

## ORIGINAL ARTICLE

# Awareness and knowledge about HPV infection and HPV vaccination among women undergoing cytology and colposcopy in Serbian cervical cancer counseling center

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## Summary

**Purpose:** Understanding target groups' awareness and knowledge regarding the human papillomavirus (HPV) and the HPV vaccine is essential for planning the screening and vaccination programs and attaining adequate vaccination coverage. The aim of this study was to estimate awareness and knowledge about HPV infection and the HPV vaccine and to assess factors associated with HPV awareness, HPV vaccine awareness and high HPV-related knowledge among women undergoing cervical cancer screening in Serbia.

**Methods:** A cross-sectional study was conducted between January and June 2013 at the Obstetrics and Gynecology Clinic "Narodni Front" in Belgrade, Serbia. HPV awareness, HPV vaccine awareness, and HPV-related knowledge of women undergoing cervical cancer screening were estimated by the means of structured, self-administered questionnaire.

**Results:** The median age of respondents was 36.0 years (range 18-65). Of 324 women participating in the study, 196 (60.5%) had heard of HPV while 95 (29.3%) had heard of the HPV vaccine. The median HPV-related knowledge score was 7 (interquartile range 4.8). Type of occupation and having an increasing number of lifetime sexual partners were associated with HPV awareness, while having no children was associated with HPV vaccine awareness. High HPV knowledge score was associated with younger age and type of occupation.

**Conclusions:** Women undergoing cervical cancer screening in Serbia have moderate awareness of HPV infection and low awareness of HPV vaccine. However, it is promising that those who heard of HPV have high knowledge about it.

**Key words:** awareness, human papillomavirus, knowledge, vaccine, cervical cancer

## Introduction

Human papillomavirus (HPV), especially types 16 and 18, is associated with almost all cases of cervical cancer, and less than 1% of cases of the disease are considered non-HPV related [1]. Comprehensive cancer prevention involves health education, vaccination of girls before first sexual intercourse, screening women for precancerous lesions and treatment before progression to invasive disease [2].

The organization of effective preventive measures, aimed at reduction of HPV transmission, is very important for public health professionals in Serbia, as it is one of the countries with the highest incidence and the highest mortality of this disease in Europe [3]. Studies so far have shown that uptake of HPV vaccination is associated with the knowledge on the virus and on the vaccine, the cost

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of vaccination and the perceived susceptibility to cervical cancer [4,5].

Insufficient knowledge about HPV, followed by negative public perception regarding the immunization against HPV, is the main reason for low coverage of the vaccination in countries of Central and Eastern Europe and Central Asia, despite that at least one vaccine type was registered, and vaccination program organized to some level [6]. The educational material and messages about HPV infection and its prevention are available to the general population or target groups to a small extent, despite the fact that Serbia is one of the countries that would benefit most from the HPV vaccination due to the high incidence of cervical carcinoma [7].

No systematic, organized screening has been implemented in practice, or vaccination programs have been established in Serbia so far. The National Organized Screening program for early detection of cervical cancer in Serbia has officially been developed and established in 2013, in accordance with the last Regulation [8]. According to this program, women aged 25-65 years should be invited to undergo initial screening at primary health care centers, which involves two cervical smears (PAP) tests in a 6-month interval and if both are negative women continue to participate in regular gynecologic check-ups in 3-year intervals. Women with cytology showing atypical and dyskaryotic squamous cells (PAP test III-V) at primary care gynecological examination are referred (in equal number) to one of two tertiary care gynecological University centers for repeated cytology and colposcopy and further management depending on its result. However, this program has not been fully implemented in practice, giving rise to the opportunistic cervical cancer screening.

Referral to cytology and colposcopy within this type of screening leads to increased pre-procedural anxiety, as we previously have shown [9]. We have also demonstrated that this anxiety is substantially facilitated by women' low level of awareness and knowledge about HPV [10]. Understanding target groups' awareness and knowledge regarding the HPV and the HPV vaccine is essential for planning the screening and vaccination programs, as well as for tailoring educational interventions which should precede these important practices. Before the HPV vaccine is officially offered to the population and mass screening program fully implemented in Serbia, it is important to assess the level of HPV and HPV vaccine-related awareness and knowledge.

