

# Knowledge, Attitudes, and Behaviors of Medical School Students about Human Papilloma Virus (HPV) And HPV Vaccine

## *Tıp Fakültesi Öğrencilerinin İnsan Papilloma Virüsü (HPV) ve HPV Aşısı Hakkındaki Bilgi, Tutum ve Davranışları*

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### Özet

**Amaç:** Bu çalışmanın amacı, tıp fakültesi öğrencilerinin Human Papilloma Virüsü (HPV) ve HPV aşısı hakkındaki bilgi, tutum ve davranışlarını ölçmek ve HPV aşılama durumlarını tespit etmektir.

**Gereç ve Yöntemler:** Bu tanımlayıcı kesitsel çalışma bir tıp fakültesindeki öğrencileri üzerinde yapılmıştır. Araştırmada sosyodemografik veri formu ve HPV Bilgi Ölçeği kullanılmıştır. P değerinin 0,05'ten küçük olması ve %95 güven aralığı ile istatistiksel anlamlılık olarak kabul edildi.

**Bulgular:** Araştırmaya katılan 518 öğrencinin %57,9'u kız, %61,6'sı prelinik öğrencisidir. Erkeklerde sigara içme (p=0,018), alkol kullanma (p=0,001) ve cinsel aktivite durumu (p<0,001) oranları kız öğrencilere göre anlamlı derecede yüksekti. Katılımcıların sadece %2,3'ü HPV aşısı olduğunu bildirmiştir. Öğrencilerin HPV aşısı yaptırmasında yaş (p<0,001), cinsiyet (p=0,017) ve uyruk (p=0,045) anlamlı bulundu. HPV bilgi düzeyi kadınlarda (p=0,004), klinik sınıfta öğrenim görenlerde (p<0,001), cinsel yönden aktiflerde (p<0,001), aile içinde cinsellik hakkında kolayca konuşabilenlerde (p=0,027), bilgilerini tıp fakültesinden (p<0,001) ve okul dışında diğer sağlık profesyonellerinden (p<0,001) alanlarda daha yüksekti.

**Sonuç:** Tıp öğrencilerinin HPV bilgi düzeyi literatüre göre orta düzeydeydi. Tıp öğrencilerinin bilgi düzeylerini artırmak, akran eğitimi yoluyla diğer akranlarını etkileyebilecekleri için çok önemlidir. Bu nedenle tıp fakültelerinde hem müfredatta hem de ders dışı etkinliklerde bilgi düzeyinin ve aşılama oranının artırılmasına yönelik çalışmalar yapılmalıdır.

**Anahtar kelimeler:** Human Papillomavirus Aşıları, Tıp Öğrencisi, Bilgi, Tutum, Cinsel Davranış

### Abstract

**Objective:** The objective of the study was to measure the knowledge, attitudes and behaviors about Human Papilloma Virus (HPV) and HPV vaccine and to detect the HPV vaccination status of medical school students.

**Materials and Methods:** This descriptive cross-sectional study was conducted on students in a medical school. A sociodemographic data form and HPV Knowledge Scale were used in the study. A p-value of less than 0.05 was considered statistical significance, with a 95% CI.

**Results:** Of the 518 students who participated in the study, 57.9% were female, and 61.6% were preclinical students. Rates of smoking (p=0.018) and alcohol consumption (p=0.001) and sexual activity status (p<0.001) were significantly higher in male than in female students. Only 2.3% of participants reported having received the HPV vaccination. Age (p<0.001), gender (p=0.017), and nationality (p=0.045) were found to have a significant effect on student receipt of HPV vaccine. HPV knowledge level was higher among those who were female (p=0.004), studied in a clinical class (p<0.001), were sexually active (p<0.001), could easily talk about sexuality in the family (p=0.027), and had obtained their knowledge from medical school (p<0.001) and medical professionals outside of school (p<0.001).

**Conclusion:** The HPV knowledge level of medical students was moderate compared to the literature. Increasing the knowledge level of medical students is crucial as they can influence other peers through peer education. Therefore, efforts should be made to improve the knowledge level and vaccination rate in medical schools, both in the curriculum and in extracurricular activities.

