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Original Research

Human Papillomavirus Knowledge and Cervical Cancer Screening Practice among Uzbekistan Women

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Abstract

Background: Data on the knowledge of the general population of Uzbekistan regarding human papillomavirus (HPV) infection and cervical cancer screening practices are limited. This study aimed to assess the association between the knowledge and practice of cervical cancer screening among women in Uzbekistan. **Methods**: A baseline survey was conducted with 445 women aged 20–59 years who visited one of the three health centres of Tashkent, Uzbekistan, in December 2020. A questionnaire on the knowledge of HPV infection and cervical cancer screening practices was administered. The knowledge score, defined as the sum of the number of correct answers to the knowledge questions and the prevalence of cervical cancer screening practices, was analysed. The adjusted relative risk (RR) and low knowledge score (<median) of (1) never screened and (2) not screened within 2 years for each demographic characteristic were calculated. **Results**: The median knowledge score was 10. Women who had been screened for cervical cancer accounted for 63.1% of the patients. Among them, 64.8% reported that their last cervical cancer screening test was within 2 years. A history of sexually transmitted diseases was associated with a lower risk of never being screened (adjusted RR = 0.43, 95% confidence interval [CI] 0.24, 0.78) and no screening within 2 years (0.54, 95% CI 0.30, 0.99). No university graduation was associated with a higher risk of not screening within 2 years (1.57, 95% CI 1.00, 2.47). Association between knowledge of HPV status and screening practices was not observed. **Conclusions**: Adequate knowledge of HPV and cervical cancer prevention may be insufficient for cervical cancer screening practices. This study provides context for the development of effective cervical cancer prevention strategies.

Keywords: cervical cancer; human papillomavirus; Uzbekistan

1. Introduction

Cervical cancer is one of the most common cancers worldwide and is a major cause of cancer-related deaths in women, with 604,127 cases and 341,831 deaths reported in 2020 [1]. It is the fourth most common cancer after breast (2.1 million cases), colorectal (0.8 million), and lung (0.7 million) cancer [2]. Notably, >85% of women with cervical cancer are young, less educated, and living in low-income countries, making it a chronic disease characterised by remarkable inequality. The World Health Organization (WHO) has reported that the incidence rate of cervical cancer in low- and middle-income countries is almost twice that in high-income countries, and the mortality rate is three times higher [3].

The primary causative factor for cervical dysplasia and cancer is the persistence of high-risk human papillomavirus (hrHPV) infection [4,5]. Secondary prevention with cervical cancer screening through cervical cytology and/or human papillomavirus (HPV) testing has been proven to be effective, depending on its coverage among the general population. Moreover, more than 44 million women will be diagnosed with cervical cancer in the next 50 years if effective prevention programs are not implemented in low- to middle-income countries [6]. However, despite the high disease burden in these countries, screening coverage is inadequate [7,8]. In essence, it is crucial to integrate a regular cervical cancer screening program into an established healthcare system that considers women's barriers to access.

In Uzbekistan, cervical cancer is the second most common cancer among women, with a reported incidence of 11.3/100,000 in 2020 [9]. The population of Uzbekistan women aged ≥15 years who are at risk of HPV infection is approximately 11.9 million [9]. This is comparable to a 2009 study of 3000 women showing an hrHPV infection rate of 26.9%, and according to the study's estimates for 2018, 1608 women were newly diagnosed with cervical cancer [10]. Furthermore, 1103 cervical cancer deaths occur annually in Uzbekistan, and cervical cancer is the third leading cause of cancer-related deaths in Uzbekistan for women aged 15–44 years [9]. Despite the high burden of

cervical cancer, data on the knowledge of the general population of Uzbekistan regarding HPV infection and cervical cancer screening practices are limited. This study aimed to assess HPV knowledge and cervical cancer-screening practices among women residing in Tashkent, Uzbekistan.

2. Methods

2.1 Study Population

Assuming a 70% prevalence rate for awareness of regular cervical cancer screening, the minimum required sample size was 440 women, including a 10% expected incomplete response rate. A survey of 445 women aged 20–59 years was conducted between 10 and 22 December 2020. The gynaecologists of three participating organisations (Tashkent Central Polyclinic, Yunusabad Central Policlinic, and Chilanzar Central Polyclinic) administered the questionnaires to women who visited the clinic for purposes other than cervical cancer screening after they provided informed consent. Those who were previously diagnosed with cervical cancer, had undergone hysterectomy, were younger than 20 or older than 59 years, and did not provide informed consent to participate were excluded from the study.

