Original Article

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Knowledge of Human Papillomavirus Among Students in Health- and Non-health-related Departments of a Private University

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Abstract

Aim: The knowledge of human papillomavirus (HPV) and related diseases plays a vital role in shaping individual perspectives on prevention. This study aimed to evaluate HPV infection and vaccination knowledge among university students based on their fields of study.

Methods: This cross-sectional study was conducted as part of the graduation project of two fifth-year students between April and May 2023 among undergraduate students from different departments at the university. The survey was administered online using Google Forms. Invitations to participate were sent to students via social media. Students' demographic data were collected using a structured form, and the Turkish validated HPV knowledge scale was used to assess their knowledge.

Results: A total of 100 students (mean age, 22.9 years; range, 18-29) completed the online questionnaire. The average score of the participants was 15.40. Students in health-related departments had higher knowledge scores ($p<0.05$). However, despite the relatively high scores, only 5% of the participants had undergone HPV screening, and only 7% had been vaccinated against HPV. Regular sexual activity was the main predictor of the knowledge score.

Conclusion: The average knowledge level of students was relatively high, but uptake of vaccination and screening was low.

Keywords: Human papillomavirus, HPV-knowledge score, HPV vaccination, HPV prevention, sexually transmitted diseases

Introduction

Human papillomavirus (HPV) is the name given to a group of 200 known sexually transmitted deoxyribonucleic acid (DNA) viruses (1). Human papillomavirus is common worldwide and is more prevalent among young adults under 25 years of age in most countries (2). High-risk HPV types are known to cause anogenital cancers, notably cervical cancer, whereas genital warts are generally caused by low-risk HPV types (1). Cervical cancer is the fourth most common cancer among women worldwide. Molecular epidemiological evidence demonstrates that certain types of HPV are the underlying cause of cervical intraepithelial neoplasia and invasive cervical cancer (2,3).

The exact prevalence of HPV in Türkiye is unknown, as reporting cases to the Ministry of Health is not mandatory. According to the most recent data obtained from 4 million women in the Turkish Cervical Cancer Screening Program, which has been ongoing since 2014, HPV DNA positivity was 4.39% as of 2020 (4).

The World Health Organization (WHO) recognizes HPV-related health problems as a global public health concern and recommends HPV vaccination and screening (5). The bivalent and quadrivalent vaccines are the two HPV vaccines approved by the Food and Drug Administration. The HPV vaccine elicits a greater systemic immune response than that induced by infection itself (6). The quadrivalent Gardasil vaccine can

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also be administered to men. Vaccinating both men and women is essential for reducing the risk of transmission (7). The WHO encourages vaccination of girls aged 9-14 years prior to sexual debut to optimize immune response and prevent viral transmission (2). In the long term, HPV vaccination plays a crucial role in the potential elimination of cervical cancer (3).

Significant decreases in the incidence of infection, precancerous lesions, anogenital warts, and cervical cancer lesions have been recorded in countries that have established efficient vaccination programs for adolescent females. In 2018, the WHO issued a circular recommending the global adaptation of vaccination programs to prevent cervical cancer and other HPV-related cancers. The HPV vaccine has been added to the national vaccination schedule of more than 100 countries, including the United States of America and some European countries (5). Given its proven efficacy, cost-effectiveness, and safety, universal HPV vaccination for early-adolescent females and, at minimum, for high-risk males in settings with sufficient resources should be prioritized in global health initiatives (7).

The HPV vaccine has not yet been adopted into the mandatory vaccination program in Türkiye. Awareness of HPV and its preventive measures among young adults who are at higher risk is vital for implementing adequate preventive strategies. The most common public health concerns regarding HPV vaccination in Türkiye, as reported in previous research, include a lack of understanding of vaccine protection, insufficient knowledge of HPV, widespread prejudice, and general attitudes toward health (8). An earlier study revealed that higher understanding of HPV and HPV vaccines was significantly associated with greater willingness to be vaccinated. Vaccine refusal was associated with inadequate knowledge of the vaccine and its potential side effects (9).

