DOI:

PERCEPCIJA RIZIKA OD RAKA STUDENATA MEDICINE: FOKUS NA RAK GRLIĆA MATERICE

PERCEPTION OF CANCER RISK AMONG MEDICAL STUDENTS: CERVICAL CANCER IN FOCUS

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SAŽETAK

Uvod. Rak grlića materice predstavlja značajan globalni javno zdravstveni problem i zauzima četvrto mesto po učestalosti među karcinomima kod žena. Cilj rada bio je da istraži percepciju studenata medicine o faktorima rizika za rak grlića materice, kao prema infekciji Humanim papilloma virusom (HPV) i informisanost o HPV vakcini. Materijal i metode. Sprovedena je studija preseka kojom su bili obuhvaćeni studenti četvrte, pete i šeste godine Integrisanih Akademskih Studija (IAS) medicine Medicinskog fakulteta Univerziteta u Nišu. Primnjen je anonmni upitnik koji je distribuiran preko Google platforme. Rezultati. U istraživanju je učestvovao ukupno 361 student (21% muškog i 79% ženskog pola). Prosečan broj poena na testu znanja o raku grlića materice iznosio je 17.25±7.92 (min 0–max 30). Srednjoškolsko obrazovanje studenata imalo je značajan uticaj na znanje o faktorima rizika za rak grlića ($p<0.001$), kao i mesto stalnog prebivališta. Značajno viši skor znanja imali su student iz gradske sredine ($p=0.01$); studenti čije su majke imale srednje ($p=0.002$) ili visoko obrazovanje imali su značajno bolje znanje ($p<0.001$) od onih čije su majke imale osnovno obrazovanje, kao i studenti čiji su očevi imali visoko obrazovanje ($p<0.05$) u odnosu na očeve srednjeg obrazovanja. Studenti koji su bili srednjeg i visokog imovinskog stanja imali su značajno viši skor znanja ($p=0.008$) od studenata koji su bili niskog imovinskog stanja. Svi studenti koji su završili srednju školu medicinske struke imali su značajno bolje znanje o HPV infekciji od studenata koji su završili gimnaziju ($p<0.001$) i škole nemedicinske struke ($p<0.001$). Studenti koji su bili u partnerskoj vezi ($p=0.005$) i oni koji su bili seksualno aktivni ($p=0.001$) imali su značajno bolje znanje o HPV infekciji. Samo 25.5% studenata bilo je svesno značaja HPV vakcinacije u prevenciji raka grlića materice i 16.0% znalo je nešto o HPV vakcini. Visoko obrazovanje majke ($p=0.028$), parterska veza ($p=0.041$) i seksualna aktivnost ($p=0.001$) bili su značajno povezani sa višim nivoom znanja o HPV infekciji. Zaključak. Istraživanje je pokazalo zadovoljavajući da student imaju zadovoljavajući nivo znanja o raku grlića materice, ali je svest o riziku od HPV infekcije i raka grlića materice kao i o prevenciji bila je relativno niska.
Ključne reči: rak grlića materice, faktori rizika, studenti medicine, HPV infekcija, prevencija

ABSTRACT

Perception of cancer risk among medical students: cervical cancer in focus
Introduction. Cervical cancer remains a significant global public health concern, ranking as the fourth most common cancer among women. This paper explores students' perceptions of risk factors for cervical cancer, as well as their awareness of human papillomavirus (HPV) infection and the HPV vaccine. Materials and Methods. A cross-sectional, questionnaire-based study was conducted among medical students at the Faculty of Medicine, University of Niš, using the Google Forms platform. Results. A total of 361 students participated in the study and the average cervical cancer knowledge score was 17.25 ± 7.92 (range: 0–30). Pre-college education had a significant impact on the knowledge score ($p< 0.001$). A significant difference was also found between students from urban and rural areas ($p=0.01$). Parental education level significantly influenced students' knowledge: both mother's ($p<0.001$) and father's ($p=0.006$) education were associated with higher knowledge scores. Students whose mothers had a medium ($p=0.002$) or high ($p<0.001$) level of education scored significantly higher than those whose mothers had a low level of education. Income status was another factor significantly associated with knowledge scores ($p=0.008$), as was relationship status—students in a relationship demonstrated higher knowledge than those who were single ($p=0.019$). Knowledge of HPV infection varied significantly depending on the type of pre-college education ($p<0.001$); students in a relationship ($p=0.005$) and those who were sexually active ($p=0.001$) were more likely to be aware of HPV infection. Conclusions. The present study revealed sufficient knowledge about cervical cancer in examined population, but awareness about HPV infection was rather low.
Key words: cervical cancer, risk factors, medical students, HPV infection, prevention

