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ARTICLE TITLE	KNOWLEDGE OF RISK FACTORS FOR CERVICAL CANCER AND METHODS OF DIAGNOSIS AND PREVENTION AMONG THE PROFESSIONAL GROUP OF POLISH ARMY PILOTS AND STUDENTS OF THE JOHN PAUL II UNIVERSITY OF BIAŁA PODLASKA
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KNOWLEDGE OF RISK FACTORS FOR CERVICAL CANCER AND METHODS OF DIAGNOSIS AND PREVENTION AMONG THE PROFESSIONAL GROUP OF POLISH ARMY PILOTS AND STUDENTS OF THE JOHN PAUL II UNIVERSITY OF BIAŁA PODLASKA

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ABSTRACT

Introduction and aim of the study: Cervical cancer is a common malignant tumor of the female reproductive system, developing in the cervix. Currently, cervical cancer is considered curable, provided it is detected at an early stage and appropriate treatment is promptly initiated. This work aims to present the results of research on the level of awareness on the cervical cancer, methods of diagnosis and prevention among the professional group of Polish Army pilots and students of the John Paul II University of Biała Podlaska.
Material and Methods: The study was conducted using an anonymous survey questionnaire. The data was collected between January and April 2025. 121 correctly completed surveys were collected and then analyzed.
Summary: The conducted research results allow us to conclude that the definition of cervical cancer, the risk factors for infection, and the methods of preventing infection are well-known terms for the studied group. Additionally, participants learn about new screening tests for cervical cancer.

KEYWORDS

Cervical Cancer, HPV Virus, Sexually Transmitted Diseases, Cytology, Prevention, Vaccination

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Introduction

Cervical cancer is a common malignant tumor of the female reproductive system, developing in the cervix. It is the fourth most common malignancy among women worldwide [1]. In Poland, it is the eighth most common cancer in terms of incidence (2.5%) and the tenth (3.1%) most frequent cause of cancer-related deaths among women [2].

Since the mid-1970s, a decreasing trend in mortality due to cervical cancer has been observed [3]. Despite the gradually decreasing incidence rate, deaths and late diagnoses of this cancer still remain a significant problem in society.

Currently, cervical cancer is considered curable, provided it is detected at an early stage and appropriate treatment is promptly initiated [4].

The occurrence of this disease is associated with various risk factors. These include early age of sexual initiation, coexistence of other sexually transmitted diseases [5], multiple sexual partners [6], age of women, long-term smoking [7], multiple pregnancies, and low socioeconomic status.

Among the biological factors influencing the development of cervical cancer, the HPV (human papillomavirus) is considered by researchers to be the main cause. Infection is usually asymptomatic but is responsible for the development of genital cancers, including cervical, vulvar, vaginal, penile cancers, as well as head and neck cancers [8].

The most common oncogenic types of HPV are types 16 and 18, identified as having high carcinogenic potential. They contribute to persistent infections and the development of cervical cancer. Vaccination is the only form of prevention. However, it does not protect against several other, less dangerous types of HPV, which can also trigger cancerous processes. One of the many routes of HPV transmission described in the literature is sexual contact [9,23].

HPV causes cancer due to upregulation of the E6 and E7 open reading frames in the HPV genome, which respectively inactivate p53 and Rb in host cells [10]. The specific mechanism of carcinogenesis after HPV infection varies depending on the infection site. Cervical cancer usually develops in the transformation zone, i.e. the junction of squamous and columnar epithelium.

