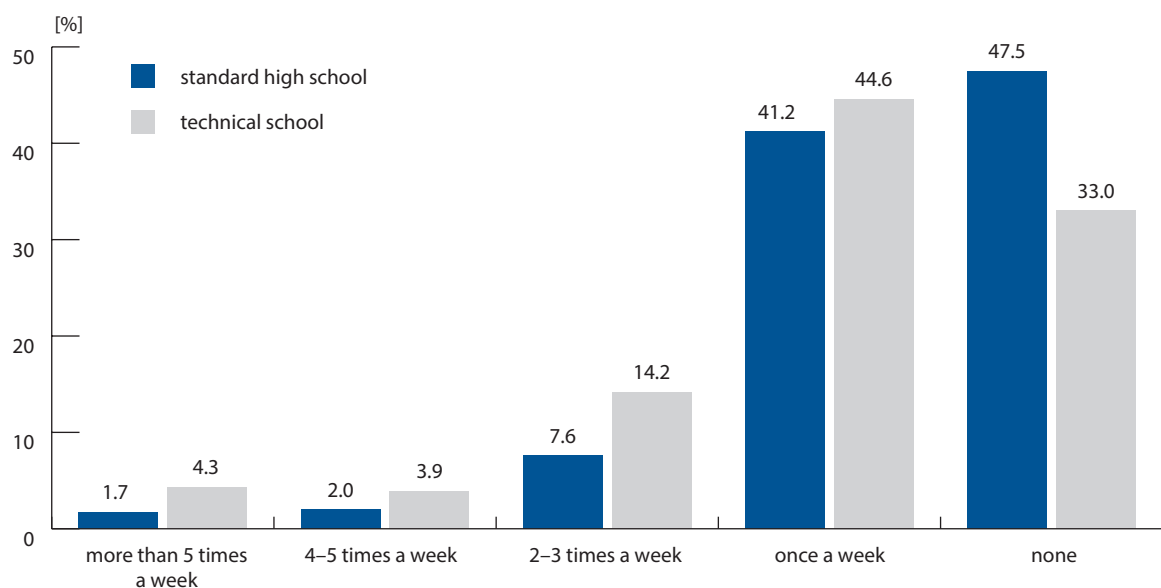


Figure 4. Alcohol consumption among standard high school and technical school students (n = 774)

Table 1. Oral cancer risk factors according to standard high and technical school students

Risk factors	% responses given				p-value
	Standard high school		Technical school		
	YES	NO	YES	NO	
tobacco smoking or chewing*	92.6	7.4	82.0	18.0	< 0.001
excessive alcohol consumption*	32.9	67.1	21.5	78.5	0.001
viral infections (HPV, HIV, EBV)*	39.9	60.1	24.5	75.5	< 0.001
ionizing and ultraviolet radiation*	36.0	64.0	20.2	79.8	< 0.001
chronic injuries	21.3	78.7	17.2	82.8	0.192
chemical compounds*	55.1	44.9	43.8	56.2	0.004
certain medicines	27.9	72.1	23.2	76.8	0.171
ill-fitting dentures	18.5	81.5	15.9	84.1	0.384
poor oral hygiene	51.8	48.2	54.5	45.5	0.498
poor nutrition	28.1	71.9	22.7	77.3	0.122
immunological and genetic disorders*	66.2	33.8	41.2	58.8	< 0.001
n = 774	541		233		

* statistically significant difference in the level of knowledge about oral cancer risk factors between standard high school and technical school students