1.INTRODUCTION

Cervical cancer is the fourth most common cancer in female population with 660,000 new cases and 350,000 deaths worldwide in 2022 [1]. Nearly half of all newly registered cases in 2022—approximately 117,944—were recorded in sub-Saharan Africa, including 10,532 in South Africa, 6,938 in Uganda, 10,868 in Tanzania, 13,676 in Nigeria, and 8,168 in Ethiopia [2]. This cancer is the leading cause of cancer death mainly in sub-Saharan Africa as well as South America and South-Eastern Asia. The majority of the burden of the disease occurs in low and middle-income countries (LMICs) [2,3]. Incidence and mortality rates vary at least 10-fold, with the highest regional incidence and mortality rates found in sub-Saharan Africa and Melanesia and the lowest rates found in Northern America, Australia/New Zealand, and Western Asia [4].
In Europe, cervical cancer causes 58 219 new cases and 26 950 deaths in 2022, which makes it the ninth most common cause of female cancer, and when it comes to cancer deaths, it is ranked 11th [5]. However, it is ranked second in both incidence and mortality among females between 15 and 44 years of age [6]. The trend of peak incidence occurring at younger ages, consistently observed over the past several decades [6,7], suggests that cervical cancer is an age-related disease, primarily affecting women of reproductive age. This cancer progresses slowly [8], and when detected in its early stages, it is highly treatable, with a 5-year relative survival rate of up to 92% [9].
Besides, it is the first cancer to have an identified agent essential for its development, human papillomavirus (HPV) infection. In the 1970s, zur Hausen suggested a possible association between HPV infection and cervical cancer [10], which was confirmed in the following decades. HPV is a necessary, but not sufficient, cause of cervical cancer [11]. In the most recent evaluation by the IARC Monographs, seventeen HPV genotypes have been identified as causally linked to invasive cervical cancer, although their carcinogenic potency varies significantly [12]. HPV types 16 and 18 are responsible for approximately three-quarters of cervical cancer cases globally [13]. Additional types, such as HPV 31, 33, 45, 52, and 58, account for 15–20% of cases. The remaining 10 causal genotypes contribute to only about 5% of cases worldwide, with notable regional differences—such as a higher prevalence (~4%) of HPV 35 in Africa compared to other regions [12] and were classified as group 1 carcinogens by the IARC Monographs [13]. Several types have been recognized as high risk according to their oncogenic potential, with types 16 and 18 being the most prevalent ones [14]. Findings from the first study of HPV infection prevalence in Serbian women [15,16] showed that in Serbia, an 1060 new cases in female population were diagnosed with cervical cancer in 2022 and 404 women died from it [17]. Among them, several types have been recognized as high risk according to their oncogenic potential, with types 16 and 18 being the most prevalent ones [8]. Findings from the first study of HPV infection prevalence in Serbian women [15] showed that nearly one third of HPV-positive women in Serbia had types HPV16/18, marked as the most aggressive high-risk genotypes of human papillomavirus HR-HPVs. According to the findings of Kovacevic [16], the most prevalent HPV types in females of the Autonomous

Province of Vojvodina, in Serbia, are: HPV 16; HPV 31, HPV 51; HPV 33; HPV 18; HPV 52; HPV 56; HPV 39; HPV 45; HPV 58; HPV 59 and HPV 35 and the most frequent HPV types are type 16 and type 31. The most prevalent HPV types of this region showed concordance with European isolates, but non-European variants were also found [15,16]. Infection with high-risk oncogenic human papillomavirus (HPV) has been established as the cause of cervical cancer [16]. While HPV infection resolves in most individuals, in others it progresses to cancer. This has led to a search for co-factors that promote persistent high-risk HPV infection, which is cardinal in the carcinogenesis of cervical cancer [17]. High parity, long-term use of oral contraceptions, cigarette smoking, overweight, obesity, physical inactivity, and immune suppression have been associated with increased progression to cervical cancer [18,19,20]. As the cause and associated risk factors of HPV have been established, various methods of prevention have also been proposed. HPV vaccination has been suggested for young adolescents who are yet to be sexually active, along with screening for precancerous lesions in women within the target age group. However, HPV vaccines, which are vaccines for sexually transmitted infections (STIs), may face acceptance and marketing challenges in certain settings [21].

2. MATERIAL AND METHOD

2.1. Study Design

The cross-sectional study was conducted from 15 October 2024 to 15 November 2024 via the Google Platform. The participants were male and female medical students in their fourth-year, fifth-year and sixth year of the study.