Therefore, we aimed at: (a) to estimate the awareness of HPV and HPV vaccine; (b) to determine the level of knowledge about HPV; and (c) to

assess factors associated with HPV and HPV vaccine awareness and high HPV-related knowledge among women undergoing opportunistic cervical cancer screening in Serbia.

## Methods

### *Study design and participants*

A questionnaire-based cross-sectional study was conducted between January and June 2013 at the Department for cervical cancer counseling of the Obstetrics and Gynaecology Clinic "Narodni Front" in Belgrade, Serbia. This clinic is the largest referral and teaching gynecological hospital in Serbia which serves the entire population of Serbia and provides ambulatory gynecological services to 120,000 women annually and several hundreds of women per day.

All women referred to cervical cancer counseling department at our hospital were on screened admission for eligibility to participate in the study by direct approach of the attending gynecology specialist. Eligibility criteria were age 18-65 years, positive PAP smear test obtained at the primary care level, first referral to cervical cancer screening and negative history of genital warts. The exclusion criteria were pregnancy, invasive cervical carcinoma, and status post-hysterectomy.

A total of 583 women were referred to our hospital due to PAP test III-V obtained at primary care examination. Of these, 285 women were not eligible due to: age younger than 25 and older than 65 years ( $n=66$ ), positive history of genital warts ( $n=196$ ), were not referred to cervical cancer screening for the first time ( $n=17$ ), pregnancy ( $n=4$ ), invasive carcinoma ( $n=1$ ) and status post-hysterectomy ( $n=1$ ). However, 43 adult women who were not invited by official screening program since they were younger than 25 years, were included since they were referred to our hospital for PAP test III-V at primary care examination. This led to 341 eligible women (eligibility rate  $341/583 = 58.5\%$ ) who were asked to participate in the study and to whom the questionnaire was administered. Out of these, 324 women accepted to participate and returned the completed questionnaires (response rate 95%). The overall participation rate was 55.6% ( $324/583$ ). None of the women have received HPV vaccination in the past.

### *Questionnaires*

HPV awareness, HPV vaccine awareness, and HPV-related knowledge were estimated by means of structured, 25-item interviewer-initiated self-administered questionnaire, which consisted of four parts. The first part comprised the data on demographic characteristics (age, birthplace, residence, marital status, and employment) and gynaecological and obstetric history (age at menarche and first sexual intercourse, number of deliveries, abortions and children and number of sexual partners in the lifetime and in last three months). The second part of the questionnaire assessed HPV awareness and HPV vaccine awareness with the two questions: "Have you ever heard of Human papilloma Virus?"

and “Have you ever heard of the vaccine against Human papilloma Virus?”. Both answers were coded as 1 = yes, 0 = no. Women who answered “yes” to these questions were considered as HPV-aware and HPV-vaccine aware, respectively. The third part of the questionnaire, which purpose was the assessment of HPV knowledge level, was filled only by HPV-aware women i.e., those who previously answered “yes” to the question regarding the HPV awareness. This part comprised 10 questions regarding the HPV transmission, relation of HPV with genital warts and cervical carcinoma, symptoms, risk factors and prevention. HPV knowledge composite score was consequently calculated for each HPV-aware participant. The true response was coded as correct and participants received 1 point, while false/don't know the response was coded as incorrect (0 point). High HPV knowledge was considered if seven or more correct answers were obtained, based on the median knowledge score of HPV aware participants.

HPV knowledge scale in our sample showed excellent overall internal consistency (Cronbach's  $\alpha = 0.896$ ) with an individual item alpha range 0.880-0.900.