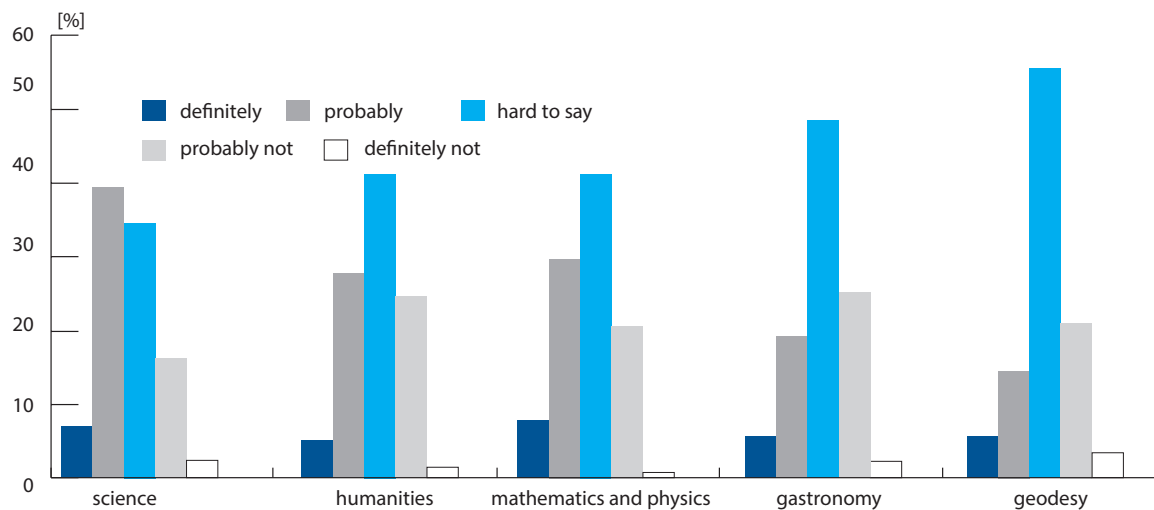
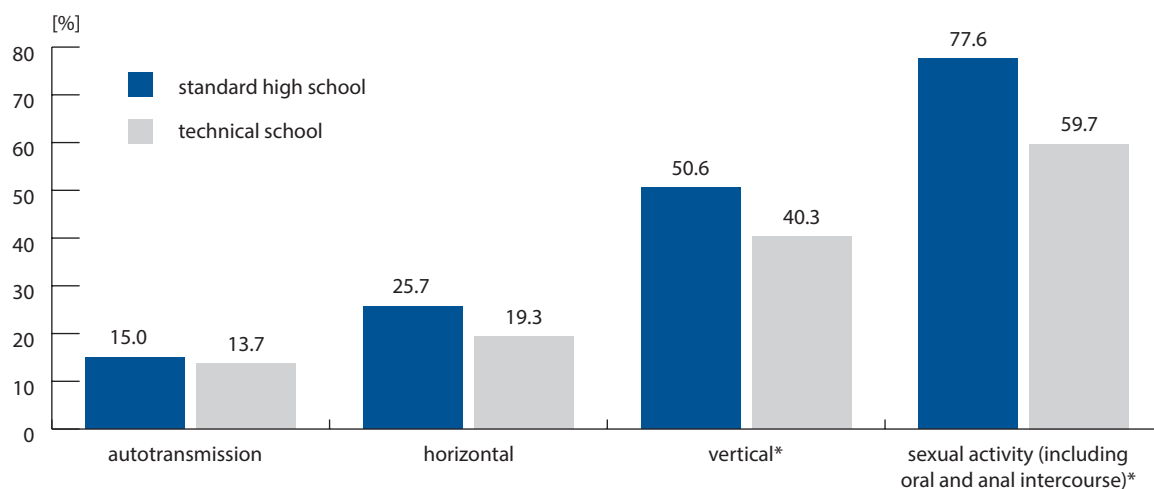


Figure 5. Do you think that HPV infections can also lead to oral cancer? (n = 774)



* statistically significant difference in the level of knowledge about the transmission of HPV infections between standard high school and technical school students

Figure 6. Transmission of HPV infections according to students (n = 774)

