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 Esra KANAR İNCE^a
 Nilüfer YILDIRIM^{b*}

^aMSc., Erzurum Technical University,
esrakanar@hotmail.com
^bAsst. Prof., Erzurum Technical
University, nilufergulten@gmail.com

*Corresponding Author

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University Students' Knowledge and Health Beliefs Regarding Human Papillomavirus and Vaccines

Abstract

The study aims to evaluate knowledge and health beliefs related to Human Papillomavirus infection and Human Papillomavirus vaccination among female university students. The study was conducted cross-sectionally, with non-probability sampling, on 329 female students studying at a university. Each participant was informed before the study, and verbal consent was obtained. Three forms were used as data collection tools: Introductory Information Form, "Human Papillomavirus Infection Knowledge Scale," and "Human Papillomavirus Infection and Vaccination Health Belief Model Scale. It was found that 51.4% of participants were knowledgeable about Human Papilloma Virus infection, 59.9% had previously received information about the vaccine, and 76.9% did not want to be vaccinated. Participants received 2.71±2.23 points from the Human Papillomavirus Infection Knowledge Scale, and their knowledge level was weak. Education programs for cervical cancer, pap smear tests, and the Human Papillomavirus Infection vaccine should be planned and implemented.

Keywords: University students, human papillomavirus infection, nursing.



Üniversite Öğrencilerinin Human Papilloma Virüsü ve Aşılarla İlişkin Bilgi ve Sağlık İnançları Öz

Çalışmanın amacı, üniversitede öğrenim gören kadın öğrencilerin Human Papilloma Virus Enfeksiyonu ve aşıları hakkındaki bilgi düzeylerini ve sağlık inançlarını değerlendirmektir. Çalışma, olasılık dışı örnekleme ile, bir üniversitede öğrenim gören 329 kadın öğrenci üzerinde kesitsel olarak yürütülmüştür. Her katılımcıya çalışmadan önce bilgi verilmiş ve sözlü onam alınmıştır. Veri toplama aracı olarak üç form kullanılmıştır: Giriş Bilgi Formu, "Human Papilloma virus Enfeksiyon Bilgi Ölçeği" ve "Human Papilloma Virus Enfeksiyon ve Aşılama Sağlık İnanç Modeli Ölçeği." Katılımcıların %51.4'ü Human Papilloma Virus Enfeksiyonu hakkında bilgi sahibi olduğu, %59.9'u daha önce aşı hakkında bilgi aldığı ve %76.9'u aşı olmayı istemediği saptanmıştır. Katılımcılar Human Papilloma Virus Enfeksiyon Bilgi Ölçeği'nden 2.71±2.23 puan almış olup, bilgi düzeyleri zayıftır. Rahim ağzı kanseri, pap smear testleri ve Human Papilloma Virus Enfeksiyonu aşısı için eğitim programları planlanmalı ve uygulanmalıdır.

Anahtar kelimeler: Üniversite öğrencileri, human papilloma virus enfeksiyonu, hemşirelik.



Introduction

Human Papillomavirus (HPV) is a very common sexually transmitted infection worldwide. Human Papillomavirus is a major public health issue and causes fatal diseases such as cervical and vulvar

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cancer in women.¹ According to a study conducted by the International Agency for Research on Cancer (IARC), 604 thousand new cervical cancer cases and 342 thousand cervical cancer-related deaths were reported in the world in 2020. Cervical cancer is the fourth most common type of cancer among women after breast, lung, and colorectal cancer.² The age-adjusted incidence rate of cervical cancer in women in Türkiye is 4.8 per 100 thousand, and the mortality rate is 2.2 per 100 thousand.³ Among the types of cancer seen among women in Türkiye, cervical cancer ranks 12th in terms of both new cases and deaths, according to 2020 data.⁴ The most common cancers vary between countries, and cervical cancer is the most frequently occurring type of cancer in 23 countries.⁵ It has been understood that Human Papillomavirus can be seen in all societies with socio-cultural and economic differences and at almost all ages.⁶ More than 70% of sexually active adults are affected by HPV at some point in their lives, and more than 70% of them are reported to be between the ages of 15-24.⁷