#### Statistics

Internal consistency and reliability of the HPV knowledge scale and individual items were assessed by determining its Cronbach  $\alpha$  coefficient. Descriptive statistics were used to analyze patients' socio-demographic characteristics and distribution of HPV knowledge items. The distribution of continuous variables (age and HPV knowledge score) was evaluated by the Kolmogorov-Smirnov test. Differences in knowledge scores between the categories of patients' characteristics were assessed using Student's T-test or Mann-Whitney U test. In case of more than two categories, one-way ANOVA or Kruskal-Wallis test were applied. Differences in categorical variables between groups were analyzed using Pearson's chi-squared test or Fisher's exact test. Three

separate logistic regression analyses were performed to determine factors associated with HPV awareness, HPV vaccine awareness, and high HPV knowledge. Variables that were significantly associated with these outcomes at the significance level  $<0.1$  in univariate logistic regression analysis were entered into the multivariable logistic regression model and a backward stepwise logistic regression was performed. Models were adjusted for age and previous PAP-smear result. Odds ratios (OR) with 95% confidence intervals (CI) were computed and the Hosmer-Lemeshow goodness-of-fit test was performed to assess the overall model fit. All statistical tests were two-sided and were performed at a 5% significance level. The statistical analysis was performed using SPSS version 20.0 software (SPSS Inc., Chicago, IL, USA).

## Results

The median age of respondents was 36.0 years (range 18-65) and young adult (age 18-35) and middle-aged adult women (36-55) were almost equally represented (46.4% and 43.2%, respectively). The majority of women (53.7%) had completed the secondary school (9-12 years of schooling), while almost a third of them had a university degree (37.6%). Most women were married or cohabitating (61.6%) and were born (96.9%) and resided (94.0%) in urban areas. A “working woman” was the most represented occupation among the respondents (44.3%), followed by community-related and social service occupations (26.1%).

Out of 324 women participating in the study, 196 (60.5%) reported that they had heard of HPV, i.e., they were classified as HPV-aware, and 95 (29.3%) had heard of the HPV vaccine and they were classified as HPV vaccine-aware.

**Table 1.** Knowledge about HPV infection in women aware of HPV (n=196)

HPV knowledge item (correct answer)	Yes n (%)	No n (%)	I don't know
Is there more than one type of human papilloma virus? (yes)	139 (70.9)	4 (2.0)	53 (27.0)
Can HPV be transmitted by sexual contact? (yes)	156 (79.6)	2 (1.0)	38 (19.4)
Can HPV cause genital warts? (yes)	145 (74.0)	3 (1.5)	48 (24.5)
Can HPV cause cervical carcinoma? (yes)	152 (77.6)	2 (1.0)	42 (21.4)
Can HPV cause infection in men? (yes)	137 (69.9)	7 (3.6)	52 (26.5)
Can person infected by HPV have no symptoms? (yes)	131 (66.8)	10 (5.1)	55 (28.1)
Can infections caused by HPV be cured spontaneously? (yes)	87 (44.4)	54 (27.6)	55 (28.1)
Does number of sexual partners affect occurrence of HPV infection? (yes)	130 (66.3)	14 (7.1)	52 (26.5)
Are infections caused by HPV more frequent in women aged 20-30 years? (yes)	119 (60.7)	11 (5.6)	66 (33.7)
Can condoms prevent occurrence of infection caused by HPV? (no)	149 (76.0)	16 (8.2)	31 (15.8)
<i>Summary of knowledge score distribution</i>			
Mean knowledge score $\pm$ SD	6.2 $\pm$ 3.1		
Median (IQR) knowledge score	7.0 (4.8)		

