



# What do students of health sciences know about cancer preventive measures?

Co studenci nauk medycznych wiedzą o profilaktyce nowotworów?

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## Abstract

**Introduction and Objective.** Cancer prevention is a critical aspect of public health, aimed at reducing the burden of malignancies through early detection and intervention. This study investigates the awareness of cancer preventive measures among health science students in Poland, with a specific focus on their knowledge of screening tests for different types of cancers. The aim of the study was to analyze the level of knowledge of health students of the Andrzej Frycz Modrzewski University in Kraków, Poland, about the secondary prevention of malignant tumours.

**Material and Methods.** The study was conducted using a questionnaire to assess the students' knowledge of cancer preventive measures, focusing on screening tests for various malignancies. The survey included questions concerning screening methods, age ranges for specific tests, risk factors, and personal behaviours. Ethical considerations were followed, ensuring participant confidentiality and informed consent.

**Results.** The questionnaire was completed by 105 students of the following specialties: medicine (81.9%), nursing (6.7%), emergency medical services (1.9%), physiotherapy (2.9%), cosmetology (3.8%), and dietetics (2.9%). More than a half of respondents (61%) provided the correct answer to the question concerning the definition of a screening test. While answering the question regarding the types of cancer for which screening tests are performed 97.1% of respondents mentioned cervical cancer and breast cancer, 84.8% colon cancer, 36.2% melanoma, 38% lung cancer, 25.7% gastric cancer, 61.9% prostate cancer, and 37.1% ovarian cancer. The vast majority of respondents (96.1%) could identify tobacco-related cancers. The part of the questionnaire concerning behaviours related with life style revealed that 99% of respondents use protection during sexual intercourse, 67.6% do not smoke cigarettes, and 87% do not consume alcohol more frequently than twice a week. In 88% of respondents the BMI does not exceed 30, and 64% of them undertake regular physical activity.

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**Conclusions.** The diversity of the respondents' level of knowledge and compliance with recommendations regarding screening tests, indicated the importance of education and emphasizing the importance of performing screening tests in society to ensure their thorough implementation.

## Key words

oncology, cancer screening, cancer prevention

## Streszczenie

**Wprowadzenie i cel pracy.** Profilaktyka wtórna nowotworów, koncentrująca się na wczesnym wykryciu raka i szybkiej interwencji, jest istotnym elementem zdrowia publicznego. Celem pracy było przeanalizowanie poziomu wiedzy studentów kierunków medycznych Uniwersytetu Andrzeja Frycza Modrzewskiego na temat wtórnej profilaktyki nowotworów.

**Materiał i metody.** W tym celu przeprowadzono w tej grupie badanie, w którym wykorzystano ankietę zawierającą pytania dotyczące metod przeprowadzania badań przesiewowych, przedziałów wiekowych, decydujących o wykonywaniu określonych badań u pacjentów mieszczących się w danym przedziale, czynników ryzyka oraz zachowań związanych ze stylem życia. Przestrzegano zasad etycznych, zapewniając uczestnikom poufność i wyrażenie świadomej zgody na udział w badaniu.

**Wyniki.** Kwestionariusz wypełniło 105 studentów następujących kierunków: lekarskiego (81,9%), pielęgniarstwa (6,7%), ratownictwa medycznego (1,9%), fizjoterapii (2,9%), kosmetologii (3,8%) i dietetyki (2,9%). Ponad połowa ankietowanych (61%) udzieliła poprawnej odpowiedzi na pytanie o definicję badania przesiewowego. Odpowiadając na pytanie dotyczące rodzajów nowotworów, w kierunku których prowadzone są badania przesiewowe, 97,1% respondentów wybrało szyjkę macicy oraz raka piersi, 84,8% raka jelita grubego, 36,2% czerniaka, 38% raka płuc, 25,7% raka żołądka, 61,9% raka prostaty oraz 37,1% raka jajnika. Zdecydowana większość badanych (96,1%) potrafiła zidentyfikować nowotwory tytoniozależne. Część kwestionariusza dotycząca zachowań związanych ze stylem życia ujawniła, że 99% ankietowanych stosuje zabezpieczenie podczas stosunków seksualnych, 67,6% nie pali

papierosów, 87% nie spożywa alkoholu więcej niż dwa razy na tydzień. BMI u 88% respondentów nie przekracza 30, a 64% z nich podejmuje regularną aktywność fizyczną.