2.2 Questionnaires

The survey questionnaire comprised 11 questions on demographic information, 14 questions on participants' knowledge of HPV infection, and five questions on their cervical cancer screening practices. This questionnaire was adapted from a cervical cancer awareness questionnaire developed in a Russian study to evaluate the knowledge and awareness of women regarding this topic [11,12]. Categories to assess individual cervical cancer screening practices were developed using the WHO STEPwise approach to non-communicable disease risk factor surveillance (STEPS) [13]. Two local public health experts translated the English questionnaire into Uzbek, and the translated questionnaire was reviewed by two physicians in Uzbekistan. After several rounds of the pilot test, each question was revised to maximise socio-cultural acceptance among women in Uzbekistan.

2.3 Statistical Analysis

Regarding patient characteristics, age was categorised into four groups (20s, 30s, 40s, and 50s). Education was categorised into two groups (university graduation or higher and university education or lower). Marital status was categorised into three groups (married, cohabiting, and single [divorced or widowed]). Parity was classified as 0, 1, or 2, and current smoking was classified as either yes or no. Age at first sexual intercourse was included as a continuous variable (years), and the number of lifetime sexual partners was recorded as a binary variable (<3 and ≥ 3). History of sexually transmitted disease (STD) and contraceptive use (condoms, combined oral contraceptive pills, intrauterine devices, or none) were measured as categorical variables. Furthermore, a total score for the knowledge questions, which corresponded to the total number of correct responses for each participant, was created. For analytical convenience, the total score for knowledge of HPV infection and cervical cancer was dichotomised into two categories based on the median score. To identify the risk factors for inadequate cervical cancer screening, women who had never been screened and had not undergone cervical cancer screening within 2 years were identified.

After collecting the survey data, a three-step analysis was performed to describe and analyse the level of knowledge and cervical cancer screening practices. First, a descriptive analysis of participant characteristics was conducted. Second, to assess screening practices according to the level of participants' knowledge of HPV and cervical cancer, the median knowledge score was compared using the Wilcoxon signed-rank test. Finally, through sensitivity analysis using multiple regression analyses, the adjusted relative risk (RR) for inappropriate cervical cancer screening (never screened and no cervical cancer screening within 2 years) was calculated. In the sensitivity analysis, the adjusted RR for inappropriate cervical cancer screening was restricted to women who responded that they had heard of HPV before. All statistical analyses were performed using R version 4.0.2 program (R Development Core Team, Vienna, Austria).

3. Results

The median age of the study participants was 38 years. Most women were married and multiparous and had secondary or lower educational levels (Table 1). The median age at initial sexual intercourse was 21 years, and 96.8% of the women had 1–3 sexual partners during their lifetime. Abortion and miscarriage were reported in 35.7% and 17.3% of the cases, respectively. Less than 10% of women were current smokers, 38% did not use contraceptive methods, and among those who used contraceptives, the intrauterine device (29.9%) was the most common method. Moreover, 18% of the women had a history of STDs.

The median score of the knowledge survey was 10 for 13 questions (range, 2–13). In the knowledge questionnaire, 32.6% of the participants answered correctly regarding HPV clearance ("HPV can clear up on their own if left untreated") (Table 2). The proportion of correct answers was $<50\%$ for statements on the categories of HPV vaccination and cervical cancer development ("Someone who has received the HPV vaccination cannot develop cervical cancer") (Table 2). Regarding above two statements, most of the women who answered wrong for these two questions were 30–39 years old, married, have a secondary education, have 2–3 children and about 60 percent of the women who wrongly answered had ever been tested for cervical cancer screening (**Supplementary Table 1**).

The proportion of women who had been screened for

Table 1. Characteristics of the female participants visiting the three clinics of Tashkent, Uzbekistan (n = 445).