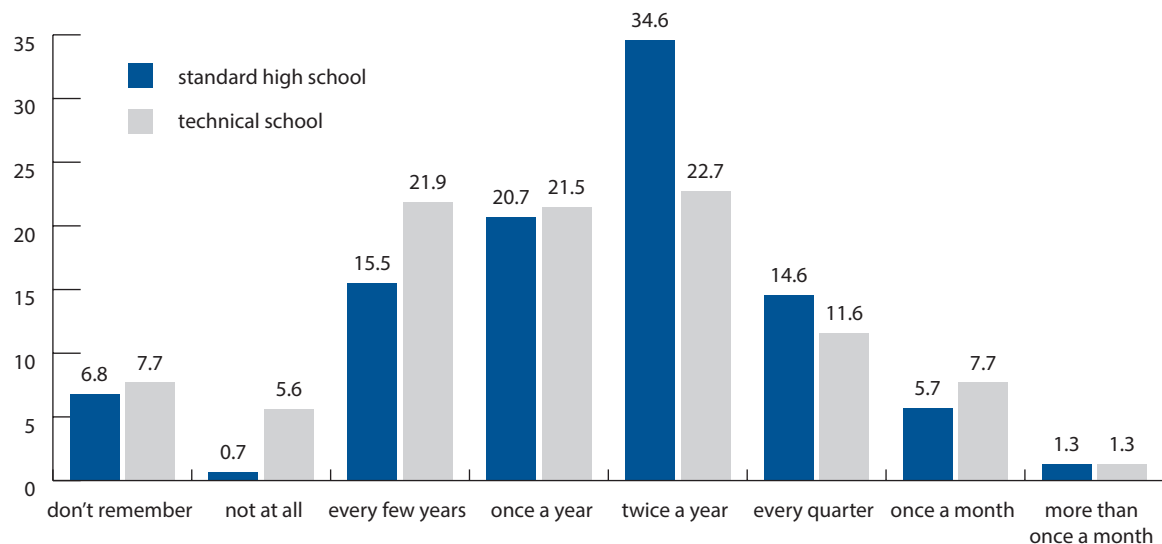


Figure 7. Prevalence of dental visits among students (n = 774)

There was no statistically significant difference between the answers concerning oral cancer risk factors and class profile. 35% of high school students reported that in their opinion environmental factors had the greatest impact on the HNCs development, then systemic diseases (33%), and genetic factors (32%).

23 students (3% of the study population) knew about cases of oral cancer diagnosis among their relatives, while 14.9% did not have such knowledge.

The Likert scale was also used to find out about a tendency to bite lip, cheek, or tongue by adolescents. The results showed that 32.2% of respondents have a tendency and 35.7% rather do it. 16.5% of students did not observe this habit, 5.5% strongly denied having such a tendency, and 10.1% said it was hard to say. The chi-square test of independence did not show a statistically significant association between the tendency of lip, cheek, or tongue biting and class profile ($p = 0.118 / p = 0.371$).

In the study population, 158 students (20.4%) reported that they have noticed a lesion in the oral mucosa. Moreover, the research showed a statistically significant relationship between the students' perception of lesions on the oral mucosa and the type of school they attended (Pearson's chi-square = 11.823, $df = 2$, $p = 0.003$). Standard high school students noticed these changes more often (80.4%) compared to technical school students (19.6%).

The same respondents were later asked about the type of lesions on the mucosa that they had noticed. They reported pustules (43.0%), erosion (23.4%), vesicles (20.3%), spots (12.7%), and sores (3.2%). In addition to the aforementioned changes encountered in the oral mucosa, the students had an opportunity to enter their own answer, which in this case was aphtha (14.6%).

One hundred and fifty five students (20.0%) claim that they examine their oral mucosa by themselves. The chi-square

test of independence did not show a statistically significant association ($p = 0.975 / p = 0.687$). The same respondents were asked about the frequency of oral mucosa self-checking and there was also no statistically significant association ($p = 0.585 / p = 0.384$). However, the majority of students perform mouth self-examination once or twice a month (27.1%), 21.3% do it once a day, 20.6% less than every 6 months, 18.7% once a week, 9.7% every 6 months, and 3.9% several times a day.