**Keywords:** Human Papillomavirus Vaccines, Medical Student, Knowledge, Attitude, Sexual Behavior

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## INTRODUCTION

Human papillomaviruses (HPV) are ubiquitous viruses that can easily evade the host's immune response. An estimated 80% of sexually active people will be infected with HPV at least once in their lifetime. Infection with this virus is associated with anogenital cancers, including cervical, vaginal, vulvar, penile, anal, and oropharyngeal cancers (1-3). HPV 16 is responsible for approximately 60% of invasive cervical carcinomas, followed by HPV 18 with 15%. HPV 16 is also responsible for 85% of HPV-associated non-cervical carcinomas (2). According to the 2017 Turkish Cancer Statistics, cervical cancer is the ninth cause of cancer in women (4). By GLOBOCAN 2020 data, 2532 new cervical cancer cases and 1245 deaths were recorded in Turkey (5). The HPV vaccine is a proven method to prevent the development of other HPV-related cancers and genital warts, especially cervical cancer (6). All types of vaccines protect against infections caused by HPV types 16 and 18 and can prevent the development of cancer. The HPV vaccine is recommended for both sexes between the ages of 9 and 26 (7). There are various studies in Turkey and in the world that question the knowledge and vaccination frequency of medical students before. It is observed that vaccination rates among university students vary between 9% and 74% worldwide. Vaccination rates in Turkey are quite low compared to these data (1.3% to 2.8%) (8-15). The information sources of university students studying in health-related departments are mostly schools, and their level of knowledge is not much different from community-based research (8, 11, 16-17). Medical students are the doctors of the future. It is known that the recommendations of the physicians affect the vaccination decision of the families, therefore it is very important that the physicians recommend the HPV vaccine, which is not included in our national immunization schedule (18). The aim of medical faculties is to train physicians who serve in primary care (19). Acquiring sufficient knowledge about HPV and HPV vaccines during medical school is critical to being a role model for other young people through peer education and is also an investment in the future. Previous studies have investigated medical students' knowledge and attitudes on this topic (8, 9, 16, 20-23). However, few of these studies have used a valid and reliable scale. Our study aims to measure the knowledge and attitudes about HPV of medical students who are expected to be role models for society and to determine their HPV vaccination rates.

## MATERIAL AND METHODS

### Nature of the Study

This study is a cross-sectional survey.

### Design

Our survey was administered to medical students at Cumhuriyet University, Faculty of Medicine in the 2019-2020 academic year who agreed to participate in the study. One thousand three hundred seventy-one students constituted the study population. The study was conducted between January 2020 and April 2020. The questionnaire was sent to all medical students online through the student communication platform. A total of eight reminder messages were sent every 15 days. At the end of the research period, 518 students answered the entire questionnaire. Those who filled out the questionnaire incompletely were excluded from the study.

### Data collection instruments

The questionnaire used in the study consisted of a total of 48 questions. The first 15 included sociodemographic data and some characteristics of the disease, and the following 33 questions belonged to the Human Papilloma Virus (HPV) Knowledge Scale (24,25).

The HPV Knowledge Scale was developed by Waller *et al.* in 2013 (24). The original scale consists of 35 items and has four sub-dimensions. Demir *et al.* conducted the Turkish validity and reliability study of this scale in 2019; 2 questions were excluded because they were not consistent with the current vaccination program in Turkey (25). The Cronbach  $\alpha$ -value calculated in the Turkish validity study was 0.96. The sub-dimensions of this scale consist of questions about the general level of knowledge about HPV, HPV screening tests, the level of knowledge about the HPV vaccine, and the application process of the HPV vaccines used. Three Likert-type answers can be given to the questions: "Yes," "No," and "I do not know." Correct answers earn 1 point; incorrect answers and answers such as "I do not know" earn 0 points. A maximum of 33 points can be scored on the scale. High scores on the scale are interpreted in favor of a high level of knowledge about HPV.

### Statistical Analysis

The data collected were analyzed using the SPSS program (Statistical Package for Social Sciences) for the Windows Version 25 package. The fit of the numerical data to the normal distribution was assessed by analyzing the skewness and kurtosis coefficients. Tabachnick and Fidell states that the skewness and kurtosis values should be between +1.5 and -1.5 for the data to be normally distributed (26). First, descriptive statistical analyzes of the data were performed. Next, frequencies for categorical data and measures of central distribution (mean  $\pm$  standard deviation) for numerical data were calculated. The chi-square test was used to compare categorical data. Whether the means of normally distributed numerical data differed significantly between

two independent groups and more than two independent groups was analyzed using the independent samples t-test or the one-way ANOVA test. A p-value of less than 0.05 was considered statistical significance, with a 95% CI.