**Wnioski.** Zróżnicowanie poziomu wiedzy respondentów na temat wtórnej profilaktyki nowotworów oraz przestrzeganie zaleceń dotyczących wykonywania badań przesiewowych

wskazują na potrzebę dalszej edukacji i podkreślenia wagi wykonywania tych badań w społeczeństwie w celu poprawy skuteczności wczesnego wykrywania nowotworu.

### Słowa kluczowe

onkologia, badanie przesiewowe, profilaktyka nowotworów

## INTRODUCTION

Cancer screening tests play a key role in the struggle to reduce the morbidity and mortality associated with malignant disease [1]. The objective of early detection and prompt treatment is the reason behind the implementation of screening tests in Poland. The efficacy of a screening programme depends on the regular participation of a significant percentage in the population considered eligible for screening, as well as adequate awareness and knowledge regarding cancer among healthcare professionals. Preventive screening tests are recommended in the population of people who do not present with symptoms, but are at high risk of developing specific types of cancer. According to the recommendations of the World Health Organization (WHO), the screening tests implemented in Poland are directed at breast, cervical and colorectal cancer. Patients with a positive result of a screening are referred to further diagnostic work-up [2]. Breast cancer is the most common cancer in women worldwide, while prostate cancer predominates in men [3]. In Poland, the breast cancer prevention programme assumes regular mammography every two years for women aged 45–74 with no symptoms.

Cervical cancer screening assumes examining women aged 25–64 every three years. In general, a colonoscopy examination is recommended for people aged 50–65, but in the case of a first-degree relative diagnosed with colorectal cancer, the recommendation is to consider colonoscopy earlier, at the age of 40–49.

The implementation of population-wide screening tests contributes to the early detection of diseases, enhances general health outcomes, reduces costs associated with potential treatment, as well as increases the quality of life in long-term. It is an essential part of the healthcare system particularly during the initial phase of a medical practitioner's training. Its success relies – among others – on knowledge and attitude toward screening tests among health care professionals. It is crucial to maintain high standards of education and provide careful consideration to important issues related to early detection of cancer among undergraduate medical students, as a variety of factors – such as the COVID-19 pandemic restricting patients' participation in screening programmes or e-learning courses at medical universities – might lead the general public and medical students becoming less aware of the significance of screening tests. Therefore, the aim of the study is to evaluate awareness and knowledge of secondary cancer prevention (i.e. screening) among students of health sciences.

## MATERIALS AND METHOD

The study was conducted between March – November 2022 via the online Google Forms survey platform. The survey was prepared in Polish for students of medicine, nursing,

emergency medicine, physiotherapy, cosmetology and dietetics, studying full-time and part time, regardless of advancement of studies (i.e. in each semester). Access to the questionnaire was granted to all students of the Andrzej Frycz Modrzewski University in Kraków, Poland. Each respondent was assured anonymity in order to encourage honest answers and thus increase the level of reliability of the survey responses.

There were two components of the questionnaire. The first part concerned the student's gender, year of birth, and population size of their hometown. Additionally, this section of the questionnaire involved the major year, type of degree programme, and other education-related details. The second section of the survey consisted of 23 items: eight single-choice questions, one question where the respondent was required to write the answer, and 14 questions where multiple answers may be chosen. Questions 1–3 were designed to test the students' general knowledge of screening, available screening methods, and knowledge of their use in detecting specific cancers. Questions 4–14 focused on screening for cervical cancer, breast cancer and colorectal cancer. Respondents were asked about the age range at which a particular test should be performed, the method of performing that test, risk factors and time intervals between tests.

Questions 15 and 17–20 focused on the participants and addressed their personal conduct, such as smoking cigarettes/e-cigarettes, alcohol consumption more than twice a week, and engaging in physical activity. Questions also included the students' obesity status, and whether they had participated in accidental, unprotected sexual activity with partners during the previous two years. Questions 16 and 21 were designed to elicit information from the respondents concerning their knowledge about which malignancies are tobacco-related and which diseases condom use protects against. In the final two questions, students were asked what characteristics of a skin lesion would concern them, as well as what screening test could be used for a group at increased risk of developing lung cancer.

## RESULTS

The questionnaire was completed by 105 students, of whom 65 (62.9%) were women. When asked about the size of the hometown in which the respondents were born, 31 (28.6%) answered that they were born in a city of >500,000 residents, 14 (13.3%) in a city of 500,000–200,000 residents, 10 (9.5%) in a city of 200,000 – 50,000 residents, 25 (23.8%) in a city of 50,000 – 10,000 residents, and 25 (23.8%) in a village/town of up to 10,000 residents (Fig. 1).