Variables	Frequency (percentage)
Age (years, median)	38
20–29	19 (4.3%)
30–39	226 (50.8%)
40–49	140 (31.5%)
50–59	60 (13.5%)
Education	
Secondary education	263 (59.1%)
University graduation or higher	182 (40.9%)
Marital status	
Married	387 (87.0%)
Cohabiting	41 (9.2%)
Single	17 (3.8%)
Age at sexual debut (years, median)	21
Number of lifetime sexual partners[a]	
1–3	431 (97.5%)
>3	11 (2.5%)
Parity	
Nulliparous	31 (7.0%)
1	71 (16.0%)
2	151 (33.9%)
3	138 (31.0%)
≥ 4	54 (12.1%)
History of pregnancy wastage	
Abortion	159 (35.7%)
Miscarriage	77 (17.3%)
No history of pregnancy wastage	235 (52.8%)
Current smoking	39 (8.8%)
Contraceptive method[b]	
Hormonal contraceptive pills	49 (11.0%)
Condom	58 (13.0%)
Intrauterine device	133 (29.9%)
None	169 (38.0%)
Ever had STD	79 (17.7%)

STD, sexually transmitted disease. [a]0.6% (n = 3) of women did not report their number of lifetime sexual partners. [b]7% (n = 31) of women did not report their contraceptive method. Column sum may not equal to the total number due to missingness.

cervical cancer was 63.1%. Of these, 64.8% reported that their last cervical cancer screening test was within 2 years. Upon stratifying the knowledge score based on participants' responses to the practice questions, the median score was higher for women who had been tested for cervical cancer ("ever tested for cervical cancer") than for those who had never been tested (10 *vs* 9, $p < 0.001$, Table 3). Furthermore, among those who had been tested, women who were screened within 2 years showed higher scores than those who were not screened ($p < 0.001$). The median scores showed no significant differences based on the last Pap smear result, follow-up visit, or treatment. While 66 of the women did not get the test results, 105 responded that they made follow-up visits due to their test results.

In the analysis of the multivariable models for women who were never screened for cervical cancer, the association between the participant's age and cervical cancer screening practices was not evident (Table 4). Although the risk of not screening within the last 2 years was generally higher among women aged $\geq$30 years, statistical significance was not reached. Notably, secondary education had a higher risk of not screening within 2 years among the participants (adjusted RR = 1.57, 95% confidence interval [CI] 1.00, 2.47), and a history of STD was consistently associated with a lower risk of never being screened (0.43, 95% CI 0.24, 0.78) and not screening within 2 years (0.54, 95% CI 0.30, 0.99). Associations with marital status, age at initial sexual intercourse, number of lifetime sexual partners, parity, current smoking status, and knowledge score higher than the median were all close to null. When restricting the 350 respondents who responded that they had heard about HPV before, for sensitivity analysis, the risk factors for inappropriate screening were the same as those in the total study population. However, a history of STD did not show association with no screening within 2 years, which was different from the results of the multivariable analysis of the total population (data not shown).

4. Discussion

This study demonstrated that Uzbekistan women who visited the three participating polyclinics in Tashkent had substantial knowledge of HPV and cervical cancer prevention. Compared to university graduation, secondary education was associated with a higher risk of lower knowledge scores in this survey. Those who had been tested and screened for cervical cancer within the last 2 years showed higher knowledge scores than their counterparts, confirming the positive association between knowledge and cervical cancer screening performance. Among the known risk factors for cervical cancer, a history of STD is associated with a lower risk of never being screened before. A lower probability of no screening within 2 years was observed among women who graduated from university. Given that there are no national guidelines or cervical cancer screening programs in Uzbekistan, our findings can be applied to many countries where a universal screening program does not exist.

The median knowledge score of this study population was comparable to that of a previous study conducted in Arkhangelsk, northwest Russia [12]. As this study included women who voluntarily visited gynaecology clinics and resided in Tashkent, Uzbekistan, those residing in rural areas may have shown lower levels of knowledge. Similar to the previous survey about knowledge of HPV and cervical cancer prevention among women in Arkhangelsk, Northwest Russia, education, parity, and age of initial sexual intercourse were associated with the level of knowledge. However, in this study, parity and age at initial sexual inter-

Table 2. Knowledge questionnaire comprising 13 questions on human papillomavirus (HPV), cervical cancer, and its prevention among female participants visiting the three clinics of Tashkent, Uzbekistan (n = 445).