Ethics committee approval for the study was obtained from Ethics Committee for non-interventional clinical research from Sivas Cumhuriyet University (approval date/number: 15/01/2020-01/39). Furthermore, permission to use the scale in our survey was obtained from Demir F. via email. During the study, the Declaration of Helsinki's principles were observed. Information about the study was provided on the platform at the beginning of the study. Informed consent was obtained from participants on the pre-survey page.

## RESULTS

The number of students in the faculty was 1371. The questionnaires were completed by 518 students

(37.7% response rate); 300 (57.9%) of the respondents were female and 218 (42.1%) were male. By period, 319 (61.6%) students were classified as preclinical (year 1,2,3) and were studying in a preclinical class, while 199 (38.4%) were classified as clinical (Year 4,5,6) and were studying in a clinical class. Sociodemographic characteristics and sexual behavior of participants by gender are shown in **Table 1**.

Only 2.3% (n=12) of participants reported having received HPV vaccination. Only 1 of those vaccinated was male; he was a foreign national. Of those who had received the HPV vaccine, 8 (66.6%) reported obtaining their knowledge from medical school, 3 (25.0%) from the Internet, 1 (8.4%) from family. The mean age of those vaccinated with HPV was significantly lower ( $p<0.001$ ). Vaccination rate was significantly higher in female students and foreign students ( $p<0.05$ ). Factors that may influence the receipt of HPV vaccination by medical students are shown in **Table 2**.

**Table 1. Sociodemographic characteristics and sexual behavior of participants by gender**

Variable	Total N=518	Male n=218	Female n=300	p-value
Age	21.3±2.1	21.5±2.3	21.2±1.9	0.155*
Mother's education level				
High school and below	348 (67.2%)	149 (42.8%)	199 (57.2%)	0.350†
University and above	170 (32.8%)	69 (40.6%)	101 (59.4%)	
Father's education level				
High school and below	226 (43.6%)	93 (41.2%)	133 (58.8%)	0.320†
University and above	292 (56.4%)	125 (42.8%)	167 (57.2%)	
Nationality				
Turkish student	494 (95.4%)	205 (41.5%)	289 (58.5%)	0.155†
Foreign student	24 (4.6%)	13 (54.2%)	11 (45.8%)	
Do you smoke?				
Yes	73 (14.1%)	40 (54.8%)	33 (45.2%)	0.018†
No	445 (85.9%)	178 (40%)	267 (60%)	
Number of pack years	2.3±1.6	2.7±1.9	1.9±0.9	0.024*
Do you drink alcohol?				
None or less than 1-3 times per month	496 (96.3%)	201 (40.5%)	295 (59.5%)	0.001†
1 - 5 times per week	17 (3.3%)	13 (76.5%)	4 (23.5%)	
Almost every day	2 (0.4%)	2 (100%)	0 (0%)	
Have you ever been sexually active?				
Yes	52 (10%)	29 (55.8%)	23 (44.2%)	<0.001†
No	408 (78.8%)	151 (37%)	257 (63%)	
I would not like to answer	58 (11.2%)	38 (65.5%)	20 (34.5%)	
Age of first sexual intercourse	19.0±2.6	18.1±1.9	20.3±2.9	0.002*

Data are presented as Mean ± Standard Deviation and n (%).

\* Independent samples T-test, †Chi-square test.

**Table 2. Factors that may influence the receipt of HPV vaccination by medical students**

Variable	Have you received the HPV vaccine?		p-value
	Yes	No	
Age	19.1±0.9	21.4±2.1	<0.001*
Gender			
Female	11 (3.7%)	289 (96.3%)	<b>0.017</b> †
Male	1 (0.5%)	217 (99.5%)	
Mother's education level			
High school and below	9 (2.6%)	339 (97.4%)	0.759†
University and above	3 (1.8%)	167 (98.2%)	
Father's education level			
High school and below	6 (2.7%)	220 (97.3%)	0.771†
University and above	6 (2.1%)	286 (97.9%)	
Nationality			
Turkish student	10 (2%)	484 (98%)	<b>0.045</b> †
Foreign student	2 (8.3%)	22 (91.7%)	
Have you ever been sexually active?			
Yes	2 (3.8%)	50 (96.2%)	0.355†
No	8 (2%)	400 (98%)	
I would not like to answer	2 (3.4%)	56 (97.7%)	

Data are presented as Mean ± Standard Deviation and n (%).