We hypothesized that undergraduate students with prior awareness of HPV would have significantly higher HPV knowledge scores compared with those who had not heard of HPV. Additionally, HPV knowledge scores will vary significantly by gender, department, and year of study. Our study aimed to evaluate awareness of HPV infection and vaccination among university students using a recently validated scale and to determine whether students' field of study affected knowledge levels.

Materials and Methods

Compliance with Ethical Standards

Ethical approval for this study was obtained from the Istanbul Medipol University Non-Interventional Clinical Research Ethics Committee (approval no.: 14, date: 05.01.2023). The study was conducted in accordance with the principles outlined in the Declaration of Helsinki.

Study Design and Participants

This cross-sectional study was conducted as part of the graduation project of two fifth-year students between April and May 2023 among undergraduate students from different departments at the university. The survey was administered online using Google Forms. Invitations to participate were sent to students via social media. Participants were required to approve the consent form before proceeding with the questionnaire (Figure 1).

Data Collection Tools

Socio-demographic data and the Turkish-validated HPV-Knowledge Scale (HPV-KS) (10) were integrated into Google Forms. The HPV-KS contains 33 items. Response choices are "True," "False," or "Don't know." One point is awarded for each correct answer, and zero points are awarded for incorrect and "Don't know" responses. A total score, with a maximum of 33, was calculated for each participant. Only participants who answered "YES" to the question "Have you heard of HPV before?" were allowed to continue with the questionnaire; those who answered "NO" scored 0 on the HPV-KS. Socio-demographic data and the summed scale scores were evaluated.

Statistical Analysis

SPSS Version 25.0 was used for statistical analysis. The distribution pattern was assessed using the Kolmogorov-Smirnov test. Normally distributed continuous variables were reported as mean ± standard deviation; non-normally distributed variables were reported as median and interquartile range. Ordinal and nominal data were expressed as n (%). Spearman's correlation analysis was used to assess the relationship between continuous variables. The Mann-Whitney U test was used to evaluate differences in HPV-Knowledge scores between groups. A backward multiple linear regression model was used to identify predictors of the HPV-KS score. A p-value <0.05 was considered statistically significant at the 95% confidence level.

Results

A total of 100 students (median age 23 years, range 18-29) completed the online questionnaire during the one-month study period. Among the participants, 72% were women, 92% were single, and 53% were studying in health-related departments. Demographic data are presented in Table 1. The educational status and occupations of the students' parents were also recorded. Most of the mothers (66%) did not have a university degree, and 70% of them were housewives. While 57% of the fathers had no university degree, 27% were traders.

Based on the responses, 86% of the students reported having heard of HPV, and 91% of them reported knowing about sexually transmitted diseases. Of the participants,