Precancerous conditions and early stages of cervical cancer do not produce characteristic symptoms. Intermenstrual discharge is malodorous, watery, and dirty-grey in color, and often constitutes the first noticeable sign of infection. Therefore, the fundamental diagnostic method for cervical cancer, often before any symptoms appear, is cytological examination. It involves collecting and laboratory analyzing a smear of epithelial cells from the cervical canal and surface. It is recommended to perform cytology immediately after menstruation and after a few days of sexual abstinence. Within the Cervical Cancer Prevention Program, women aged 25-64 who have not undergone cytological screening within the last 3 years qualify for the test. It should be performed every 36 months or, upon written indication after an abnormal or non-diagnostic result, after 12 months. However, according to the latest guidelines of the Polish Society of Gynecologists and Obstetricians, screening methods are being changed from cytology to HPV HR (High-Risk Human Papillomavirus) testing using PCR (Polymerase Chain Reaction) technology, which allows detection and identification of specific high-risk HPV types. The significantly higher sensitivity of HPV HR testing (90%) compared to cytology (50-70%) is the reason for implementing this method in screening for precancerous lesions and cervical cancer [11]. Pilot molecular HPV testing programs are currently ongoing [12]. The National Health Fund (NFZ) has announced the introduction of the HPV HR test, which can be performed every five years, to its guaranteed benefits starting July 1, 2025. The program is aimed at women aged 25 to 64. Along with the test, a sample from the patient's cervix will be collected. If the result is positive, a liquid-based cytology test will be performed. If the results are normal, follow-up tests will be performed after 12 months. However, if dysplastic changes are detected, the patient will be referred for further diagnostics, such as a colposcopy or a colposcopy with a biopsy for histopathological examination. The new benefits are part of the "Conscious, Safe Me" package [13]. HPV screening tests are only performed in women. Men are not screened for HPV. However, a meta-analysis by Bruni L. et al. showed that one in three men over the age of 15 is or has been infected with HPV, and 21% of those studied were infected with high-risk HPV [14].

The National Cancer Registry indicates that unfortunately only 27% of Polish women regularly undergo cytological tests [15]. For this reason, preventive HPV vaccination offers a chance to improve the epidemiological situation. The HPV vaccine was introduced in Poland in 2006. It was the quadrivalent Silgard vaccine (since September 2018 known as Gardasil), providing immunity against HPV types 6, 11, 16, and 18. The universal HPV vaccination program implements the goals of the National Oncology Strategy for 2020–2030. Recommendations include administering two doses of the vaccine to people aged 9 to 14 years (before their 15th birthday) at intervals of 5-13 months. For individuals aged 15 and older, three doses are used, administered on a 0, 1, and 6-month schedule. This means the second dose is given one month after the first, and the third dose six months after the first. Among the reimbursed preparations are the bivalent Cervarix vaccine (against HPV types 16 and 18) and the 9-valent Gardasil9 vaccine (protecting against types 6, 11, 16, 18, 31, 33, 45, 52, 58). The current reimbursement rules are presented in Table 1.

Table 1. Current reimbursement rules for HPV vaccines.

Vaccine	Age group	Reimbursement	Notes
Gardasil 9	9–13 years (before 14th birthday)	100% (free of charge)	Under the Universal HPV Vaccination Program
	≥14 years	No reimbursement	Paid (approx. PLN 500–600 per dose)
Cervarix	9–18 years	100% (free of charge)	(free of charge)
	>18 years	50% pharmacy reimbursement	Price after reimbursement: approx. PLN 140 per dose

Source: Announcement of the Minister of Health of 30 August 2023 on the list of reimbursed drugs, special dietary foods, and medical devices. Off. J. Min. Health 2023.73; Ministry of Health information on inclusion of HPV vaccines in the list of reimbursed drugs and changes to the e-Vaccine Card.

Vaccinations, along with education and health-promoting attitudes, are elements of primary prevention of cervical cancer and other cancers. Activities raising awareness about cancer prevention include numerous social campaigns, e.g. "Let's Beat HPV" carried out since 2022 by MSD Polska and the "Bye, Bye HPV" campaign by the SEXEDPL Foundation launched in March 2024. The awareness ribbon color for cervical cancer is turquoise and white. To highlight this issue and encourage society to expand knowledge about

cervical cancer through conferences and social campaigns, March 4 was established as "International HPV Awareness Day", and January as "Cervical Cancer Awareness Month".