Since it is of great importance to detect cervical cancer early, the Cervical Cancer Elimination Program was carried out for the first time in 2020 by the World Health Organization for cervical cancer. The aim of this program is that by 2030, 90% of young women who have reached the age of 15 in the world will have been vaccinated with HPV, 70% of women between the ages of 35-45 will have been screened with screening programs, and 90% of women with cervical disease will have access to care and treatment.⁵ It is thought that cervical cancer will cease to be a problem in the future with early diagnosis and widespread use of the vaccine.⁸

More than 50% of cases diagnosed with cervical cancer consist of patients who have not been screened enough or not at all.⁹ Systematic studies conducted in our country reveal that women in our country have insufficient or inadequate knowledge and interventions regarding early diagnosis, prevention, and treatment of cervical cancer.^{10,11} Although there are national screening programs in Türkiye, the fact that the rates of Pap smear tests are not at the desired level and are not performed at regular intervals indicates a severe lack of awareness and implementation on this issue.^{12,13} The reason for such low rates of Human Papillomavirus vaccination can be attributed to the low level of knowledge about HPV.¹⁴ With the World Health Organization's call to action, it is thought that cervical cancer will cease to be a problem that threatens public health with screening programs, HPV vaccination, early diagnosis, and necessary interventions.⁸ The research conducted by Özdemir et al. in our country stated that the vaccination rate against HPV is between 3 per thousand and 6 percent. In the articles reviewed for the research, it was observed that the vaccination rate of university students in our country ranges from 6 per thousand to 15 per thousand.^{15,17} The HPV vaccination rates are often linked to a lack of knowledge and awareness about HPV. The studies reviewed found that women's level of understanding about HPV is between 11.9% and 16.1%.^{18,19} It has been observed that those with positive HPV tests have a higher level of knowledge than those with negative results.²⁰

A study conducted among women working at a university in 2017 examined the factors affecting women's health beliefs about Pap smear tests and cervical cancer. The study's findings indicate that the perception of obstacles towards Pap smear tests, which women are aware of, is low, and the perception of motivation and benefits is high. Additionally, it was found that women who underwent Pap smear tests had lower barrier perceptions and higher health motivation. The study found that 7 out of every 10 women had a Pap smear test.²¹ In a survey conducted in 2018 to determine the relationship between women's behaviors and attitudes toward early diagnosis of cervical cancer and their health beliefs, it was determined that the rate of women having a Pap smear test and their awareness were low.²² Despite all the competence of nurses, it has been determined in some studies conducted in Türkiye that there are deficiencies in the transfer of information about HPV to university students, and it has been reported that students' HPV knowledge is insufficient.^{17,23,24} Based on this essence, the study aims to determine the knowledge levels of university students regarding HPV infection and vaccines, to evaluate their health beliefs, and to assess their attitudes, beliefs, and behaviors regarding cervical cancer screening and Pap Smear testing.

Materials and Methods

Type of Study

The study is a cross-sectional study.

Place and Time of the Study

The study was conducted between September 2023 and November 2024 with female students studying at a university in the east of Türkiye.

Universe and Sample of the Study

The study was conducted cross-sectionally on 329 female students studying at a university, using non-probability sampling. Volunteer (Self-Selected) Sampling was used. The sample included students from

the faculties of Sports Sciences, Science, Architecture-Engineering, Health Sciences, Literature and Economics, and Administrative Sciences.

Data Collection Tools

Three forms were used as data collection tools: Introductory Information Form, "Health Belief Model Scale on Human Papillomavirus Infection and Vaccination," and "Human Papillomavirus (HPV) Infection Knowledge Scale."

Demographic Information Form:

The Demographic Information Form, created by reviewing the literature, includes six questions regarding demographic characteristics such as age, marital status, economic status, and place of residence. In addition, there are nine questions to determine the health behaviors of the participants.^{17,23,25}

Human Papillomavirus (HPV) Infection Knowledge Scale:

The original form, developed by Kim to measure individuals' level of knowledge about HPV infection and HPV vaccination, consists of 20 items. The short version of the form includes 10 information statements. For each information sentence, 1 point is given for a correct answer (true or false), while no points are given for an incorrect answer or the "I don't know" option. In Kim's study, the Cronbach's alpha value of the form is 0.88.²⁶ In the Turkish validity and reliability study by Güvenç et al., Cronbach's alpha was calculated as 0.85.²⁷ In our study, Cronbach's alpha was calculated as 0.726.