Discussion

The study on the attitudes and knowledge about oral cancer among high school students is the first of its kind in Poland. The research showed that an enormous number of students had bad lifestyle habits – tobacco smoking, alcohol consumption, as well as poor oral hygiene, including tendencies related to the oral mucosa biting (that could lead to HNCs development), and the lack of mouth self-examination (which is particularly important in the cancer prevention). Respondents have insufficient knowledge about oral cancer risk factors, primarily in the field of infection factors, which are the most common causes of HNCs in this age group.

The comparison of standard high school and technical school students showed a significant difference in the prevalence of the use of drugs, the level of knowledge, and specific behaviors. Technical school students are less knowledgeable than standard high school students. Differences also appeared among particular classes – the least aware of HNCs are students attending classes with an advanced curriculum in gastronomy and geodesy and the most conscious are students interested in science. The questionnaire carried out among high school students between the ages of 16 and 20 showed that almost 1/3 (29.1%) of them smoked or vaped. Wojtyła-Buciora et al. (2011) [10] discovered more than a twofold increase in the number of students reaching for tobacco products in high school wi-

thin 2 years (from 11% in 2009 to 24% in 2011). Kozłowski et al. (2017) [11] demonstrated that 28.8% of school-age youth (15–25 years old) admitted that they smoked or used to smoke and 31.2% declared that they vaped or used to vape.

Despite the current ban on the sale of alcohol and tobacco products (including e-cigarettes accessories) to youth under the age of 18, the percentage of adolescents reaching for these products is increasing. The conducted study showed that e-cigarettes are favored by technical school students. This fact is not comforting, because the evidence about health risks and impact of e-cigarettes on the human body is still insufficient.

The presented results indicate that standard high school students reach more often for tobacco cigarettes, while technical school students are more eager to vape. However, 12.1% of standard high school students and 12.9% of technical school students are dual users. Interestingly, the research conducted by Goniewicz et al. (2016) [5] among 1785 respondents showed that the percentage of dual users is slightly higher among technical (58.6%) than standard high school students (41.4%).

In the study population, technical school students consume alcohol more often than standard high school students. The highest percentage appears among students attending classes with an advanced curriculum in geodesy. Similarly, Wojtyła-Buciora et al. (2014) [12] stated that the percentage of students reaching for alcohol increased from 51% (n = 4423) in 2009 to 82% in 2011. Moreover, the change in prevalence in drinking was noticed. There was an increase in the frequency of drinking once a week, a few times a week, and daily, but a decrease in the percentage of students who drink less than once a week [12]. However, in the conducted study, respondents who drink once a week compose the largest group. In comparison, a study carried out by Nowak et al. (2018) [7] among 535 secondary school students aged 13–17 showed that 36.1% of teens consume alcohol, while most of them do it less than once a month (68.9%) and 16.1% daily. 39.8% of respondents smoke and most of them are daily smokers (55%) [7].

The aforementioned analysis aimed to determine the prevalence of the use of drugs that may have a further impact on HNCs development among youth. Most of the available studies related to risk factors, including HPV infections, refer to cervical cancer. However, the conducted study concerns knowledge and attitudes on oral cancer among high school students. The results were unsatisfactory, especially among the technical school students. Krentowska et al. (2018) [13] compared the knowledge of oral cancer among medical, non-medical, and high school students. 20.5% of all respondents (n = 1903) were high school students. 77.98% of all interviewees indicated smoking as one of the main causes of HNCs, 68% them were high school students.