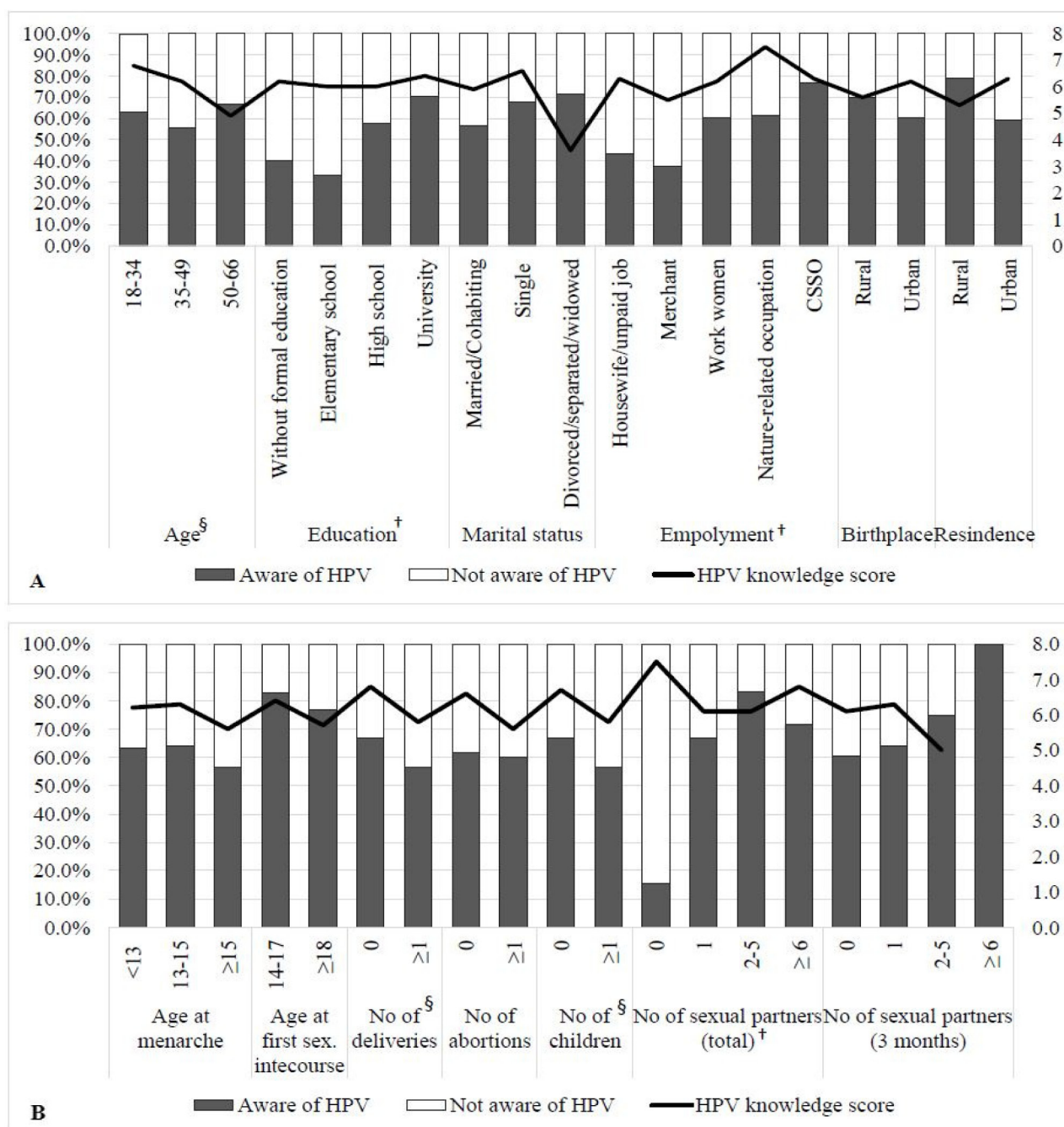
HPV: Human papilloma virus, IQR: Interquartile range



Ten questions that were used to assess the level of HPV knowledge are presented in Table 1. Among those who had heard of HPV, the majority of them (79.6%) knew that HPV can be transmitted by sexual contact. Most of them were also aware of the association between HPV and genital warts (74.0%) and cervical carcinoma (77.6%). A large number of women knew that HPV can cause infection in men (69.9%) and that HPV infection can have no symptoms (66.8%). Slightly fewer women knew that HPV can be cured spontaneously

(44.4%), however more than half of them knew that the number of sexual partners is associated with the risk of HPV infection (66.3%) and that HPV is more frequent in younger women (60.7%). Only 8.2% of women answered correctly that condoms cannot prevent HPV infection. The mean HPV knowledge score was  $6.2 \pm 3.1$  and median (IQR) was 7.0 (4.8).