Human Papillomavirus Infection and Vaccination Health Belief Model Scale:

This scale, adapted to Turkish by Güvenç et al. in 2016, consists of four sub-dimensions: perception of seriousness (4 items), perception of susceptibility (2 items), perception of obstacle (5 items), and perception of benefit (3 items).²⁷ The scale is applied on a four-point Likert-type scale, and the responses of the participants are scored as follows: "Not at all" (1 point), "A little" (2 points), "A lot" (3 points), "A lot" (4 points). The responses given by the participants are calculated according to the score of each item. After the total scores of each sub-section are calculated, the scores of seriousness, susceptibility, obstacle, and benefit are obtained by dividing the number of items in the sub-section. As a result of this calculation, each sub-sections score averages between 1 and 4. This method is used to quantitatively evaluate the extent to which the participants adopt each perception. A high participant's benefit perception score shows that they perceive HPV vaccination as beneficial, and a high seriousness perception score shows that they perceive HPV infection as a significant problem. A high barrier perception score shows that they think there are many difficulties to vaccination. A high sensitivity perception score shows that their sensitivity to this issue is significant. In the study conducted by Güvenç et al., Cronbach's alpha reliability coefficients for the sub-dimensions of the scale were given as follows: Seriousness perception: 0.78, Susceptibility perception: 0.72, Barrier perception: 0.71, Benefit perception: 0.78.²⁷ However, in our study, Cronbach's alpha reliability coefficients were reported as follows: Seriousness perception: 0.841, Susceptibility perception: 0.699, Barrier perception: 0.741, and Benefit perception: 0.742.

Data Collection

Data was collected face-to-face by the researcher between September 2023 and November 2024. The students in the research group were informed about the purpose of the research, and forms were applied to individuals who volunteered for the study. The improbable sampling method was used to collect data. The survey forms were distributed by hand to 329 students who could be reached for 14 months; the forms were collected according to the students' suitability, and the research continued until the forms were filled in completely. The average response time for the survey forms was approximately 5-10 minutes.

Evaluation of Data

Analyses were conducted using SPSS for Windows version 22. Descriptive statistics (frequencies, percentages, min and max, means, standard deviations) were calculated. The normality of continuous variables was tested using the Kolmogorov-Smirnov test, skewness and kurtosis coefficients, and visual inspection of histograms and Q-Q plots. Although the Kolmogorov-Smirnov test showed significant results ($p < .05$), skewness and kurtosis values were within the range of (± 2). Thus, with a large sample size ($n = 329$), and the convenience of parametric tests under large samples, the distributions were assumed normal and parametric tests were used. Independent samples t-test was performed for two-group comparisons, while one-way analysis of variance (ANOVA) was performed for three and multi-group comparisons. Levene's test was utilized for examining homogeneity of variance. When ANOVA showed significant differences, Tukey HSD post-hoc test was performed for multiple comparisons; Games-Howell test was performed when variances were found to be heterogeneous.

Bonferroni correction was performed for four sub-dimensions of Health Belief Model in order to correct for inflated Type I error rate. The significance level of comparison tests was specified as $p < .0125$. For the variables which were not normally distributed, Mann-Whitney U test and Kruskal-Wallis test were

performed respectively. The internal consistency of measurement tools was assessed using Cronbach's alpha coefficient. A p-value $\leq .05$ was considered significant, unless stated otherwise in relation to Bonferroni adjustment.

This research was approved by the Scientific Research and Publication Ethics Committee of Erzurum Technical University on April 27, 2023, with Meeting Number: 05 and Decision Number: 03. Permission was obtained from Erzurum Technical University and the students participating in the study for the conduct of the research. Permissions for the scales used in the research were also obtained.