The questionnaire was completed by students of medicine (81.9%, 86 students), nursing (6.7%, 7 students), emergency medicine (1.9%, 2 students), physiotherapy (2.9%, 3 students), cosmetology (3.8%, 4 students) and dietetics (2.9%, 3

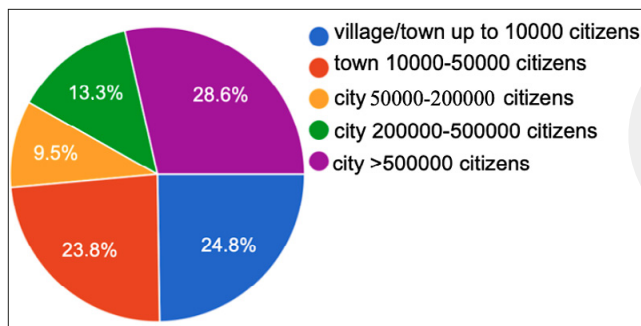


Figure 1. Population size of place of birth. village/town up to 10,000 inhabitants

students). The questionnaire was completed by students in year 1 (17.1%, 18 students), year 2 (19%, 20 students), year 3 (11.4%, 12 students), year 4 (28.6%, 30 students), year 5 (8.6%, 9 students), and year 6 (15.2%, 16 students) of study. The respondents were studying full-time (87.6%) and part-time (12.4%). Of the 105 students who took part in the survey, when asked what screening is, 17 (16.2%) answered that it is a test to reduce the number of cancer patients – 58 (55.2%), a test to detect early forms of cancer – 64 (61%), a test performed on people without symptoms of the disease – 16 (15.2%), a test organized for at-risk groups only, such as X-ray room staff. Among those surveyed, 102 (97.1%) participants considered that screening tests are also applicable to cervical cancer, and the same number of respondents believed that the above examinations are also applicable in breast cancer. In addition, 89 (84.8%) of students responded that screening is useful in colorectal cancer. Less frequently chosen answers were: 38 (36.2%) – skin melanoma, 40 (38%) – lung cancer, 27 (25.7%) – stomach cancer, 65 (61.9%) – prostate cancer, and 39 (37.1%) – ovarian cancer.

Respondents were asked at what age range should women be examined for cervical cancer; 16 (15.2%) responded that a woman should be examined between the ages of 18–30, 81 (77.1%) replied between the ages of 25–59, 23 (21.9%) suggested between the ages of 50–69, and 9 (8.6%) mentioned after the age of 69 (Fig. 2).

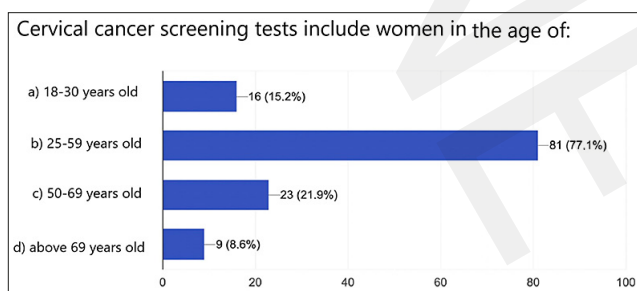


Figure 2. Age at which women should undergo cervical cancer screening tests

Of the surveyed participants, 101 (96.2%) indicated that transvaginal cytology (also known as the Pap-test), is the screening test used to identify cervical cancer. Six (5.7%) respondents also indicated that the test is a colposcopy, or cervical speculum, while five (4.8%) respondents suggested it is a hysterectomy. The response ‘virological DNA test’ (4.8%) was the least frequently preferred answer.

When asked about the time interval for cytological examination, almost half of the respondents (52, 49.5%) suggested that it was two years, slightly fewer (45, 42.9%) answered that it was three years. The third most common

answer, (chosen by 9, 8.6%), was six months. The least frequently chosen answer was 10 years, which was marked by a single participant (1%). Regularity of performing cytological examination is summarized in Figure 3.