\* Independent samples T-test, †Chi-square test.

The reasons why students did not get vaccinated were in order of frequency: Low knowledge about HPV (39.0%; n=202), not being sexually active (28.8%; n=149), the absence of HPV vaccine in the national immunization schedule (23.9%; n=124), not considering themselves at risk (22.0%; n=114), not being reimbursed for the cost (8.7%; n=45), the vaccine being too expensive (4.4%; n=23), and fear of the side effects of the vaccine (2.5%; n=13). Sources mentioned for knowledge about HPV and the vaccine were: medical school (66.4%; n=344), Internet (32.6%; n=169), medical professionals outside of school (12.5%; n=65), friends (11.0%; n=57), and family (5.0%; n=26). 17.2% (n=89) reported that they knew nothing about this topic.

The mean score of students for HPV Knowledge Scale was 14.9±9.3 (min:0-max:30). The mean scores of the sub-dimensions "General HPV Knowledge", "Knowledge About HPV Screening Tests", "General Knowledge About HPV Vaccine" and "Knowledge About Current HPV Vaccination Program" were 8.9±5.0 (min:0-max:16), 2.2±1.9 (min:0-max:6), 2.9±2.3 (min:0-max:7) and 0.7±0.9 (min:0-max:4) respectively.

The comparison of the scores obtained by the students on HPV Knowledge Scale and its sub-dimensions with different variables is given in **Table 3**. There was

a significant difference between female gender, sexual activity status, studying in a clinical class, talking easily about sexuality in the family, and the mean score of the scale ( $p<0.05$ ). Both the total score and the scale sub-dimension scores of the students whose information source about HPV was medical school and medical professionals outside of school were higher ( $p<0.05$ ) (**Table 4**). When the mean scores of the scale and its sub-dimensions were compared by period, there were significant differences between them ( $p<0.001$  for each dimension) (**Figure 1**).

## DISCUSSION

HPV vaccination is recommended for both sexes between the ages of 9-26 years (7). University-aged adolescents may be vaccinated as an age group. Educating university students about HPV is an opportunity that should not be missed. In this article, we aimed to investigate the knowledge and attitudes of medical students, who are expected to be role models for both society and their fellow students, about HPV and the HPV vaccine.

Although the number of vaccinated students was quite small, most medical students indicated that they acquired their knowledge about HPV and the vaccine in medical school. Students' scale scores were higher in some studies that used the same scale and lower in