2.2. Instrument of investigation

Data were collected using a semi-structured questionnaire specially created for this investigation. It was a self-administered questionnaire with three distinct three sections.
The first section explored respondents' socio-demographic characteristics, including age, type of faculty, mother's and father's education level, place of residence, type of secondary school completed and financial and relationship status. In addition, participants were asked if they ever had sexual intercourse and, if yes, how many sexual partners they had had.
The second section consisted of 22 items divided into three subsections (knowledge about risk factors for cervical cancer, HPV awareness, HPV vaccination awareness). Cervical cancer knowledge was evaluated by a composite score estimated using a total of 18 items regarding risk and protective factors, preventive measures and the outcome of cervical cancer. Participants had three possible response options regarding proposed factors (protective factor, risk factor and do not know) and correct answers were coded with either one or two points, deepening factor significance. As for the rest of the questions, the given options were "true", "false" and "do not know" and correct answers were given two points. The total number of points represented the participant's cervical cancer knowledge score (CC-KS), with higher scores meaning better knowledge. The maximum number of points was 30. All questions were based on data from the relevant literature and information provided by the American Cancer Society [18]. Awareness about HPV was determined based on whether or not participants had heard about HPV infection. The remaining three items were related to HPV vaccination. Participants were asked to indicate if they have heard about the HPV vaccine. If the answer was positive, they then answered when the best time to get the HPV vaccine is and if the HPV vaccine is available in Serbia.
The last part of the questionnaire inquired about the source of respondents 'knowledge about the subject. Thirteen multiple choice answers, from three categories of source (personal contact, organized health education (OHE) and media were o red. The opportunity to declare not having any knowledge was also given.
Ethical approval for the study was obtained from the Ethics Committee of the Faculty of Medicine in Nis (Decision No. 12-8310-1/2-4, dated 10 July 2024).

2.3. Statistical Analysis

Data were presented as the mean and standard deviation (SD) or as frequencies and proportions. Comparison of the mean values between two groups was done using t-tests or Mann–Whitney tests depending on data distribution, while theme an values between the three groups were compared using either ANOVA or Kruskal–Wallis tests. The chi-squared test was used for the comparison of categorical variables. The Chi-squared test was used for comparison of categorical variables. The p-value was set at $p<0.05$ (two-tailed). All statistical analyses were performed using R software, version 3.0.3 [23].

3.RESULTS

3.1. A total of 361 participants completed the entire questionnaire. The average age of the study population was 22.7 ± 1.3 years. The majority of respondents were female students (79%) compared to male students (21%). Most participants came from urban areas (75.7%). A total of 95% had mothers with either a medium or high level of education, while 62.9% had fathers with the same level of education. Regarding socioeconomic status, 70.2% reported having a medium or high income. In terms of relationship status, 44.9% were in a relationship, while 55.1% were single.

3.2. Perception risk of cervical cancer

The knowledge about cervical cancer was evaluated using composite score. It was established that average score in our students was 17.25±7.92 (Min 0, Max 30). Statistical analysis showed that medical students have knowledge score ($p<0.001$). The pre-college education also significantly influenced participants' score ($p<0.001$), with the highest score noted in students that previously attended medical high school followed by those that attended grammar schools (Table 1). Furthermore, significant difference in the score was established between participants from urban and rural areas ($p=0.01$) with the former being better informed about cervical cancer. Mother's and father's level of education also influenced cervical cancer knowledge of our subjects ($p<0.001$ and $p=0.006$, respectively). The knowledge was significantly higher in students whose mothers had middle ($p=0.002$) and high ($p<0.001$) education compared to those with low education. Likewise, having a father with high education meant having higher score (Table 1). Income status of participants was significantly associated with knowledge score ($p=0.008$). Thus, participants with high and middle income demonstrated higher scores (Table 1). Students in a relationship showed better knowledge than single students ($p=0.019$). On the other hand, no significant difference was proven between women that had sexual experience and those who did not (Table 1).