Results

The demographic characteristics of the participants are presented in Table 1. As shown in Table 4.1, 83% of the participants are single, 73.9% have a moderate economic status, 52.3% live in dormitories/apartments, 47.7% have mothers who are primary school graduates. 62% of the participants have a health check-up once a year, 95.1% do not have a relative diagnosed with cervical cancer and 51.4% have previously heard of HPV infection. 59.9% of the participants have previously heard of the HPV vaccine, 35.5% heard about the HPV vaccine from the internet, 76.9% do not want to get the HPV vaccine, and 59.7% do not want to get the HPV vaccine due to lack of information (Table 1).

Table 1. Demographic characteristics of participants and information on HPV.

		n	%
Marital Status	Married	13	4.0
	Single	273	83.0
	In a relationship	43	13.0
Economic Status	Good	65	19.8
	Average	243	73.9
	Bad	21	6.3
Place of Residence	Own family	141	42.9
	At home	16	4.8
	Dormitory/Apartment	172	52.3
Attendance at Health Check-ups	Never	94	28.6
	Once a year	204	62.0
	Once every two years	31	9.4
Relative Diagnosed with Cervical Cancer	Yes	16	4.9
	No	313	95.1
Prior Knowledge of HPV Infection	Yes	169	51.4
	No	160	48.6
Awareness of HPV Vaccine	Yes	197	59.9
	No	132	40.1
Where Information about HPV Infection/Vaccine was Obtained	TV	12	6.1
	Internet	70	35.5
	Friends and Family	61	31.0
	Friends and Family	17	8.6
	Book/Magazine	5	2.5
	Healthcare Professionals	22	11.2
	Other	10	5.1
Desire to Receive HPV Vaccine	Yes	76	23.1
	No	253	76.9
Reasons for not wanting to get the HPV vaccine	I don't know	185	56.3
	I don't have the financial means to get it	37	11.2

I don't know the side effects	58	17.6
I don't think it's necessary	49	14.9

The participants received 2.71±2.23 points in total from the HPV Infection Knowledge Scale. The scores obtained from the scale vary between 0-8. The participants scored 2.28±0.66 on the Perception of Benefit sub-dimension, 2.28±0.75 on the Perception of Sensitivity sub-dimension, 2.56±0.81 on the Perception of Seriousness sub-dimension, and 2.22±0.64 on the Perception of Obstacle sub-dimension (Table 2).

Table 2. Distribution of scores obtained from the sub-dimensions of the HPV infection knowledge scale and health belief model scale regarding HPV infection and vaccination.

Scale and Subscales	n	Min.	Max.	Mean	SD
HPV Infection Knowledge Scale	329	0	8.00	2.71	2.23
Perceived Benefit	329	1.00	4.00	2.28	0.66
Perceived Sensitivity	329	1.00	4.00	2.28	0.75
Perceived Severity	329	1.00	4.00	2.56	0.81
Perceived Obstacle	329	1.00	4.00	2.22	0.64

A statistically significant difference was found among faculties in HPV infection knowledge scale scores, $F(5, 323) = 8.533, p < .001$. Post-hoc comparisons using Tukey HSD test indicated that students from the Engineering faculty had significantly higher knowledge scores compared to students from Sports Sciences and Social Sciences faculties ($p < .05$). No significant differences were observed among the remaining faculties (Table 3).

Table 3. Comparison of HPV infection knowledge scale scores by departments.

	n:329	HPV Infection Knowledge Scale			
		Mean	SD	Test	p
Health Sciences	151	2.94	2.24	F=8.533	<0.001*
Engineering	33	4.39	1.88		
Science	21	2.19	2.01		
Sports Sciences	70	1.82	1.91		
Social Sciences	39	1.97	2.13		
Economics & Admin	15	3.40	2.23		