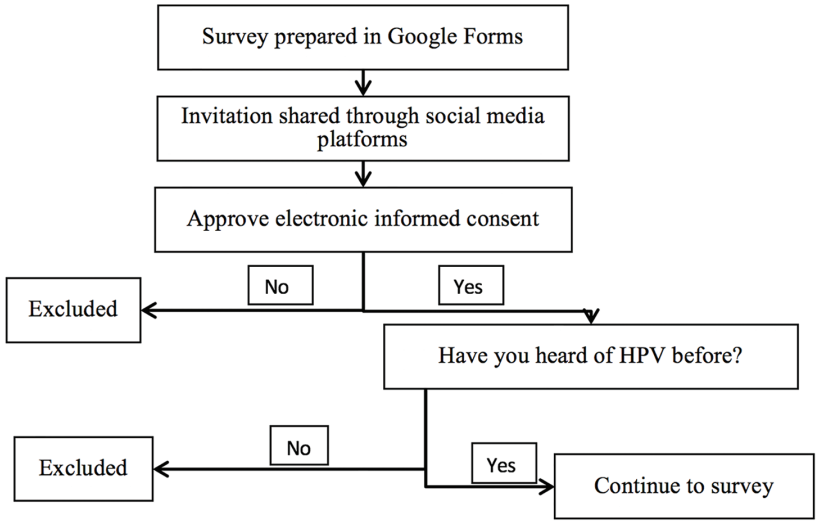

Figure 1. Flowchart of the study

HPV: Human papillomavirus

Table 1. Socio-demographic data of the students			
Demographic data		**Median**	**Min-max**
Age (year)		**23**	**18-29**
		Frequency (n)	**Percentage (%)**
Gender	Female	72	72
	Male	28	28
Marital status	Married	8	8
	Single	92	92
Field of study	Health-related	53	53
	Non-health related	47	47
Year in university	1st year	5	5
	2nd year	7	7
	3rd year	12	12
	4th year	41	41
	5th year	28	28
	6th year	7	7
Parents' socio-demographic data		**Mother (n)**	**Father (n)**
Educational level	No formal education	0	1
	Primary	18	14
	Secondary	48	42
	Under-graduate	30	33
	Post-graduate	4	10
Occupation	Housewife/unemployed	70	8
	Trader	2	27
	Civil servant	14	22
	Worker	7	26
	Retiree	1	15
	Other	6	2

35% reported having had at least one instance of sexual intercourse between the ages of 17 and 27 years, with 25 reporting a regular sex life. Only 5% of the participants had undergone at least one HPV test and only seven of them were vaccinated, four of whom were from non-health departments. Details are given in Table 2. Most of the students who had heard of HPV (p=0.048), had sexual intercourse (p<0.001), and had regular sex lives (p=0.01) were significantly more likely to be from the health-related departments.

When asked about the preferred method of sexually transmitted disease prevention, 16 students reported using condoms, the majority (75%) of whom were from the non-health departments. Only four students, all from health-related departments, stated a preference for vaccination.

The 86 participants who answered yes to "Have you ever heard of HPV?" continued with the HPV-KS. Details of their responses are given in Table 3. The majority (84%) of the participants correctly answered the items "Having many sexual partners increases the risk of getting HPV" and "HPV can be passed on during sexual intercourse," whereas only 3, 4, and 9 students, respectively, correctly answered the items "HPV usually doesn't need any treatment," "The HPV vaccine is licensed for women aged 30-45 years," and "The available HPV vaccines (Gardasil and Cervarix) protect against both genital warts and cervical cancer." The highest score obtained was 30 and the lowest was 0. The median (mean) score for all participants was 17 (15.40); that for students in health-related departments was 20 (18.32), and that for other students was 15 (12.11). Spearman's rho test was used to assess associations between factors and students' scores. Although their scores were correlated with their year of study (r=0.251, p=0.012), there was no correlation with their ages (p=0.208) or with age at first sexual encounter (p=0.382).

Human papillomavirus knowledge level scores were compared between groups using the Mann-Whitney U test (Table 4). There were statistically significant differences between genders (p=0.042) and, in particular, between fields of study (p<0.001). Significant differences by gender and in students' scores were primarily found in five items. Female participants provided significantly more appropriate responses to the items "Having more than one sexual partner increases the risk of HPV transmission," "HPV is very rare," "Girls who have been vaccinated with the HPV vaccine do not need to have a smear test at an advanced age," "HPV vaccines protect against many types of cervical cancer," and "The HPV vaccine should be given in three doses" with counts of 90 versus 69 (p=0.009), 78 versus 55 (p=0.026), 61 versus 28 (p=0.003), 72 versus 38 (p=0.002), and 56 versus 24 (p=0.003), respectively. There was no difference

Table 2. The distribution of participants with previous knowledge and experience regarding sexual health

Questions	Yes		No/don't know	
	n	HPV-KS median (IQR)	n	HPV-KS median (IQR)
Have you heard of HPV before?	86	18 (8)	14	0 (1)
Do you have information about STDs?	91	18 (11)	9	1 (13)
Have you ever had sexual intercourse?	35	16 (13)	65	18 (14)
Do you have a regular sex life	25	19 (8)	75	16 (15)
Have you ever been tested for HPV?	5	21 (6)	95	16 (14)
Have you had an illness related to your genitals?	12	16 (12)	88	17 (14)
Have you received any HPV vaccines?	7	22 (3)	93	16 (15)
What is your approach to preventing sexually transmitted diseases?				
Approach not specified	15			
Use of emergency contraceptive	1			
Having one sex partner	2			
Vaccination	4			
Nothing as I am not sexually active	4			
I pay attention to personal hygiene and cleanliness	7			
Use of condom	16			
Nothing	51			