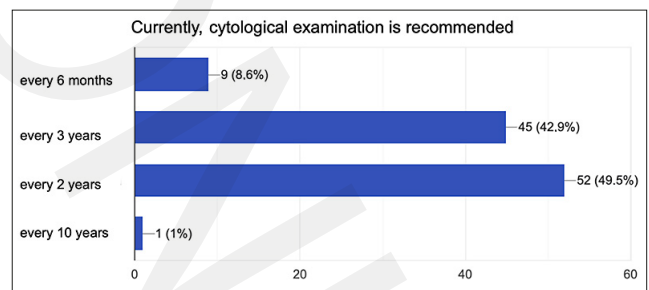


Figure 3. Regularity of performing cytological examination

The next item on the survey was a question about risk factors for cervical cancer, to which the vast majority of respondents – 65 (61%), marked the answer ‘all of the above’, which included HPV infection, cigarette smoking and Chlamydia trachomatis infection. Thirty-eight (37.1%) participants suggested that the only recognized risk factor for cervical cancer was HPV infection, while 2 (1.9%) answered that Chlamydia trachomatis infection was the sole factor. None of the respondents identified smoking cigarettes as the only risk factor for cervical cancer. The age range of the women screened for breast cancer was the subject of the survey’s following question. Of those surveyed, 72 (68.6%) reported they were between the ages of 50–69. Thirty-seven (35.2%) selected the age range 25–59, and 10 (9.5%) between the ages of 18–30. Nine (8.6%) selected the response for those above 69 years of age. Knowledge of the age at which women should perform breast screening tests is summarized in Figure 4.

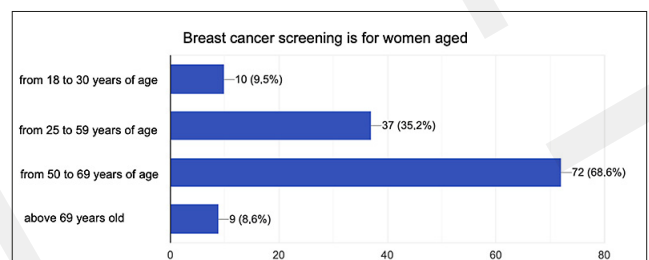


Figure 4. Breast cancer screening tests age recommendations for women

Among respondents answering the question about the screening test to detect breast cancer, 98 (93.3%) of students suggested mammography, and 28 (26.7%) considered breast ultrasound as a screening modality. The remaining respondents considered chest CT (5 [4.8%]) and biopsy (4 [3.8%]). Participants were asked about the time interval for breast cancer screening. More than half of them (53 [50.5%]) answered that it was two years for mammography; the second most frequently chosen answer was ‘ultrasound every two years, mammography every three years’, which was marked by 31 (29.5%) respondents. Almost a quarter (21%) thought it was mammography performed every year. The answer that was marked the least often was ‘ultrasound every three years’ (4 [3.8%]). Frequency of performing cancer screening test is summarized in Figure 5.

Regarding the question about breast cancer risk factors, the ratio of the two different respondents’ answers was very similar.

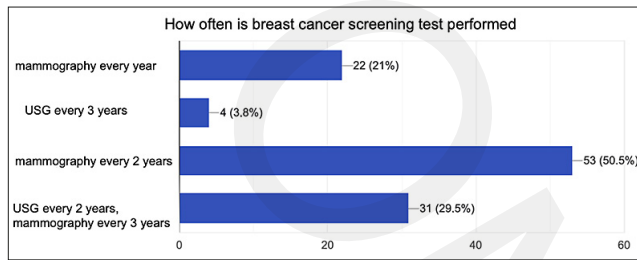


Figure 5. Frequency of performing cancer screening test

Nearly half (49.5%) of the participants considered the following to be risk factors for breast cancer: mutation of the BRCA1 and BRCA2 genes, lack of physical activity, and childbirth after the age of 30. Slightly more than half (50.5%) responded that only BRCA1 and BRCA2 mutation was a risk factor for breast cancer. When asked which examination is a screening test for colorectal cancer, the most common answer (91.4%), was colonoscopy. Far fewer responded that it was a faecal occult blood test (21%), while even fewer said it was a digital rectal examination (15.2%). The two least common responses were 'virtual colonoscopy' and 'faecal calprotectin test' – 8.6% each. Additionally, respondents were asked for whom a colonoscopy is recommended. Among all responses, the majority – 81 (77.1%) suggested that anyone over the age of 40 should undergo a colonoscopy (particularly if there was evidence of colorectal cancer within the immediate family). A smaller number of students – 57 (54.3%) determined that males aged between 50 – 65, without symptoms, but with familial risk of colorectal cancer, require a colonoscopy performed aged over 25. Furthermore, 45 (42.9%) respondents agreed with the statement that women between the ages of 50 – 65, without symptoms, should have a colonoscopy. Knowledge of recommendations for colonoscopy is summarized in Figure 6.