There were significant differences in Total HPV Infection Knowledge Scale scores by residence, going to health check-ups, having previously heard of HPV infection, having heard of the HPV vaccine, source of information regarding HPV infection/vaccine, willingness to take HPV vaccine and reasons for not wanting vaccination ($p < .05$). Tukey HSD post-hoc tests were conducted for independent variables with more than 2 categories. Students living at home had significantly higher scores than students living with their families and students living in dormitories/apartments. Students who attended health check-ups annually had significantly higher score than students who never attended. Participants who have previously heard of HPV infection had significantly higher knowledge scores than participants who have not ($p < .001$). Participants who heard of HPV vaccine had also significantly higher mean scores ($p < .001$). Tukey HSD test regarding source of information revealed that students who received information from friends and family had significantly higher knowledge scores than students who received information from unspecified/multiple sources. Students who are willing to receive the HPV vaccine had significantly higher knowledge scores than students who are not willing to receive the vaccine ($p < .001$). There were significant differences in knowledge scores by reasons for not wanting to take the vaccine ($p < .001$). Tukey HSD test revealed that participants who stated that they were not informed about the vaccine had significantly lower knowledge scores than students who stated that they were concerned about financial issues, side effects or

that it is not needed. There were no significant differences in knowledge scores by marital status, economic status and having a close relative diagnosed with cervical cancer ($p > .05$). (Table 4).

Table 4. Comparison of HPV infection knowledge scale scores according to demographic characteristics.

		n	HPV Infection Knowledge Scale			
			Mean	SD	Test	p
Marital Status	Married	13	2.77	2.01	F=0.652	0.522
	Single	273	2.77	2.30		
	In a relationship	43	2.35	1.85		
Economic Status	Good	65	2.97	2.37	F=0.842	0.432
	Average	243	2.68	2.21		
	Bad	21	2.29	1.95		
Place of Residence	Own family	141	2.51	2.22	F=4.807	0.009
	At home	16	4.31	1.92		
	Dormitory/Apartment	172	2.73	2.22		
Attending Health Check-ups	Never	94	2.01	2.18	F=6.852	0.001
	Once a year	204	3.02	2.18		
	Once every two years	31	2.81	2.29		
Relative Diagnosed with Cervical Cancer	Yes	16	3.00	2.61	t=0.530	0.596
	No	313	2.70	2.21		
Having Heard of HPV Infection Before	Yes	169	3.67	1.94	t=8.975	0.001
	No	160	1.69	2.06		
Having Heard of the HPV Vaccine	Yes	197	3.42	2.04	t=7.584	0.001
	No	132	1.66	2.09		
Where Information About HPV Infection/Vaccine Was Obtained	TV	12	3.50	2.20	F=2.546	0.021
	Internet	70	3.26	1.95		
	Friends	61	4.02	1.71		
	Family	17	2.53	2.53		
	Books/Magazines	5	3.40	2.70		
	Healthcare Professionals	22	3.59	2.06		
	Other	10	1.90	2.28		
Desire to Get the HPV Vaccine	Yes	76	4.01	1.99	t=6.380	0.001
	No	253	2.32	2.15		
Reasons for Not Wanting to Get the HPV Vaccine	I don't know	185	2.15	2.22	F=9.898	0.001
	I cannot afford it financially	37	3.57	2.18		
	Because I don't know the side effects of the vaccine	58	3.47	2.10		
	I don't think it's necessary	49	3.31	1.86		

Post-hoc comparisons were performed using Tukey HSD test for variables with more than two groups.

When examining Table 5; Bonferroni correction was applied for comparisons across the four sub dimensions of the Health Belief Model, and the adjusted significance level was set at $p < .0125$.

Perceived Benefits

There was a significant difference for benefits by prior awareness of HPV infection and HPV vaccine ($p < .0125$). Higher benefits were shown by those with prior awareness of HPV infection and HPV vaccine. Students willing to receive the vaccine also demonstrated higher benefits scores.

Perceived Susceptibility

There was a significant difference for susceptibility by prior awareness of HPV infection and HPV vaccination ($p < .0125$). Higher perceived susceptibility scores were shown by those with prior awareness of HPV infection and HPV vaccination.

Perceived Severity

There were significant differences for severity by prior awareness of HPV infection and the HPV vaccine, source of information, willingness to receive the vaccine and reasons for not wanting to receive the vaccine ($p < .0125$). Higher perceived severity scores were shown by students willing to receive the vaccine and those with prior awareness.