Aim of The Study

The aim of the study was to assess the level of knowledge among two professional groups: Polish Army pilots and students of the John Paul II University in Biała Podlaska (AB) regarding risk factors for cervical cancer, as well as methods of its diagnosis and prevention.

The article analyzes the following issues:

1) The respondents' knowledge about the definition of cervical cancer, routes of infection, and risk factors.
2) Methods of detecting HPV infection in the population.
3) The importance of vaccination alongside pro-health behaviors as a method of preventing disease development.

Materials and Methods

The study was conducted among pilots of the Polish Armed Forces and students of the Jan Paul II Biała Podlaska Academy, using an original questionnaire consisting of 25 questions of varied structure. The questions concerned, among others, knowledge of the term cervical cancer, risk factors for the disease, and methods of prevention. The data was collected between January and April 2025.

A total of 121 correctly completed questionnaires were collected, including 54 from pilots (44.6%) and 67 from students (55.4%). The respondents represented a diverse age group. The youngest respondents were 18 years old, and the oldest were over 50 years old. The age structure of the respondents is presented in Chart 1.

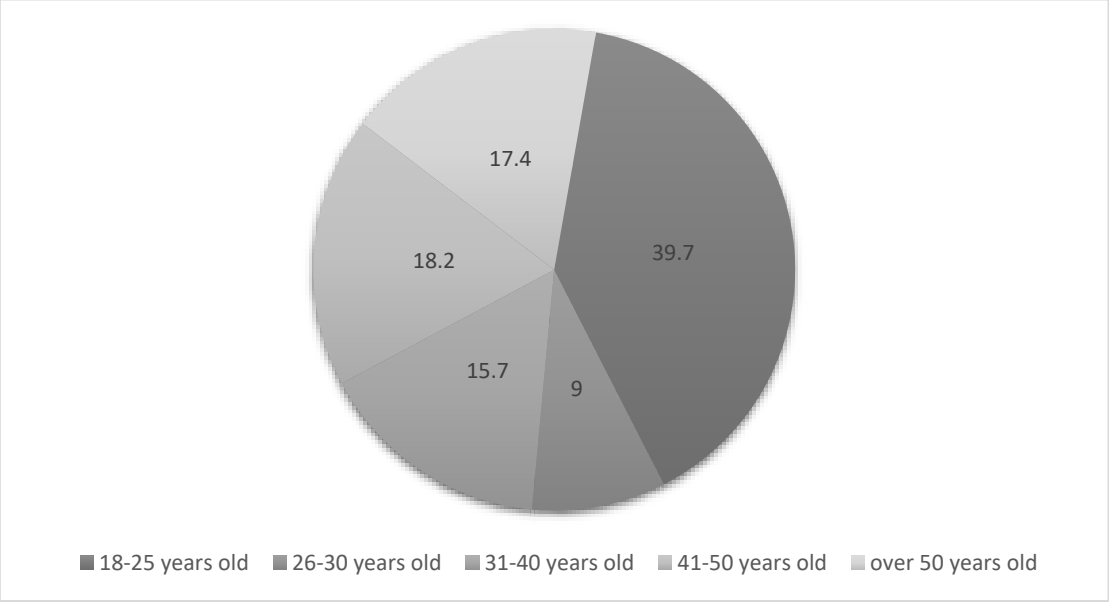

Fig. 1. *Age structure of the respondents.*

Among all respondents, women constituted the majority (80 people, i.e., 66.1%). Female students made up a larger share of this group (74.4%), while female pilots accounted for 55.6%. Among male respondents, pilots were the majority, representing 44.4% of the total, while male students accounted for 25.4%.

When analyzing the place of residence, the respondents indicated either the countryside or cities, with a breakdown by population size. The vast majority of respondents (81 people) declared living in a city, while rural residents were the minority (40 people, i.e., 33%). Among city dwellers, the smallest group lived in cities with 150,000 to 500,000 inhabitants (7.4%). The remaining respondents lived in cities with more than 500,000 inhabitants (9.9%), cities with 50,000–150,000 inhabitants (20.8%), and cities with fewer than 50,000 inhabitants (28.9%).