HPV: Human papillomavirus, STD: Sexually transmitted diseases, IQR: Interquartile range, HPV-KS: Human Papillomavirus Knowledge scale

in students' scores between those who had sexual experience or engaged in regular sexual intercourse and those who had not. The Kruskal-Wallis test revealed no significant differences in students' HPV knowledge scores between parents' educational levels and occupations (p>0.05).

Linear regression analysis was performed to identify potential predictors of the HPV-KS score (Table 5). Numerical variables included in the analysis were students' ages, year of study, and age at first sexual experience. Categorical variables included department (health/non-health), gender, marital status, and parents' education level. Their responses to the questions "Have you heard of HPV before?," "Do you have information about STDs?," "Have you had an illness related to your genitals?," "Do you have a regular sex life?," "Have you ever been tested for HPV?," and "Have you received any HPV vaccines?" were recorded. Only two factors were identified as predictors of HPV-KS: previous knowledge of HPV and regular sexual activity. However, there was no statistically significant difference in HPV-KS between those having regular sexual intercourse and those who were not (p=0.342); the median scores were 19 and 16, respectively.

Table 3. Distribution of appropriate responses among participants based on their field of study

HPV-KS	Students in health-related departments (n=53)	Students in other departments (n=47)	Total	p-value
1. "HPV can cause cervical cancer" (T)	41	25	66	0.011*
2. "A person could have HPV for many years without knowing it" (T)	45	30	75	0.015*
3. "Having many sexual partners increases the risk of getting HPV" (T)	48	36	84	0.057
4. "HPV is very rare" (F)	40	31	71	0.295
5. "HPV can be passed on during sexual intercourse" (T)	47	37	84	0.175
6. "HPV always has visible signs or symptoms" (F)	39	26	65	0.056
7. "Using condoms reduces the risk of getting HPV" (T)	43	33	76	0.202
8. "HPV can cause HIV/AIDS" (F)	15	9	24	0.287
9. "HPV can be passed on by genital skin-to-skin contact" (T)	38	23	61	0.020*
10. "Men cannot get HPV" (F)	45	31	76	0.027*
11. "Having sex at an early age increases the risk of getting HPV" (T)	32	7	39	<0.001**
12. "There are many types of HPV" (T)	39	22	61	0.006*
13. "HPV can cause genital warts" (T)	42	27	69	0.019*
14. "HPV can be cured with antibiotics" (F)	34	13	47	<0.001*
15. "Most sexually active people will get HPV at some point in their lives" (T)	10	7	17	0.597
16. "HPV usually doesn't need any treatment" (T)	3	0	3	0.106
17. "If a woman tests positive for HPV, she will definitely get cervical cancer" (F)	37	22	59	0.020*
18. "An HPV test can be done at the same time as a Pap test" (T)	20	11	31	0.122
19. "An HPV test can tell you how long you have had an HPV infection" (F)	20	6	26	0.004*
20. "HPV testing is used to indicate if the HPV vaccine is needed" (F)	25	13	38	0.045*
21. "When you have an HPV test, you get their results the same day" (F)	15	8	23	0.181
22. "If an HPV test shows that a woman does not have HPV, her risk of cervical cancer is low" (T)	22	10	32	0.030*
23. "Girls who have had an HPV vaccine do not need a Pap test when they are older" (F)	35	16	51	0.001*
24. "One of the HPV vaccines offers protection against genital warts" (T)	28	16	44	0.005*
25. "The HPV vaccines offer protection against all sexually transmitted infections" (F)	33	15	48	0.002*