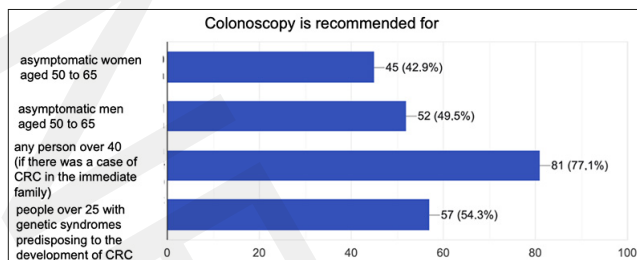


Figure 6. Recommendations for colonoscopy

Another question regarding colorectal cancer concerned the risk factors for that type of cancer. Among the answers were such risk factors as 'diet poor in fruits and vegetables', which was chosen by one (0.95%), and 'obesity' which selected by two (1.9%) of the respondents. Eight (7.6%) participants decided that genetic syndromes (FAP, Lynch Syndrome) were risk factors for colorectal cancer, while the vast majority of respondents (94, 89.5%) answered that all of the above-mentioned risk factors can cause colorectal cancer.

Students were questioned regarding their understanding of tobacco-related malignancies. The most common answers selected by respondents were lung cancer – 103 (98.1%), laryngeal cancer – 100 (95.2%), and oral/pharyngeal cancer – 100 (95.2%). Other answers, such as 'pancreatic cancer' and 'kidney cancer', were far less frequently chosen by respondents, 42 (40%) answered that pancreatic cancer was tobacco-related, and 30 (28.6%) – kidney cancer.

In the part of the questionnaire that focused on the participants' personal behaviour, a large percentage of respondents (67.6%) answered negatively when asked if they used cigarettes or e-cigarettes more frequently than once a month. The proportion of respondents who answered 'yes' to this question was less than one-third. Regarding alcohol consumption more often than twice a week, participants also overwhelmingly answered 'no' (87%), with only 13% of those surveyed consuming alcohol more often than twice a week.

The next question concerned whether respondents engaged in at least 90 minutes of physical activity per week. Slightly more than half (64%) answered that they did perform such an activity. The students were asked whether their BMI was more than 30, to which the vast majority – 88%, answered 'no'. The final question involved having casual sexual partners within the previous two years without using a condom, which was denied by as many as 93%. To the question 'Does using condom generally protect against contracting/infecting', almost every respondent (99%) felt that condoms did protect against HIV. The next most frequently marked answers were 'syphilis' (93%), 'gonorrhoea' (91%), 'HPV' (86%) and 'HSV' (76%).

Respondents were asked which skin lesions would alarm them and prompt them to visit a medical specialist. Among all responses, the most frequently selected answers were growth of a lesion and accompanying pain – 101 (96.2%); periodic bleeding from the lesion – 100 (95.2%); uneven, ragged edges of the skin lesion – 96 (91.4%); and change in skin colour to dark – 92 (87.6%). Less frequently chosen were 'change in colour of the lesion to very light/complete discoloration of the lesion', which was chosen by 49 (46.7%) of participants, and 'no growth of the lesion and accompanying itching of the skin', for which 43 (41%) of students responded. The least frequently chosen answer was 'disappearance of a previously visible skin lesion', which was stated by 24 (22.9%) respondents. Knowledge about disturbing characteristics of skin lesion is summarized in Figure 7.

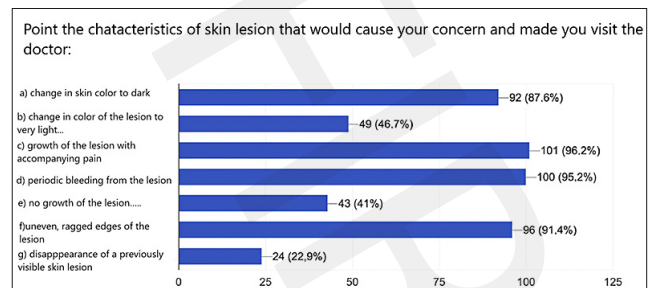
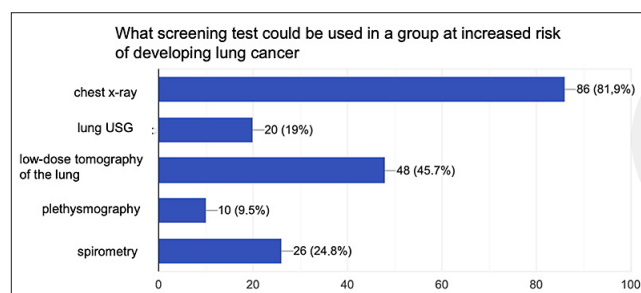


Figure 7. Disturbing characteristics of skin lesion

The final question in the survey concerned the type of screening test that might be performed to a population which was more likely to develop lung cancer. 81.9% of participants selected 'chest X-ray'; the second most common response was 'low-dose chest CT scan', which was chosen by almost half of the participants (45.7%). Spirometry (24.8%), plethysmography (9.5%), and lung ultrasonography (19%) were the next most common procedures chosen. Knowledge of the preferred screening test in the group at increased risk of developing lung cancer is summarized in Figure 8.