More than half of the respondents were single (61%). Among the students surveyed, the largest group was single (59.7%), while 40.3% were married. Among the pilots, 63% were single, and 37% were married.

Results

Based on the analysis of the survey results, it was found that the majority (73.5%) of respondents knew the correct definition of cervical cancer. This concept was correctly defined by 73.1% of students and 74.1% of pilots.

The vast majority of respondents (69.4%) indicated the age group between 35–50 years as the period when cervical cancer occurs most frequently. A minority provided incorrect answers, indicating the age group 20–35 years or 50–60 years. The results are shown in Chart 2.

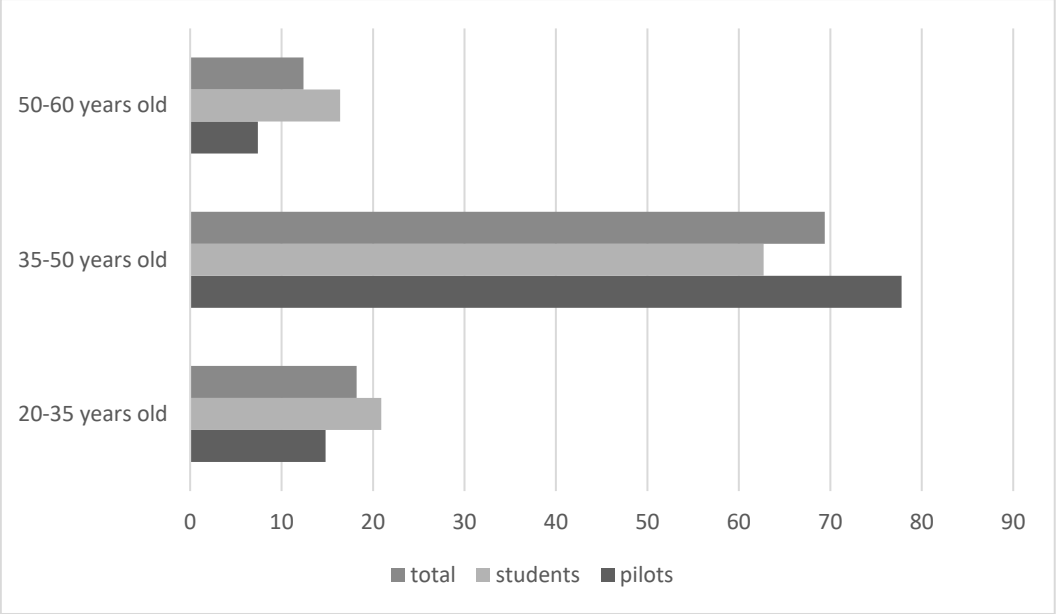

Fig. 2. *Age group most at risk according to the respondents.*

Among the factors of HPV infection, the coexistence of other sexually transmitted diseases was the most frequently indicated response by both groups of respondents (67.2% of students and 77.8% of pilots).

On the other hand, the least frequently given answer was low economic status. This was indicated by 9% of students and 11.1% of pilots. The results are presented in Chart 3.