Perceived Barriers

There were significant differences in perceived barriers by prior awareness of HPV infection and HPV vaccination ($p < .0125$). None of the other demographic variables showed any differences after Bonferroni correction ($p > .0125$).

Table 5. Comparison of scores obtained from the sub dimensions of the health belief model scale regarding HPV infection and vaccination according to demographic characteristics.

		n	Perceived Benefits		Perceived Susceptibility		Perceived Severity		Perceived Obstacle	
			M.	SD.	M.	SD.	M.	SD.	M.	SD.
Marital Status	Married	13	2.41	0.63	2.27	0.75	2.54	1.02	2.18	0.84
	Single	273	2.29	0.66	2.28	0.75	2.59	0.79	2.25	0.63
	In a relationship	43	2.22	0.70	2.28	0.77	2.38	0.87	2.03	0.59
			F=0.409 p=0.665		F=0.002 p=0.998		F=1.256 p=0.286		F=2.190 p=0.114	
Economic Status	Good	65	2.37	0.69	2.37	0.74	2.57	0.81	2.20	0.59
	Average	243	2.28	0.64	2.28	0.76	2.58	0.81	2.24	0.65
	Bad	21	2.00	0.75	1.98	0.64	2.31	0.82	2.06	0.62
			F=2.573 p=0.078		F=2.181 p=0.115		F=1.117 p=0.328		F=0.810 p=0.446	
Place of Residence	Own family	141	2.29	0.68	2.28	0.76	2.49	0.78	2.25	0.65
	At home	16	2.63	0.54	2.44	0.44	3.23	0.67	2.47	0.57
	Dormitory/Apartment	172	2.25	0.65	2.27	0.77	2.56	0.82	2.17	0.63
			F=2.438 p=0.089		F=0.372 p=0.690		F=6.287 p=0.002		F=1.975 p=0.140	
Attendance at Health Check-ups	Never	94	2.16	0.69	2.20	0.77	2.43	0.86	2.17	0.65
	Once a year	204	2.35	0.64	2.32	0.74	2.63	0.80	2.25	0.64
	Once every two years	31	2.20	0.66	2.26	0.78	2.55	0.73	2.15	0.63
			F=2.838 p=0.060		F=0.926 p=0.397		F=1.840 p=0.160		F=0.697 p=0.499	
Relative Diagnosed with Cervical Cancer	Yes	16	2.31	0.77	2.19	0.87	2.59	0.74	2.10	0.74
	No	313	2.28	0.66	2.29	0.75	2.56	0.81	2.22	0.63
			t=0.185 p=0.853		t=-0.509 p=0.611		t=0.151 p=0.880		t=-0.764 p=0.446	
Previous Knowledge of HPV Infection	Yes	169	2.52	0.61	2.51	0.70	2.78	0.73	2.34	0.59
	No	160	2.04	0.62	2.04	0.74	2.34	0.83	2.09	0.66

		t=7.083 p <0.001		t=5.919 p <0.001		t=5.084 p <0.001		t=3.631 p <0.001		
Awareness of HPV Vaccine	Yes	197	2.42	0.64	2.40	0.71	2.66	0.78	2.29	0.61
	No	132	2.08	0.65	2.10	0.78	2.42	0.84	2.12	0.67
		t=4.617 p <0.001		t=3.667 p <0.001		t=2.655 p=0.008		t=2.432 p=0.016		
Source of Information about HPV Infection/Vaccine	TV	12	2.44	0.77	2.33	0.62	2.17	0.79	2.33	0.76
	Internet	70	2.49	0.55	2.51	0.66	2.79	0.74	2.35	0.59
	Friends	61	2.45	0.63	2.48	0.72	2.75	0.72	2.29	0.57
	Family	17	2.41	0.74	2.18	0.71	2.56	0.86	2.28	0.83
	Books/Magazines	5	2.13	0.69	2.50	1.00	2.50	0.59	2.44	0.36
	Healthcare Professionals	22	2.55	0.61	2.48	0.66	2.70	0.84	2.28	0.53
	Other	10	1.57	0.39	1.50	0.47	1.93	0.73	1.78	0.64
		F=3.754 p=0.001		F=3.704 p=0.002		F=3.036 p=0.007		F=1.335 p=0.243		
Desire to Receive the HPV Vaccine	Yes	76	2.76	0.59	2.73	0.75	2.91	0.68	2.29	0.62
	No	253	2.14	0.61	2.15	0.70	2.46	0.82	2.20	0.64
		t=7.874 p <0.001		t=6.261 p <0.001		t=4.384 p <0.001		t=1.142 p=0.254		
Reason for Not Wanting to Receive the HPV Vaccine	I don't have enough information	185	2.15	0.65	2.17	0.76	2.44	0.82	2.14	0.65
	I cannot afford it financially	37	2.59	0.70	2.61	0.79	2.82	0.76	2.36	0.70
	Because I don't know the side effects of the vaccine	58	2.43	0.53	2.36	0.62	2.85	0.73	2.37	0.56
	I don't think it's necessary	49	2.37	0.70	2.37	0.76	2.48	0.81	2.21	0.61
		F=6.769 P <0.001		F=4.285 p=0.006		F=5.407 p=0.001		F=2.561 p=0.055		