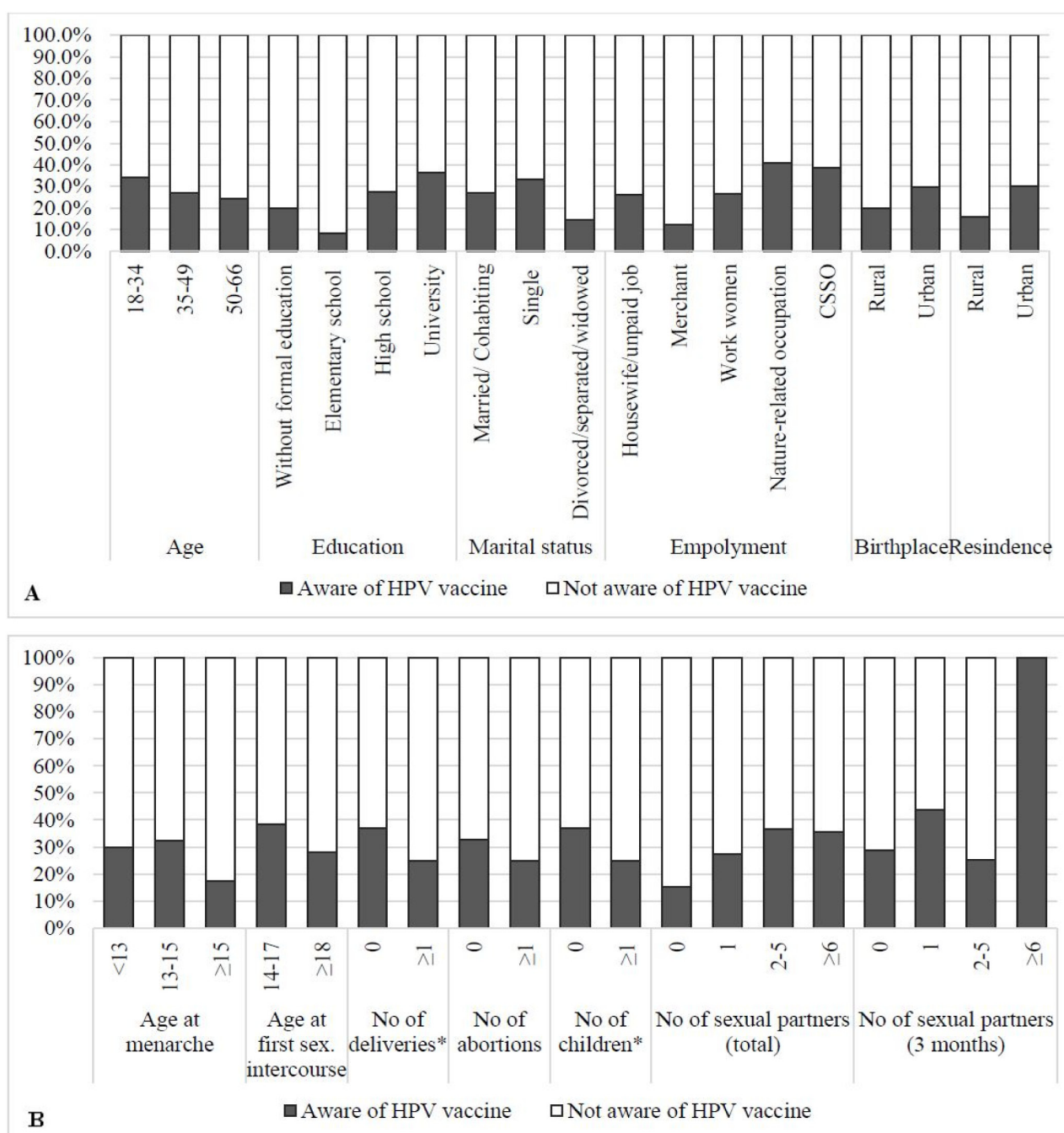
Women who heard of HPV had higher education ( $p=0.008$ ), were mostly employed as working women or had community and social service oc-



**Figure 1.** HPV awareness and HPV knowledge score according to (A) patient characteristics and (B) patient with obstetrics and gynaecological history. CSSO, Community and Social Service Occupation. <sup>†</sup>Significant difference for HPV awareness; <sup>§</sup>Significant difference for HPV knowledge score.

cupation ( $p=0.006$ ) and had more lifetime sexual partners ( $p<0.001$ ) compared to women who had not heard of HPV (Figure 1). Considering HPV-related knowledge, women with higher knowledge score were significantly younger ( $p=0.002$ ) and had no abortions ( $p=0.006$ ), no deliveries ( $p=0.019$ ) or children ( $p=0.023$ ) (Figure 1). Higher percentage of women who had heard of the HPV vaccine had no delivery ( $p=0.022$ ) and no children ( $p=0.024$ ) with respect to women who had never heard of HPV (Figure 2).