In the conducted study, 92.6% of standard high school students and 82% of technical school students indicated smoking as one of the main HNCs risk factors. Krentowska et al. (2018) showed insufficient awareness among all non-medical school

students compared to medical students, a similar trend was observed in the conducted study (when comparing students of scientific and non-scientific curriculums). 34% of high school students consider alcohol to be an oral cancer risk factor and 22% say that HPV infections have an impact on HNCs development [13]. Similarly, in the opinion of 32.9% of standard high school students and 21.5% of technical school students from the study population, alcohol can influence the development of cancer. Interestingly, a larger percentage of responses were related to viral infections (39.9% of standard high school/ 24.5% of technical school). However, the percentages of chosen responses on cancer risk factors are still worrying.

Conclusions

High school students do not have adequate knowledge of oral cancer, as well as its risk factors and prevention. The majority of students have inappropriate lifestyle habits, such as smoking, drinking alcohol, or biting their oral mucosa. These habits may have a damaging impact in the future, and not only on their oral health.

The presented results suggest that it is necessary to focus and emphasize education about oral cancer prevention, including highlighting the role of HPV infections, which is responsible for more than just cervical cancer incidence. It is particularly important to increase the awareness of the association between HPV infections and HNCs among students of technical schools and those attending non-scientific classes.

Abbreviations

HNCs – Head and Neck Cancers
HPV – Human Papillomavirus

Conflict of interest: none declared

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References

1. Wojciechowska U, Czaderny K, Ciuba A et al. Cancer in Poland in 2016. Warsaw: The Maria Skłodowska-Curie Oncology-Institute Centre, Polish National Cancer Registry 2018.
2. Oral cavity and oropharyngeal cancer causes, risk factors and prevention. American Cancer Society, <https://www.cancer.org> [cited Feb 2019].
3. Sulowska U, Mańczuk M, Przewoźniak K et al. Estimating of the number of cancer cases attributed to HPV infections for Poland in 2015. *NOWOTWORY J Oncol* 2018; 4: 173–175.
4. Poznańska A, Rabceńko D, Wojtyński B. Selected lifestyle-related health risk factors. In: Goryński P, Wojtyński B, (ed.) *Health status of Polish population and its determinations*. Warsaw: National Institute of Public Health – National Institute of Hygiene 2018; 388–398.
5. Goniewicz M, Leigh N, Gawron M et al. Dual use of electronic and tobacco cigarettes among adolescents: a cross sectional study in Poland. *Int J Public Health* 2016; 61: 189–197.

6. Bhatnagar A, Whitsel L, Ribisl KM et al. Electronic cigarettes: a policy statement from the American Heart Association. *Circulation* 2014; 130: 1418–1436.
7. Nowak M, Papiernik M, Mikulska A et al. Smoking, alcohol consumption, and illicit substances use among adolescents in Poland. *Subst Abuse Treat Prev Policy* 2018; 13: 42.
8. Don't lose your head! Program on prevention and early detection of head and neck cancers in Poland in the years 2017–2019. The Maria Skłodowska-Curie Institute-Oncology Centre, <https://www.coi.pl> [cited Feb 2019].
9. Babbie E. Indexes, scales, and typologies. In: Babbie E. *The Practice of Social Research*. Cengage Learning 2012; p. 157–184.
10. Wojtyła-Buciora P, Stawińska-Witoszyńska B, Żukiewicz-Sobczak W et al. Trends in smoking among secondary school and high school students in Poland, 2009 and 2011. *Int J Occup Med Environ Health* 2017; 5: 763–773.
11. Kozłowski P, Kozłowska M, Kozłowska K. Frequency and habits of cigarette smoking among adolescents. *J Educ Health Sport* 2017; 7: 170–176.
12. Wojtyła-Buciora P, Wojtyła C, Urbaniak M et al. Alcohol consumption in Polish middle and high school pupils – has this rapidly increased during 2009–11? *Ann Agric Environ Med* 2014; 3: 552–556.
13. Krentowska A, Sierko-Nobis E, Strzalka A et al. Awareness of head and neck cancer – a multicentre survey among young respondents in Poland. *Int Dent J* 2018; 6: 441–449.