Table 1. Association of participants socio-demographic characteristic with cervical cancer knowledge score

Variable	Cervical cancer knowledge score	p
Type of high school finished		<0.001
General High school	16.79±7.73	
Other, non-medical high school	14.69±7.98[a,b]	
Medical high school	20.82±6.38[b]	
Place of residence		0.010
Urban area	16.62±7.82	
Rural area	15.48±8.16	
Mother's level of education		<0.001
Low	13.33±8.27[c,d]	
Middle	16.22±8.04	
High	17.02±7.53	
Father's level of education		0.006
Low	15.68±7.82	
Middle	15.78±8.09	
High	17.22±7.57[e]	
Financial status/income		0.008
Low	14.25±8.53	
Middle	16.62±7.85[f]	
High	16.51±7.79[f]	
Marital/relationship status		0.019
Single	15.89±8.06	
In relationship	16.96±7.69	
Ever had sexual intercourse		0.065
Yes	16.67±7.90	
No	16.01±7.93	
Number of sexual partners [g]		0.537
1	16.65±7.80	
2-4	16.96±8.08	
5+	17.00±8.45	

a vs. medical high school, p<0.05; b vs. general high school, p<0.05; c vs. middle educated mother, p<0.05; d vs. high educated mother, p<0.05; e vs. middle educated father, p<0.05, f vs. low income, p<0.05; g of those that had sexual intercourse

3.3. HPV and HPV vaccine awareness

Total number of participants that have heard of HPV infection was 174 (48,0%) with medical students of fourth-, five- and six-year of study being aware of this infection. Furthermore, knowledge of this infection differed significantly depending on the type of secondary education (p<0.001). Thus, students that have finished medical high school had significantly higher knowledge compared to those from general high school (p<0.001) and non-medical high schools (p<0.001). Finally, students that were in relationship (p=0.005) and that were sexually active (p=0.001) knew about HPV infection significantly more often.

When it comes to HPV vaccine, the overall awareness was quite low (25.5%), whereas even lower percentage of students have heard for both HPV and its vaccine (16.1%). The statically significant difference was noted relative to mother's education, relationship and sexual status. Students raised by highly educated mothers have heard of the HPV vaccine more often (compared to students whose mothers had low education, p=0.028), just as the students that were in relationships (vs. single, p=0.041) and that had had sexual intercourse (compared to those who have not had sexual intercourse, (p=0.001).

The other two questions about HPV vaccination were correctly answered by only a small number of subjects. Of those who declared that they were aware of HPV and the vaccine only 37 knew when the best time to get the HPV vaccine is and 48 knew that it is available in Serbia. No difference between distinct demographic groups was established (Table 1).

3.4. Source of information

The media was listed as the dominant source of information about the investigated topics by all of examined students. Two hundred fifty-five subjects declared having no knowledge about investigated topics.

The knowledge score was significantly higher in subjects that received information from either of three source categories compared to subjects who denied receiving information from that particular category (Table 2). A similar relationship is noted between information sources and HPV awareness. Among the students who knew about HPV, significantly more reported acquiring information through each of the source categories (vs. not acquiring information through that source). Finally, OHE was the only information source category associated with significantly higher number of subjects that have heard about HPV vaccine ($p<0.001$), that knew when it should be administered ($p=0.039$) and that it is available in Serbia ($p=0.029$)

The complete statistical analysis regarding sources of information among our participants and their relationship with cervical cancer knowledge score, HPV and HPV vaccine awareness is shown in Table 2.

Table 2. Source of information and its association with cervical cancer knowledge score, HPV and HPV vaccine awareness

Source of information	Knowledge score about cervical cancer	Heard about HPV	Heard about HPV vaccine [a]		Know the best time to get the HPV vaccine [b]		Know that HPV vaccine is available in Serbia [b]
		(%)		(%)		(%)	
Media							
Yes	17.38±7.52	67.5		69.0		78.4	70.8
No	14.62±8.28	32.5		31.0		21.6	29.2
p	<0.001*	<0.001***		0.628***		0.249***	0.893***
OHE [c]							
Yes	18.49±7.15	65.0	170	74.2	33	89.2	87.5
No	13.87±8.05	35.0	59	25.8	4	10.8	12.5
p	<0.001*	<0.001***	<0.001***		0.039***		0.029***
Personal contact							
Yes	18.42±6.98	37.8		41.0		45.9	41.7
No	15.31±8.16	62.2		59.0		54.1	58.3
p	<0.001**	<0.001***		0.264***		0.632***	0.922***

*Mann-Whitney test; **independent t test; *** Chi-squared test; a Only those who have also heard about HPV were taken into account; b Only those who have heard about HPV and HPV vaccine were taken into account; c OHE - organized health education