The results of multivariate logistic regression with adjusted odds ratios and 95% CI are presented in Table 2. Housewives and women with unpaid jobs (OR 0.21, 95%CI 0.06-0.80;  $p=0.021$ ), as well as merchants (OR 0.21, 95%CI 0.05-0.90;  $p=0.034$ ), had less chance to hear of HPV compared to women with the community-related occupation. Among all categories of the number of total lifetime sexual partners, having a 2-5 lifetime sexual partners was associated with the highest odds of having heard of HPV (OR 24.94, 95%CI 4.60-135.17;  $p<0.001$ ). Of all



**Figure 2.** HPV vaccine awareness according to (A) patient characteristics and (B) patient gynaecological and obstetric history. CCSO, Community and Social Service Occupation. \*Significant difference for HPV vaccine awareness.

**Table 2.** Multivariate logistic regression of predictors of HPV awareness, HPV vaccine awareness and high HPV knowledge

Predictor variable	HPV aware		HPV vaccine aware		High HPV knowledge score	
	(n=324)		(n=324)		(n=196)	
	OR (95%CI)	p value*	OR (95%CI)	p value*	OR (95%CI)	p value†
Age (years)						
18-34	-	-	-	-	3.9 (1.38-11.11)	0.011
35-49	-	-	-	-	2.03 (0.70-5.84)	0.191
50-66	-	-	-	-	ref	
Occupation						
Housewife/unpaid job/student	0.21 (0.06-0.80)	0.021	-	-	0.44 (0.15-1.28)	0.131
Merchant	0.21 (0.05-0.90)	0.034	-	-	0.19 (0.40-0.97)	0.046
Working women	0.65 (0.26-1.62)	0.353	-	-	0.79 (0.43-1.47)	0.461
Nature-related occupation	0.80 (0.23-2.83)	0.730	-	-	1.15 (0.52-2.53)	0.735
Community-related occupation	ref		-	-	ref	
Number of children						
0	-	-	1.76 (1.05-2.96)	0.033	-	-
≥1	-	-	ref		-	-
Number of sexual partners (total)						
0	ref		-	-	-	-
1	8.99 (1.71-47.32)	0.010	-	-	-	-
2-5	24.94 (4.60-135.17)	<0.001	-	-	-	-
≥6	8.33 (1.13-61.47)	0.038	-	-	-	-

\*adjusted for age and results of previous cytology; †adjusted for results of previous cytology

variables, having no children was associated with a higher chance of HPV vaccine awareness (OR 1.76, 95%CI 1.05-2.96;  $p=0.033$ ). Considering HPV-related knowledge, younger age (OR 3.9, 95%CI 1.38-11.11;  $p=0.011$ ) was associated with higher odds with having high HPV knowledge score, while being merchant (OR 0.19, 95%CI 0.40-0.97;  $p=0.046$ ) was associated with the lower chance of having high HPV knowledge score.

## Discussion

Understanding women's knowledge of HPV and HPV vaccine is of great importance not only for effective planning and implementation of screening and vaccination programs but also for attaining adequate vaccination coverage, especially in low-income societies. To the best of our knowledge, the present study is the first in South-Eastern Europe to examine HPV-related awareness and knowledge among women, who have already undergone the HPV screening, and as such allows more insight into women's perception of HPV as an important cause for the development of cervical cancer.

In this cross-sectional study, more than half of the women have heard of HPV (60.5%). Considering general population, the observed awareness

level of Serbian women is higher than awareness of women from Singapore (20%) [11], Taiwan (26.6%) [12], United Arab Emirates (29%) [13] and Brazil (40%) [14], while it is much lower than those reported in USA (97%) [15]. However, HPV-related knowledge rate in our study is similar to the rate from the neighboring Romania (62.3%) [16], which is not surprising since Serbia and Romania are the countries where cervical cancer is one of the most frequent carcinomas in women, unlike other South Eastern European countries where the breast and colorectal cancer are the most common [17]. However, unexpected was the fact that the awareness rate that we observed is similar to the percentages of HPV aware women of the general population in some developed countries which have already introduced vaccine programs in previous years along with educational campaigns (US, UK, Australia) [18-20]. This rate is slightly lower than Scandinavian countries and Japanese young women (67.5%) [21] after vaccine implementation (71.8%) [22].