Table 3. Continued

HPV-KS	Students in health-related departments (n=53)	Students in other departments (n=47)	Total	p-value
26. "Someone who has an HPV vaccine cannot develop cervical cancer" (F)	33	16	49	0.005*
27. "HPV vaccines offer protection against most cervical cancers" (T)	36	26	62	0.195
28. "The HPV vaccine requires three doses" (T)	29	18	47	0.101
29. "The HPV vaccines are most effective if given to people who have never had sex" (T)	17	9	26	0.141
30. "HPV vaccine is recommended for all females aged 11-26 years" (T)	31	20	51	0.112
31. "HPV vaccine is licensed for women aged 30-45 years" (F)	3	1	4	0.368
32. "Both HPV vaccines that are available (Gardasil and Cervarix) protect against both genital warts and cervical cancer" (F)	6	3	9	0.389
33. "HPV vaccine is permitted for males aged 11-26 years" (T)	20	6	26	0.004*
Total HPV-KS, median (IQR)	20 (9)	15 (15)	17 (13)	<0.001**
Total HPV-KS, mean ± SD	18.32±7.35	12.11±8.19	15.40±8.32	<0.001**

Mann-Whitney U test, *p<0.05, **p<0.01
HPV-KS: Human Papillomavirus Knowledge scale, T: True, F: False, HPV: Human papillomavirus, AIDS: Acquired immune deficiency syndrome, SD: Standard deviation, HIV: Human immunodeficiency virus, AIDS: Acquired immune deficiency syndrome, IQR: Interquartile range

Table 4. The difference between median HPV scores according to gender and the field of study

p-value		<0.001*				
	Gender	Health field		Non-health field		p-value
		n=53	HPV-KS median (IQR)	n=47	HPV-KS median (IQR)	
0.042*[b]	Female (n=71)	40 (56%)	21.5	31 (44%)	16	0.002*[a]
	Male (n=29)	13 (45%)	19	16 (55%)	9.5	0.045*[a]
	p-value	0.373[a]		0.093[a]		

*p<0,05
[a]: Mann-Whitney U, [b]: Chi-square, HPV: Human papillomavirus, IQR: Interquartile range, HPV-KS: Human Papillomavirus Knowledge scale

Table 5. Predictive Factors of HPV-KS

	Unstandardized coefficients		Standardized coefficients	t	p-value
	B	Std. Error	Beta		
Factors	-2.552	1.502		-1.699	0.100
Having regular sexual intercourse	4.966	1.363	0.266	3.644	0.001*
Being vaccinated	4.759	2.523	0.137	1.886	0.069
Having previous knowledge of HPV	16.328	1.480	0.803	11.036	<0.001*

Dependent variable: Total HPV-KS

*p<0.05
HPV: Human papillomavirus, HPV-KS: Human Papillomavirus Knowledge scale, Std. Error: Standard error

Discussion

Human papillomavirus is a group of viruses known to cause various diseases in humans, including genital warts and cervical cancer (1). The WHO considers HPV-related health problems a global public health concern and recommends HPV vaccination and screening (5). The most recent data revealed that HPV DNA prevalence among Turkish women in 2020 was 4.39% (4). Awareness and attitudes regarding HPV and prevention strategies among the younger generation are critical for deterring HPV transmission and reducing HPV-related diseases.

In this study, conducted among university students, 100 participants (median age 23 years) completed the online questionnaire during the one-month study period. Most participants were female and unmarried. Our study population is similar to that reported by Ergün (11), which was conducted at the faculty of health sciences. They reported that 71.6% of the students were familiar with HPV, while 93.1% had not been vaccinated. While 86% of our participants had heard of HPV, 93% had not been vaccinated. A similar study involving 144 students (71.5 % female) from health sciences stated that 74.3% of their participants had heard of HPV. They reported higher HPV knowledge among females (12). A study in China, conducted only on male college students, showed HPV-related knowledge to be insufficient, and it negatively affected vaccine recommendations (13). In our study, a notable disparity existed between male and female students; most female participants were enrolled in health-related departments. A more detailed examination reveals that there is no difference between genders within the same field of study. Therefore, the discrepancy is attributable to the field of study. Consistent with our findings, a previous study in Türkiye among younger participants also found no sex-based differences in HPV knowledge.