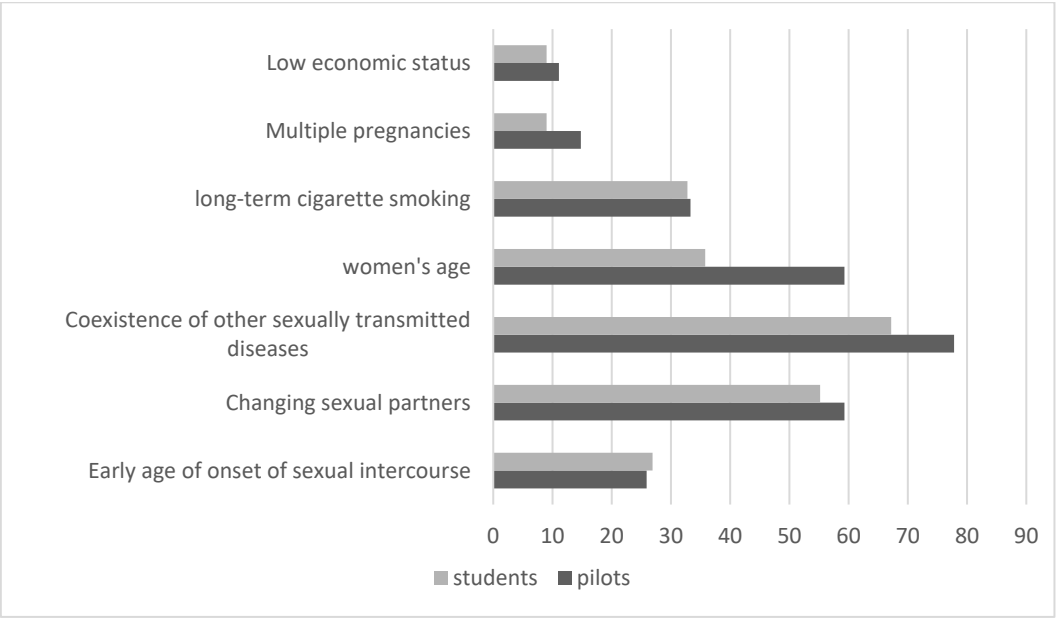

Fig. 3. *Risk factors for cervical cancer infection according to respondents.*

The vast majority of respondents know that HPV is transmitted sexually. This answer was given by 88.4% of respondents (85.1% of students and 92.6% of pilots).

Analyzing the results, it was observed that most respondents know the methods of cervical cancer screening. Cytological examination (Pap smear) was the method most frequently indicated by respondents (82.1% of students and 81.5% of pilots). Meanwhile, 47.8% of students and 66.7% of pilots indicated the high-risk human papillomavirus test as an equivalent screening method. Among the possible methods for detecting cervical cancer included in the survey were also those unrelated to this cancer. An incorrect answer (mammography) was given by a total of 4.1% of respondents.

Analysis of the obtained results showed that the vast majority of respondents (85.1%) had encountered information about the HPV vaccine. However, there was a group (14.9%) who had not known about the vaccine so far. In response to the question about the preferred age for vaccination, 88.3% of respondents gave the correct answer, namely: regardless of age, but preferably before the onset of sexual activity. The respondents' answers regarding the number of doses administered in the full HPV vaccination cycle are presented in Chart 4.