*Bonferroni-adjusted significance level was set at $p < .0125$.

Discussion

The study aimed to examine the knowledge level of female students studying at a university about HPV infection and the HPV vaccine, as well as their health beliefs and the factors affecting them. In this context, the results obtained, depending on the findings studied, were discussed in relation to findings of similar studies in the literature. As shown in Table 2, low scores were obtained on the HPV Infection Knowledge Scale. The reason for the low knowledge levels of the students in our study can be attributed to the lack of adequate educational programs provide information about HPV and women's health. Many studies conducted on university students on HPV have revealed results that help our findings. The study of Şahin and his colleagues also confirms this situation; it shows that the HPV knowledge level of law school students is lower than that of medical and dentistry students.²⁸ When the studies conducted on university students were examined, It was concluded that medical school students are generally knowledgeable about HPV, which is thought to be related to the education they receive.^{29,31} The fact that our research findings are consistent with other studies in the literature reveals the importance of disseminating precautions against HPV and raising awareness, especially in young age groups.^{16,32,33} Studies conducted with midwifery and nursing students found that the HPV knowledge level of midwifery students was low, and the HPV knowledge level of nursing students was insufficient.^{16,34} Another study found that the HPV knowledge level of nursing students was sufficient.³⁵ It is an expected result that students who do not study in health departments have less knowledge about a particular disease. The data analysis results showed that Engineering students have a higher level of knowledge compared to students in other departments. This is thought to be related to the fact that computer engineering students access digital information

resources more frequently and are exposed to online health information more often. Still, the question content asked in our study is aimed at the basic information required to protect themselves from diseases caused by HPV. They are expected to have the necessary information to demonstrate healthy life behaviors. Nurses need to plan training to increase university students' knowledge level about HPV. In our study, 23.1% of students said they considered vaccinating. In other studies conducted in our country, university students indicated they wanted to get vaccinated at low and medium rates, such as 28%, 46.9%, and 47.3%.^{27,36,37} Kitur et al., conducted a study on university students in the United States; only 21.6% of students who had never been vaccinated stated that they wanted to be vaccinated.³⁸ In different studies, the rate of participants who indicated that they were considering getting the HPV vaccine was 44% in the study of Gu et al., 55.2% in the study of Lin et al., but in a study conducted among women aged 20-35, Chen et al. reported that the percentage of respondents who intended to vaccinate was as high as 83.7%.³⁹⁻⁴¹ It is seen that the percentage of respondents who stated their intention to vaccinate varies significantly between studies. It can be said that the differences in the rates of students wanting to be vaccinated vary by country, region, population, and time. In our opinion, the courses students take, their cultural background, and their level of knowledge about HPV infection may cause differences. Therefore, awareness programs should be organized, and health education should be given importance to increase the rate of students wanting to be vaccinated.