**Table 3. Comparison of students' scores on HPV Knowledge Scale and its sub-dimensions with different variables**

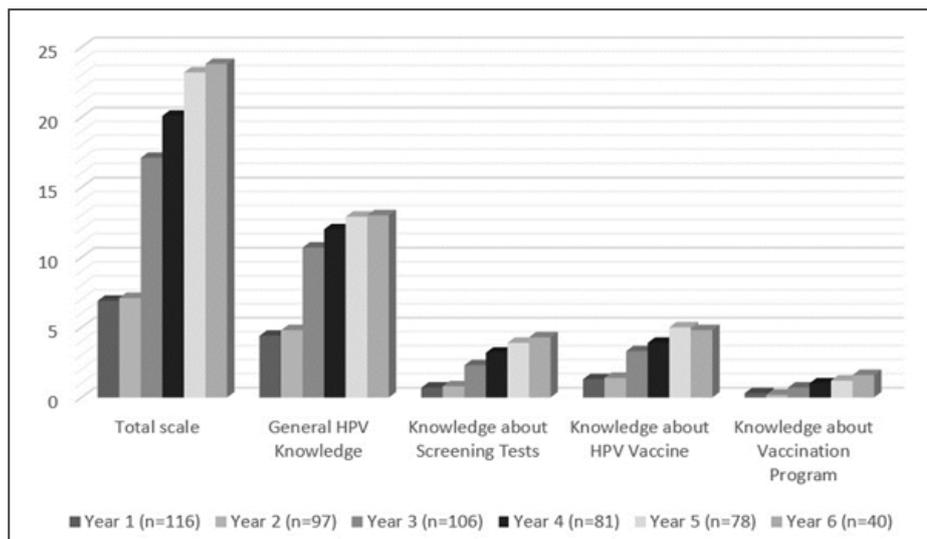
	Total scale	p value	General HPV Knowledge	p-value	Screening Tests Knowledge	p-value	HPV Vaccine Knowledge	p-value	Vaccination Program Knowledge	p-value
<b>Gender*</b>										
Female	16.0±8.8	<b>0.004</b>	9.4±4.7	<b>0.034</b>	2.4±2.0	<b>0.001</b>	3.2±2.2	<b>0.001</b>	0.7±0.9	0.765
Male	13.3±9.7		8.2±5.5		1.8±1.9		2.5±2.4		0.7±0.9	
<b>Medical school year (by period)*</b>										
Preclinical	10.4±8.4	<b>&lt;0.001</b>	6.6±5.0	<b>&lt;0.001</b>	1.2±1.6	<b>&lt;0.001</b>	2.0±2.1	<b>&lt;0.001</b>	0.4±0.8	<b>&lt;0.001</b>
Clinical	22.1±5.3		12.6±2.3		3.7±1.5		4.5±1.8		1.2±0.9	
<b>Hearing status about cervical cancer*</b>										
Heard	16.8 ± 8.4	<b>&lt;0.001</b>	10.1±4.3	<b>&lt;0.001</b>	2.5±1.9	<b>&lt;0.001</b>	3.4±2.2	<b>&lt;0.001</b>	0.8±0.9	<b>&lt;0.001</b>
Unheard	4.3 ± 6.6		2.7±4.1		0.6±1.3		0.7±1.5		0.2±0.9	
<b>Family history of cervical cancer*</b>										
Yes	17.7 ± 11.2	0.216	10.1±6.1	0.328	3.0±2.0	0.113	3.6±2.5	0.238	0.8±0.8	0.460
No	14.8 ± 9.2		8.9±5.0		2.2±1.9		2.9±2.3		0.7±0.9	
<b>Sexual activity status †</b>										
Not active	14.8 ± 9.2	<b>&lt;0.001<sup>a,b,c</sup></b>	9.0±5.1	<b>&lt;0.001<sup>a,b,c</sup></b>	2.1±1.9	<b>&lt;0.001<sup>a,c</sup></b>	2.9±2.3	<b>&lt;0.001<sup>a,b,c</sup></b>	0.7±0.9	<b>0.003<sup>c</sup></b>
Active	19.8 ± 7.5		11.0±3.2		3.2±1.9		4.4±2.2		1.0±0.9	
I would not like to answer	10.5 ± 9.4		6.5±5.4		1.7±2.2		1.8±2.4		0.4±0.8	
<b>Talking easily about sexuality in the family ‡</b>										
Unspeaking	14.6 ± 9.9	<b>0.027<sup>d,e,f</sup></b>	8.8±5.2	<b>0.004<sup>d,e,f,g</sup></b>	2.2±2.1	0.085	2.9±2.4	0.603	0.6±0.9	0.059
Unspeaking	14.6 ± 8.3		8.9±4.6		1.9±1.6		2.9±2.0		0.7±1.0	
Partially	14.9 ± 9.6		8.8±5.1		2.4±2.0		3.0±2.5		0.6±0.8	
Speaking	13.0 ± 9.0		7.9±5.4		1.7±1.6		2.7±2.2		0.5±0.7	
Easily Speaking	20.1 ± 7.3		12.3±3.1		2.8±1.8		3.6±2.5		1.2±0.9	
<b>Mother's education level*</b>										
High school and below	14.9±9.1	0.876	8.9±4.9	0.830	2.2±2.0	0.658	3.0±2.3	0.909	0.6±0.9	0.382
University and above	14.8±9.7		8.8±5.4		2.1±1.9		2.9±2.5		0.7±0.9	
<b>Father's education level*</b>										
High school and below	14.0±8.9	0.082	8.5±4.8	0.131	1.9±1.9	<b>0.014</b>	2.8±2.2	0.121	0.7±0.9	0.971
University and above	15.5±9.6		9.2±5.2		2.4±1.9		3.1±2.4		0.7±0.9	