4. DISCUSSION

Based on the presented data, we analyzed medical students' perception, knowledge, and awareness regarding the risk factors and prevention of cervical cancer. Our participants showed decent knowledge about cervical cancer with mean score being more than half of the total possible score. Similar data were obtained in a study conducted on a sample of 1,616 first-year female students at the University of Niš, which compared the knowledge of medical and non-medical students. First-year female medical students demonstrated better knowledge about HPV infection as a risk factor for cervical cancer compared to their non-medical peers. However, overall knowledge about HPV infection and the HPV vaccine was low among all student groups [24]. However, in a study done in Serbia's capital, Belgrade, a considerable portion of women had insufficient knowledge about cervical cancer, especially those who did not participate in mass screening [25]. This discrepancy can be explained by differences in study population, since our research included only college students, the future intellectual elite of the state. Furthermore, a good share of our participants had affiliation with medical profession which greatly contributed to higher cervical cancer knowledge level. In that manner, we proved that subjects involved in medical studies or those that attended medical high school had the highest knowledge about cervical cancer. In accordance with the previous interpretation, the results of another Serbian study showed that both students of secondary medical school and midwives who had finished that same school had significantly better knowledge than patients [26].

Apart from education, we also identified good financial status, living in urban areas and having parents with higher education as factor that contribute to better knowledge about cervical cancer. This means that higher socio-economic status is associated with better health standard and can explain the fact that the highest prevalence of cervical cancer is seen in underdeveloped countries [1]. However, data from relevant studies are inconsistent regarding this matter, occasionally showing low knowledge about cervical cancer even in people from developed countries. For example, in other Balkan countries the situation regarding cervical cancer and HPV knowledge is generally quite poor. In Romania, even though the majority of interviewed women have heard of HPV, the level of knowledge was low, especially about risk factors for infection [28]. Likewise, Greek adolescents were also insufficiently informed about risk factors and protection methods against cervical cancer [29]. Similar situation is also recorded in Hungary and Slovenia [30,31]. The inconsistency of the results from different studies was also noted regarding the association between relationship status and knowledge about cervical cancer. Whereas in our study students in relationship had higher CC-KS, there are other studies in which being single was associated with knowledge about cervical cancer screening [33].

Despite relatively good knowledge about cervical cancer in the investigated population HPV awareness was quite low. We established that a bit less than 50% of investigated students have heard of HPV infection. The research performed in Slovenia [31] that included women of wide range of ages and the one that included adolescents from Greece [29] also noted low awareness of HPV. On the other hand, the study in neighboring Romania [28] showed that between two thirds and three quarters of questioned women have heard about HPV. Such result was also recorded in our study among

subjects that finished medical high school and those attending medical faculty. In addition, in our study females in relationship and the ones that had sexual experience were more likely to have heard about HPV. This is encouraging since it implies that the subjects who enter into relationship at least have basic awareness about HPV. According to a study conducted at the University of Glasgow, Scotland, involving two groups of first-year medical students with a mean age range of 17–20 years, the results highlight a significant lack of understanding regarding the level of protection against cervical cancer provided by the HPV vaccine [32]. In a study conducted in Germany in 2010, a survey was administered to students aged 18 to 25 from six vocational schools in Berlin. A total of 259 women and 245 men completed a questionnaire that assessed socio-demographic data, sexual behaviors, HPV awareness, vaccination status, reasons for vaccine reluctance, and HPV-related knowledge. While 95% of women and 80% of men were aware of a 'vaccine for cervical cancer,' only half of the women and 25% of the men had heard of HPV. Overall knowledge was limited, with average scores of 2.8 (SD = 2.10) for women and 1.5 (SD = 1.49) for men (on a scale from 0 to 11). Additionally, 51% of women and 42% of men mistakenly believed that only women could contract HPV, and most were unaware that HPV is sexually transmitted [33].
Significant part of our study was also investigation of HPV vaccination awareness. This topic was especially important among medical students and young women [22-24,26].

5. CONCLUSION

The present study revealed sufficient knowledge about cervical cancer in examined population, but awareness about HPV infection was rather low. The pre-college education, significant difference in the score was established between participants from urban and rural areas with the former being better informed about cervical cancer, parents level of education also influenced cervical cancer knowledge Since the highest score of knowledge about cervical cancer was determined in the group of students who denoted organized health education as a source, this established scenario should serve as a guide for development of the high-quality education programs directed particularly towards raising awareness about cervical cancer prevention and the importance of HPV vaccination. Furthermore, in accordance with the result that the media was the most common source of information, these campaigns should be conducted using exactly this information source. However, steps must be taken in order to increase its reliability, thus making the media a powerful instrument through which correct information would be spread to general public. In addition to such well-targeted health promotion campaigns, official national strategy is also necessary with the goal to introduce the HPV vaccine in NIP, with monitoring and real support from authorities. Only by achieving these goals can the cervical cancer burden be reduced.

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