When the reasons for not wanting to get the HPV vaccine were listed, the most common answer was "I don't know," and the other answers were; I don't think it's necessary because I don't know the side effects of the vaccine, and I don't have the financial means to get it. In a different study, the reasons for not getting vaccinated among students were: 38.4% thinking that the vaccine is harmful, 32% thinking that it will protect them, and 29.5% stating that the vaccine is ineffective.⁴² In another study conducted with university students, the most common answers were not finding the vaccine necessary, fear of the vaccine, and lack of information about the vaccine.³⁷ Correcting false beliefs by providing students with accurate and reliable information about vaccination is necessary. Health institutions, schools, and families can help increase vaccination rates by working together. In this way, it is thought that it will be possible to prevent HPV infection and related cancers. When asked where people heard about HPV infection and the vaccine, it was determined that most of the information was obtained through the Internet. In the study conducted by Ogbolu and Kozlovszky, it was determined that information about HPV was mainly obtained from the internet and health personnel.⁴³ A different study conducted with university students in Ethiopia determined that students received information about HPV mostly from health professionals, media, and the Internet.⁴⁴ It is thought that initiating public health campaigns in university environments to promote accurate information about HPV prevention at university and disseminating precise information using communication channels such as health professionals and social media would be the best choice for this age group. When the sub-dimension features of the health belief model scale regarding HPV infection and vaccination of university students were examined, it was determined that the Benefit Perception sub-dimension was 2.28 ± 0.66 , the Susceptibility Perception was 2.28 ± 0.75 , the Seriousness Perception sub-dimension was 2.56 ± 0.81 , and the Barrier Perception sub-dimension was 2.22 ± 0.64 . According to our study, students' perceptions of barriers against HPV vaccination are partially lower than other sub-dimensions. The study conducted by Güvenç et al. determined that barrier perceptions were low, but perceptions of sensitivity, seriousness, and benefit were high.²⁷ According to the results obtained in this study, the highest score belonged to the perception of severity, followed by the perception of benefit and sensitivity. In contrast, the lowest score belonged to the perception of the barrier.²⁷ In the study conducted by Yağız Altıntaş et al., it was determined that students' perceptions of obstacles against HPV vaccination were low compared to other sub-dimensions.⁴² The study conducted with students of the faculty of health sciences determined that the barrier sub-dimension had the lowest score. At the same time, the other sub-dimensions were relatively higher.⁴⁵ Similarly, Kim found that perceptions of sensitivity, seriousness, and benefit were high, and perceptions of barriers were low.²⁶ Our study found that university students found the HPV vaccine beneficial, that this disease and vaccination required seriousness, and that their sensitivity to this issue was high. The perception of obstacles is relatively high; it is thought that university students have obstacles such as coming to the East from different regions and cultures, and a lack of finances and information.

The fact that the data collection phase of the research was conducted at a single university and the number of departments was small creates limitations in terms of generalization.

Conclusion

These results indicate that HPV remains a significant public health problem and that study participants had relatively insufficient knowledge about HPV, the HPV vaccine, and its relationship to cervical cancer, although they had more knowledge about Pap smear testing than about the HPV vaccine. Furthermore, the findings suggest that nurses should increase awareness levels regarding HPV and cervical cancer through educational programs. Therefore, these findings suggest that this data can be used as preliminary information for healthcare professionals, particularly nurses, to increase HPV awareness and participation in preventive health behaviors.



Reviewer: External, Independent

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Declarations:

- 1. Originality Statement:** This study is original and has not been published previously.
- 2. Author Contributions:** Conceptualization: EKI, NY; Idea: EKI, NY; Literature Review: EKI, NY; Data Collection: EKI; Data Processing: EKI, NY; Analysis: EKI, NY; Writing – Original Draft: EKI, NY; Writing – Review and Editing: EKI, NY
- 3. Ethics Committee Approval:** This research was approved by the Scientific Research and Publication Ethics Committee of Erzurum Technical University on April 27, 2023, with Meeting Number: 05 and Decision Number: 03.
- 4. Funding/Support:** This study did not receive any financial support.
- 5. Conflict of Interest:** The author(s) declare that there is no conflict of interest.
- 6. Generative Artificial Intelligence Statement:** No generative artificial intelligence tools were used at any stage of this study.
- 7. Sustainable Development Goals:** This work is related to the following United Nations Sustainable Development Goals



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