Year 1,2,3 presented as *Preclinical* and Year 4,5,6 presented as *Clinical*

\* Independent samples T-test

† One Way ANOVA Test, Bonferroni Post-hoc analysis, a: not active and active, b: not active and I would not like to answer, c: I would not like to answer and active,

‡ One Way ANOVA Test, Bonferroni Post-hoc analysis, d: absolutely unspeaking and easily speaking, e: unspeaking and easily speaking, f: speaking and easily speaking, g: partially and easily speaking



**Figure 1.** Comparison of mean scores of HPV Knowledge Scale and its sub-dimensions by period

**Table 4. Comparison of students' scores on HPV Knowledge Scale and source of knowledge about HPV and the vaccine**

	Total scale	p-value	General HPV Knowledge	p-value	Screening Tests Knowledge	p-value	HPV Vaccine Knowledge	p-value	Vaccination Program Knowledge	p-value
<b>Medical school</b>										
Yes	19.1±6.9	<b>&lt;0.001</b>	11.3±3.2	<b>&lt;0.001</b>	2.9±1.8	<b>&lt;0.001</b>	3.8±2.0	<b>&lt;0.001</b>	0.9±0.9	<b>&lt;0.001</b>
No	6.5±7.6		4.2±4.7		0.8±1.5		1.2±1.8		0.2±0.7	
<b>Internet</b>										
Yes	15.5±8.3	0.256	9.7±4.4	<b>0.008</b>	1.8±1.8	<b>0.006</b>	3.1±2.3	0.194	0.7±0.9	0.798
No	14.5±9.7		8.5±5.3		2.3±2.0		2.8±2.3		0.7±0.9	
<b>Medical professionals outside of school</b>										
Yes	21.0±6.3	<b>&lt;0.001</b>	12.3±3.3	<b>&lt;0.001</b>	3.5±1.7	<b>&lt;0.001</b>	4.1±2.0	<b>&lt;0.001</b>	1.0±1.0	<b>0.004</b>
No	14.0±9.3		8.4±5.1		2.0±1.9		2.8±2.3		0.6±0.9	
<b>Friends</b>										
Yes	15.4±8.5	0.636	9.4±4.8	0.436	2.0±1.8	0.401	3.0±2.2	0.838	0.9±1.0	0.084
No	14.8±9.4		8.8±5.1		2.2±1.9		2.9±2.4		0.6±0.9	
<b>Family</b>										
Yes	14.2±8.7	0.723	8.2±4.7	0.479	2.1±1.9	0.850	2.8±2.6	0.746	1.0±1.0	0.131
No	14.9±9.3		8.9±5.1		2.2±1.9		3.0±2.3		0.7±0.9	

Independent samples T-test was used

others (10,11, 16,27). The mean scores of students in the present study were lower than in studies conducted with medical personnel in New Zealand and university students in the USA (10, 27). Our study participants also had higher knowledge scores than nursing students who participated in a study conducted in Turkey and the male medical students who participated in the survey conducted in Saudi Arabia (11,16). We found that being female, studying clinical sciences, being sexually active, and talking easily about sexuality in the family influenced students' HPV knowledge.

Similarly, Farsi et al. reported that studying clinical sciences significantly increased medical students' knowledge (16). Villanueva et al. concluded in their study of female nursing students that increasing age, years of schooling, better financial status, and sexual activity significantly increased HPV knowledge (12). In the study by Albright et al. high levels of health literacy and HPV knowledge were positively correlated (10). In Aslan et al.'s study of nursing students, which is similar to our data, female gender and increasing years of schooling significantly increased HPV knowledge scores (11).

Studies conducted at universities in the United States found HPV vaccination rates of 44-47% in females and 11-16% in males (10,13). Villanueva et al. in Spain reported a vaccination rate of 73% among nursing students (12). In various studies conducted with nursing and medical students in Turkey, vaccination rates ranged from 1.3% to 2.8% (8,9,11,14,15). The HPV vaccination rate among male medical students in Saudi Arabia was 9% (16). In our study, only one of the male students reported having been vaccinated; he was

also a foreign national. It is well known in the literature that knowledge about HPV, vaccination campaigns and physician recommendations influence vaccination (13,16-27). In Turkey, the HPV vaccine is not included in the vaccination program. Pediatric associations recommend it, but although the rate of pediatricians recommending vaccination is high, especially in girls, they have reservations due to cost and family concerns (28).