Questionnaire items	Correct or knowledgeable answer	Number (%) of women who answered correctly
1. Have you ever heard of HPV?	Yes	350 (78.6%)
2. HPV is very common in women.	True	329 (73.9%)
3. HPV can be transmitted during vaginal sexual intercourse.	True	327 (73.5%)
4. The chance of contracting HPV infections increases with number of sexual partners.	True	371 (83.4%)
5. HPV is a known risk factor for the development of cervical cancer.	True	384 (86.3%)
6. Most HPV types can be cleared up on their own if left untreated.	True	145 (32.6%)
7. A person usually does not have symptoms when infected with HPV.	True	241 (54.2%)
8. Most sexually active women will never contract an HPV infection during their life.	False	268 (60.2%)
9. Cytological smear (Pap test) can detect changes that can lead to cancer if left untreated.	True	378 (84.9%)
10. HPV vaccine can prevent cervical cancer.	True	347 (78.0%)
11. HPV vaccine is most effective when administered before the first sexual intercourse.	True	355 (79.8%)
12. Someone who has received the HPV vaccination cannot develop cervical cancer.	False	188 (42.2%)
13. Women who have received the HPV vaccination do not need a Pap test later in their life.	False	277 (62.2%)

Table 3. Associations between knowledge of HPV, cervical cancer prevention, and screening practice in female participants visiting the three clinics of Tashkent, Uzbekistan (n = 445).

Answers to five practice items		Frequency (percentage)	Median score (Q1–Q3)	p for difference
Ever tested for cervical cancer (n = 445)	Yes	281 (63.1%)	10 (8–11)	<0.001
	No	164 (36.9%)	9 (8–11)	
Last cervical cancer test[a] (n = 281)	Within 2 years	182 (64.8%)	10 (8–10)	<0.001
	≥3 years ago	98 (34.9%)	9 (7–10)	
Result of your last cervical cancer test	Did not receive the result	66 (23.5%)	9 (7–10)	0.759
	Normal/negative	186 (66.2%)	9 (8–10)	
	Abnormal	29 (10.3%)	10 (8–11)	
Any follow-up visits because of your last test result	Yes	105 (37.4%)	10 (8–10)	0.631
	No	176 (62.6%)	9 (7–11)	
Any treatment to your cervix because of your last test result	Yes	101 (35.9%)	9 (8–10)	0.321
	No	180 (64.1%)	9 (8–11)	

[a]restricted to those who answered "Yes" to "ever tested for cervical cancer". One of the responses was missing.

course were not evident at the knowledge level. A positive association between a higher level of knowledge of HPV infection and cervical cancer screening performance, supporting the role of health education in improving screening behaviour, was not observed [13,14]. The primary reasons for not having been tested for cervical cancer were lack of information, no symptoms, and dislike of pelvic examinations among women in several studies [15–17]. Shyness and fear were the major problems associated with inappropriate screening practices in knowledge, attitude, and practice (KAP) studies of women from Yemen and Uganda [16,18]. The proportion of women who did not get results of their screening (23.5%) and were lost to follow-up (37.4%) after their test revealed the problem of women's attitudes toward prevention strategies in our study. The gap between knowledge and performance may be attributed to the generally low public awareness of the burden of cervical cancer. The identification of the source of this difference requires further investigation.

The proportion of women who had been screened for cervical cancer and underwent screening within 2 years was higher in this study population than in previous reports conducted in Uzbekistan. A nationwide STEPS survey conducted in 2014 reported that only 14% of women in Uzbekistan, aged 30–49 years, had ever had a screening test for cervical cancer; this supports the notion of low public awareness of cervical cancer prevention [9]. The rate of screening utilisation was also lower (13.9%) among rural women in the Philippines in a previous cross-sectional community-based survey [19]. However, considering the availability of an affordable cervical screening service in the study area and the high level of knowledge about the disease shown by the responders, this screening rate is relatively lower than those in previous studies [20,21] and the global target of WHO [22]. This may be attributed to a lack of information regarding the prevalence of hrHPV infection in the general population [9]. Age and education level were associated with screening utilisation in the Philip-

Table 4. Adjusted relative risk for women who were never screened or had no cervical cancer screening within the last 2 years.