A recent study in Türkiye reported generally low HPV knowledge scores (mean: 12.16) among students in health sciences (11). We recorded higher scores among students studying in health-related faculties (mean: 18.32). A previous study also reported higher HPV knowledge in nursing students (14). Higher awareness of HPV did not correspond to willingness to receive vaccination or undergo regular screening in their study. Likewise, in our study, only a few students had been vaccinated against or screened for HPV.

A study in 2010 reported a vaccination rate of 0.4% among 717 1st-year college students (15). Studies identified lack of information as the most significant barrier to vaccination (8,9,16). One study reported limited awareness of and knowledge about HPV, its link to cervical cancer, cervical cancer screening through Pap smears, and prevention through vaccination among Turkish female adolescents and young women (16). Our results show an increase in knowledge, but the attitude towards vaccination remains unchanged. A Turkish review reported the lowest and highest rates of HPV vaccination as 0.3% and 6.0%, respectively. However, parents' willingness to vaccinate their daughters with the HPV vaccine ranged from 14.4% to 68.0%, and their willingness to vaccinate their sons ranged from 11% to 62% (17). The overall vaccination rate among the Turkish population is low. Females are more likely than males to be vaccinated. Only one of the seven vaccinated participants in our study group was male. Aksoy et al. (12) reported that 21 participants, 16 of whom were female, had been vaccinated. This suggests that Türkiye is falling short of the WHO 2030 vaccination target of 90% vaccination coverage among girls (3).

Having had sexual intercourse and prior knowledge of HPV were found to be the main determinants of HPV awareness in our study. Durusoy et al. (15) also reported that similar factors affected their participants' knowledge. Oz et al. (9) also found that similar predictors influence vaccine decisions. They identified sexual experience, a history of sexually transmitted infections, sexual behavior, and knowledge of HPV and vaccines as the main predictors of willingness to be vaccinated. Another study among nursing students found that HPV infections and opinions about vaccination were affected by sexual behavior, culture, and religion (18). HPV awareness is still considerably low among the Turkish population, and concerns about vaccine effectiveness and side effects are common among patients attending vaccination programs (19). Public knowledge should be improved through the provision of socioculturally appropriate campaigns; health care professionals should address all patients' concerns to improve acceptance of screening and vaccination (18,19). Research by Yıldız et al. (20) reported that HPV vaccination was not readily recommended by different health care professionals, who cited a lack of knowledge about vaccines, concerns about side effects, and cost implications as the main reasons for abstaining from recommending vaccination. Improved training of healthcare professionals is also required.

Study Limitations

The study was limited to students at a single university who had similar socio-economic and educational backgrounds. The number of participants was low relative to the total number of students at the university. The study could yield results for different socio-demographic groups of students if conducted as a multicenter study across public and private universities. Despite these limitations, our study contributes valuable data to the limited body of literature assessing HPV knowledge among university students studying in health-related and non-health-related

departments; it also highlights the educational disparities and emphasizes the need for targeted awareness interventions.

Conclusion

Overall HPV knowledge among participants was high, but vaccination and screening rates were significantly low, even among students in health-related departments. Our study has made an additional contribution to the limited body of research on university students' knowledge of HPV. Notably, the comparison of students in health-related fields with those in other fields has demonstrated the relevance of this topic within university education. There is a need to improve attitudes toward vaccination and screening by increasing awareness and implementing more effective nationwide HPV vaccination and screening programs.

Ethics

Ethics Committee Approval: Ethical approval for this study was obtained from the Istanbul Medipol University Non-Interventional Clinical Research Ethics Committee (approval no. 14; date: 05.01.2023).

Informed Consent: Participants were required to approve the consent form before proceeding with the questionnaire.

Footnotes

Authorship Contributions

Concept: B.N.C., Design: B.N.C., Data Collection or Processing: A.K., Analysis or Interpretation: B.N.C., R.M.U., A.K., Literature Search: B.N.C., R.M.U., A.K., Writing: B.N.C., R.M.U., A.K.

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