In addition to high HPV awareness in our study, the participants also showed a high level of knowledge on HPV infection. Namely, the median knowledge score was 7 out of 10, but only a few of them knew that the use of preservative could not



prevent HPV infection. This HPV knowledge score is higher than in several studies in Japan, Argentina, US, UK and Australia [18,22,23]. Although we did not assess the participants' source of information, we assume this high percentage of awareness and high knowledge score about HPV could be the result of the specificity of the organization of the health care system in Serbia. Namely, patients' primary care gynecological examination was provided by the gynecology specialist at the primary health centre, who is responsible for providing the basic information to them. Besides that, women had enough time for acquiring additional information about HPV due to a period of approximately 7 to 10 days between the examination in the primary health center and the consequent one in our hospital.

In our study, only one quarter of women (23%) had heard of HPV vaccine which is substantially less than the rates reported in gynecology patients (65%) [24], women living with HIV (38%) [25] and general population in USA [26], as well as in Sudan (39.2%) [27] and Romania (62.3%) [16]. Such a low awareness about HPV vaccine can be partially explained by the unavailability of relevant information, either through the lack of official educational and promoting materials, but also as a reflexion of knowledge and attitudes of Serbian medical practitioners toward HPV vaccination. In the recent studies in Serbia, two-thirds of gynecologists and pediatricians were willing to recommend the vaccine and this willingness depended on parents' attitudes, frequent changes in recommendations, concerns that the vaccine would decrease preservative usage and attitudes toward boys' vaccination [28,29]. Moreover, having received pediatrician's recommendation for HPV vaccination was independently associated with positive attitude towards HPV vaccination among parents of children in Serbia [30]. Interestingly, not having children was the only factor associated with vaccine awareness in our study even after adjustment for age and severity of Pap-test cervical changes. Similar results were reported in few previous studies; never being pregnant or having two or fewer children were factors associated with HPV awareness and vaccination in Norway and Midwestern countries, respectively [24,31].

As it is already mentioned, this is the first study in Serbia to assess awareness and knowledge of HPV and HPV vaccine among women undergoing opportunistic cervical cancer screening. However, the generalizability of results is limited due to possible selection bias i.e., recruitment of women from only one gynecological hospital. Although it is the closest estimate of the general female population

in Serbia so far, it is likely to be an overestimation of the HPV and HPV vaccine awareness and knowledge of the women in the general population, since only women who care enough for their gynecological health present themselves at regular gynecology check-ups and subject to referral to our hospital. The lack of use of a standard instrument for data collection could have resulted in misclassification of information and/or lack of comparability of results to those of prior studies that have used standard instruments. Lastly, the cross-sectional design of our study did not allow us to make a final causality conclusion. However, important strengths of the study are that there were no unanswered questions which refer to HPV and vaccine awareness and knowledge. Such a high response rate and completeness of the questionnaires were possible due to the fact that the patients were filling in the questionnaires in the presence of gynecology specialist who supervised the whole process and encouraged them to answer all the questions. Further, all participants were interviewed under equal conditions, by the personally-approached interviewer-initiated and assisted type of survey, the design that combines interviewer-administered and self-administered data collection methodologies with all their advantages [32].

This study showed that women undergoing cervical cancer screening in Serbia have moderate awareness of HPV and low awareness of HPV vaccine. However, those women who heard of HPV have high knowledge about it. These results are promising, given that women who are HPV-aware are willing to learn about the virus and the virus-related risk factors. It also stresses the necessity for the implementation of public health and medical education programs regarding the HPV vaccination.

## Ethical considerations

All participants provided written informed consent to participate in the study. The study was approved by the Ethical Review Board at Belgrade University in Serbia.

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## Conflict of interests

The authors declare no conflict of interests.

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