	Relative risk (95% CI)	
	Never screened (N = 164/455)	No screening within 2 years (N = 98/281[a])
Age (years)		
20–29	1.00 (reference)	1.00 (reference)
30–39	1.10 (0.55, 2.19)	4.09 (0.54, 30.69)
40–49	0.70 (0.33, 1.48)	3.93 (0.52, 29.86)
50–59	0.66 (0.28, 1.58)	5.35 (0.67, 42.86)
Education		
University education	1.00 (reference)	1.00 (reference)
Secondary education	1.03 (0.74, 1.43)	**1.57** (**1.00**, **2.47**)
Marital status		
Single	1.00 (reference)	1.00 (reference)
Married	1.40 (0.79, 2.49)	0.85 (0.48, 1.52)
Number of sexual partners		
1–3	1.00 (reference)	1.00 (reference)
>3	1.50 (0.54, 4.17)	0.58 (0.08, 4.32)
Parity		
1 or 0	1.00 (reference)	1.00 (reference)
≥2 *vs* 1 or 0	0.95 (0.65, 1.38)	1.10 (0.64, 1.89)
Current smoking	1.13 (0.61, 2.09)	1.53 (0.79, 2.96)
Ever had STD	**0.43** (**0.24**, **0.78**)	**0.54** (**0.30**, **0.99**)
Total score for knowledge		
Higher than median (>10)	1.00 (reference)	1.00 (reference)
Median or low (≤10)	1.13 (0.82, 1.55)	1.16 (0.77, 1.74)

STD, sexually transmitted disease. [a]The risk of not screening within 2 years was calculated for 291 women, excluding those who had never been screened. Estimates with a p-value < 0.05 are boldfaced.

pines. Women who were older and more educated were more likely to enrol in screening in many previous studies [19,23]. These findings were confirmed by the present study. In addition to insufficient knowledge, age, education, and low-income levels are also predictors of inappropriate screening practices [23]. Further studies are warranted to investigate the association between income and screening practices.

Low-income families, those with less education, and those without health insurance are also less likely to undergo screening. Early detection is less likely because particular ethnic and racial groups are less likely to be screened. To increase the use of efficient screening procedures, healthcare delivery systems should provide eligible populations with cancer screening services, health care professionals should perform cancer screening as advised, promptly, and competently, and individuals should obtain suggested screening procedures and pursue follow-up. By using health insurance coverage, lowering cost-sharing, and providing free screening at public clinics, screening rates can be improved [24].

We observed some mismatches in the proportion of those who received the screening test results and those who received treatment afterwards. Given that some of the benign common conditions, such as contact bleeding, frequently occur after Pap smear, we believe that many of the treatments as a consequence of the last test result could have been due to benign conditions. Further questions about the specific reason and type of treatment during the follow-up visit will be necessary in future studies.

This study had certain limitations. As the study population was recruited from a hospital setting, the findings may not be applicable to the general population of Uzbekistan. In the hospital setting, the young age group (20–29 years old) who are also sexually active comprised only 4.3% of the study population, which may affect the results of reproductive information such as history of STD and use and type of contraceptive method. However, considering the scarcity of studies on cervical cancer knowledge and screening performance in this population, this study can provide context on the status of women living in the capital city of Tashkent. Second, the use of a self-administered questionnaire might have led to a recall bias among older women. The effect of recall bias could have been mitigated by investigating the most recent screening results. Third, the doctors at the three clinics did not count the number of women who did not meet the eligibility criteria. The lack of such information limits the interpretation of our findings. However, we believe our estimates can be generalised to our target population because most of the women who were eligible and visited one of the three study sites for the 12 days agreed to participate.

5. Conclusions

The findings of this study suggest that adequate knowledge of HPV and cervical cancer prevention may be insufficient for cervical cancer screening practices in a sample of women in Uzbekistan. Furthermore, it would be effective to provide HPV and cervical cancer screening information, mostly for women with less university graduate education. The results of this study provide context for the conception of effective cervical cancer prevention strategies in Uzbekistan.

Availability of Data and Materials

The datasets used during the current study are available from the corresponding author on reasonable request.

Author Contributions

EB—Writing Original draft preparation, Statistical analysis. S-AC—Conceptualization, Methodology, Data curation. BY & MA—Writing Reviewing and Editing. YJY—Supervision, Reviewing and Editing. All authors read and approved the final manuscript.

Ethics Approval and Consent to Participate

The study protocol was reviewed and approved by the Institutional Review Boards of the Ministry of Health of the Republic of Uzbekistan Ethical Committee (approval No. 7/7-1465).

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Conflict of Interest

The authors declare no conflict of interest.

Supplementary Material

Supplementary material associated with this article can be found, in the online version, at https://doi.org/10.31083/j.ceog5001004.

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