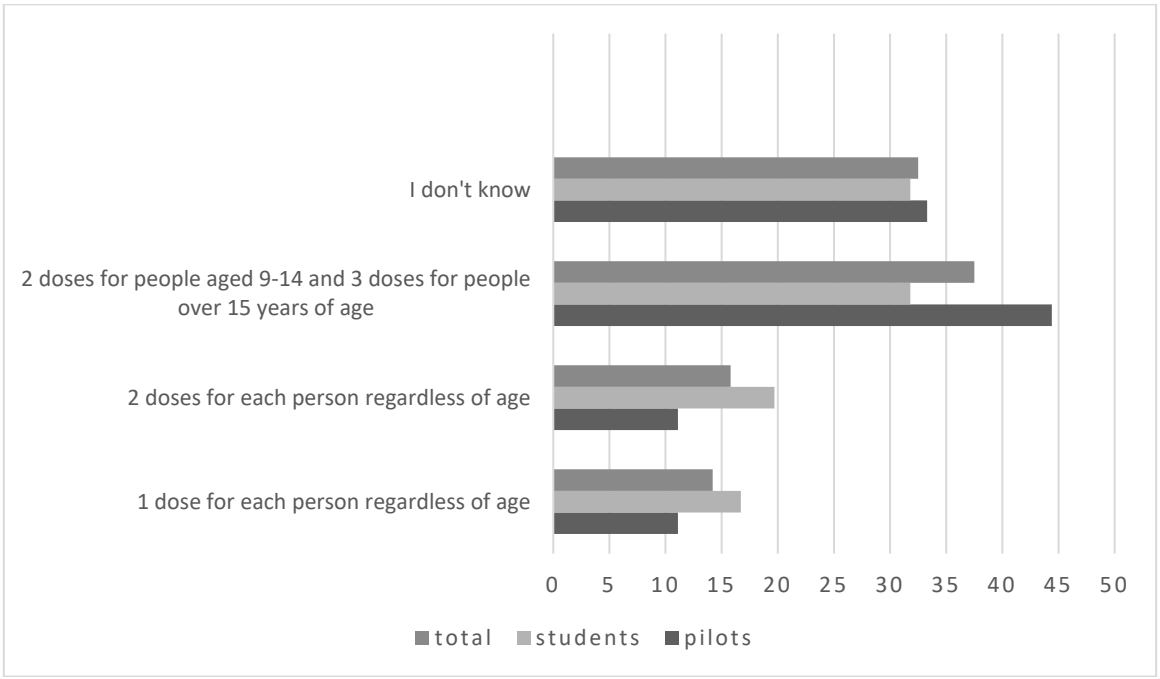

Fig. 4. *Number of vaccine doses according to respondents constituting the full vaccination cycle.*

When analysing the obtained research results, it was noted that according to the respondents, the HPV vaccine should be administered to both boys and girls. This answer was given by 79.3% of respondents (77.6% of students and 81.5% of pilots).

Discussion

The conducted research results allow us to conclude that the definition of cervical cancer, the risk factors for infection, and the methods of preventing infection are well-known terms for the studied group. The obtained results confirm the analysis conducted by Osowiecka K. et al., in which the surveyed students also had satisfactory awareness of the role of HPV in carcinogenesis and indicated vaccination as a method of preventing infection [16]. In a study assessing the level of knowledge regarding risk factors and prevention of cervical cancer among 160 female university students in Kraków, Mędrel-Kuder E. indicated that female students, just as in this study, consider sexual contact as the route of HPV infection [17].

Research on cervical cancer conducted in other countries has resulted in a wider dissemination of knowledge about prevention and treatment. Consequently, public awareness of HPV infection and their immunity is relatively high. One of the first countries to implement a national HPV vaccination program in 2007 for girls aged 12-13 was Australia. In 2013, the program was expanded to include both boys and girls [18]. The national HPV vaccination program in the United Kingdom, launched in 2008, has effectively

prevented HPV infections, with the majority of boys and girls vaccinated at school [19]. A full vaccination cycle consists of two or three doses, depending on age; however, some studies indicate that receiving a single dose of the HPV vaccine provides similar effectiveness compared to two or three doses [20]. Basu P. et al. compared antibody responses after a single dose of HPV vaccine in the Dose Reduction Immunobridging and Safety Study (DoRIS), confirming the effectiveness of a single-dose vaccination comparable to two or three doses. The study included 1002 girls, of whom 930 were enrolled in DoRIS, and 155 were assigned to receive either one, two, or three doses of the bivalent vaccine, or one, two, or three doses of the nine-valent vaccine [21]. Contrary conclusions were drawn by Pasmans H. et al., stating that although a single-dose HPV vaccine is immunogenic and reduces the incidence of precancerous lesions, the protection provided by this dose is not equal to the protection provided by two or three doses [22].

Despite the satisfactory knowledge of the respondents, it is recommended to continue health education through social campaigns to raise awareness of HPV infection. Alongside ensuring access to vaccination, this seems to be a way to reduce the incidence and mortality from cancer and other HPV-related diseases worldwide.

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Conceptualization: Mandziuk Anna, Mandziuk Marta, Roczek Dorota
Methodology: Skutta Anastazja, Kozerska Natalia, Młocek Aleksandra
Formal Analysis: Białas Aleksandra, Jankowska Angelika, Mandziuk Magdalena
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Writing –Original Draft: Mandziuk Anna, Mandziuk Marta
Writing –Review & Editing: Kozerska Natalia, Mandziuk Magdalena
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