**Figure 8.** Screening test the most preferably used in a group at increased risk of developing lung cancer

## DISCUSSION

Several important conclusions can be drawn from the analysis of responses to the survey questions and related to health prevention. The study included questions about various risk factors for cervical cancer, with the most commonly mentioned human papillomavirus (HPV) infection [1]. Participant demonstrated an understanding of the connection between HPV infection and cervical cancer by identifying it as one of the most frequently mentioned risk factors for the disease [2]. It was additionally determined that cytological testing was the best screening tool for cervical cancer, demonstrating an understanding of the importance of routine screenings in the prevention of this kind of disease [3]. Furthermore, a positive finding from the poll was that almost 87.6% of participants suggested that they would be willing to get screened for lung cancer, particularly if they were in a high-risk category. These conclusions collectively indicate that students possess a commendable awareness of the importance of health prevention, and a nuanced understanding of the diverse risk factors associated with different diseases. The health prevention study conducted among students has shed important light on their understanding of risk factors and protective strategies [4]. The results showed that students possess a commendable awareness of the importance of health prevention and a nuanced understanding of the diverse risk factors associated with different diseases. However, there remain areas where targeted educational efforts could yield further improvements, particularly in addressing smoking habits and promoting early detection strategies for skin diseases [5–10]. These findings are consistent with other studies conducted among healthcare professionals, such as public health nurses, nurse practitioners, and physicians [11–13]. A 2019 study by Pataya which focused on conducting educational programmes, underlined the thesis about encouraging awareness of health promotion mentioned above, and emphasizes the importance of cancer prevention and risk factors on the different levels of education, especially among undergraduate students [12]. Studies have found that while healthcare professionals generally have a good understanding of health promotion and disease prevention, there still exist gaps in their knowledge and practices that could be addressed through targeted education and training. The results of the current study therefore highlight the need for ongoing educational initiatives to improve awareness and practices of disease prevention among young adults [14, 15]. It is important to note that the study's findings regarding breast cancer showed that mammography is the most often selected

screening test, highlighting the importance of this test in identifying malignant changes in the breasts. Additionally, a significant portion of students expressed willingness to undergo lung cancer screening, especially in the high-risk group, suggesting a growing awareness of the connection between smoking and the risk of developing lung cancer [16–18]. These findings are encouraging and suggest that efforts to promote cancer screening and awareness of risk factors are having a positive impact [19–21]. In summary, the results of the health prevention study among students demonstrate a commendable awareness of the importance of disease prevention and a nuanced understanding of risk factors associated with different diseases. However, there are areas where targeted educational efforts could yield further improvements [22]. These findings are consistent with other studies conducted among healthcare professionals and highlight the need for ongoing educational initiatives to improve awareness and practices of disease prevention [23–29].

Comparable to the Samra study (2021), the knowledge on breast cancer incidence in medical students still needs to be extended especially in the early detection and management of the disease [30]. The study by Pietrzyk (2017) that focused on colorectal cancer screening knowledge, performed on 1,130 medical students, also showed that there is still the need to improving the quality of oncological education in this area, which is consistent with the findings of the presented study [31]. It is evident from the above-mentioned articles that cancer is a major concern for global public health, and is linked to a wide range of risk factors, including genetic, environmental, and lifestyle choices, such as food, exercise, and tobacco use.

## CONCLUSIONS

The study participants who were all students at the Andrzej Frycz Modrzewski University in Kraków, had varying levels of knowledge and adherence to cancer screening recommendations, and indicate the need for further education and frequent screening promotion in order to enhance early detection and treatment results. The levels of knowledge of the participants, according to questionnaire results, depended on the year of study. Respondents differing comprehension of cancer risk factors, including hereditary disorders, smoking, and obesity, highlights the need to raise awareness to enable people to make knowledgeable health decisions and take preventative action to reduce the chance of developing the disease.

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