In our survey, the highest rate of sources of HPV knowledge acquisition was medical school. However, the rate of those who reported obtaining their knowledge from school was not high enough (66%). For example, in Farsi's study (16), the rate of those who obtained their knowledge from school was 90%; in Emre et al. 's study (8), this rate was 75%. Moreover, knowledge of cervical cancer prevention measures included in National Core Medical Education Program is a minimum competency expected of school leavers (20). However, the HPV knowledge rate found in our study was quite low compared to other studies. Therefore, efforts should be made to increase the knowledge of students, especially females, about HPV and the HPV vaccine through courses, various committees, and campaigns that should be included in the educational program. The most common reasons for female students in the current study for not getting vaccinated were: low knowledge of HPV, not being sexually active, the absence of the HPV vaccine in the national immunization schedule, and not considering themselves at risk. The study results of Farsi et al. were consistent with ours, and they found the following similar reasons: not needing vaccination, not being sexually active, and having little knowledge about HPV (16). In the study of Emre et al. students also thought that

they were not at risk and stated that they did not get vaccinated against HPV because they did not have enough knowledge and found the vaccine expensive (8). In our study, the high cost of the vaccine ranked last among the reasons for non-vaccination. We can interpret this as a lack of knowledge among the students. The fee for three doses of the HPV vaccine is approximately equivalent to one month's salary of a minimum wage worker in our country conditions (29). This cost is too high for university students to afford. In the study by Çeşmeci *et al.* among intern doctors, 42% of students reported that they did not get vaccinated because the vaccine was too expensive (23). The most hesitant factor of pediatricians in recommending the vaccine to families is the cost of the vaccine (28). When we compare our data with other studies from the same country, the sexual activity rate of college students is relatively low compared to their peers (30-32). This confirms that our study participants are also at low risk of contracting sexually transmitted diseases, with HPV vaccination ideally administered before first sexual intercourse (33).

As a result, a moderate level of knowledge was determined in a group expected to have high health literacy. The frequency of getting vaccinated against HPV was found to be relatively low. Factors that influenced vaccination were lack of knowledge about the vaccine and that the vaccine was not included in the vaccination schedule. The most common source of vaccination knowledge was school, but the percentage of those who obtained their knowledge from school was also low. Medical students are the physicians of the future and a group who are role models for their peers and pioneers in health education. Improving the knowledge of these students can indirectly affect many people (peers, family, relatives, etc.). Students' knowledge and attitudes can be improved through additional programs in the medical curriculum and outside of school. For example, HPV vaccine can be included in the scope of reimbursement or regular vaccination campaigns can be organized where students can get vaccinated and with the help of sponsors, students can be provided with the vaccine.

There are some limitations of the study. Since specific and sensitive topics were asked in the survey, the research was conducted online so that the participants could answer more easily. However, there may still be students who do not feel comfortable answering a survey on this topic. These students may not have chosen to participate in the research. They may also have attended and given answers that they thought were socioculturally acceptable. The cross-sectional nature of the study may make it difficult to establish a causal link.

In addition, our research results are valid for the students of this faculty and cannot be generalized to the students of other faculties with different socio-cultural structures in different geographies of Turkey.

**Ethical approval:** Ethics committee approval for the study was obtained from Ethics Committee for non-interventional clinical research from Sivas Cumhuriyet University (approval date/number: 15/01/2020-01/39). During the study, the Declaration of Helsinki's principles were observed.

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**Consent to participate:** Information about the study was provided on the platform at the beginning of the study. Informed consent was obtained from participants on the pre-survey page. Permission to use the scale in our survey was obtained from Demir F. via email. The research abstract has been presented as an oral presentation in 9. International Trakya Family Medicine Congress, Turkey (March 2020) and published in Congress Book.

## REFERENCES

1. Cubie HA. Diseases associated with human papillomavirus infection. *Virology* 2013;445(1-2):21-34.
2. Schiffman M, Doorbar J, Wentzensen N, de Sanjosé S, Fakhry C, Monk BJ *et al.* Carcinogenic human papillomavirus infection. *Nat Rev Dis Primers* 2016;2:16086.
3. St Laurent J, Lockett R, Feldman S. HPV vaccination and the effects on rates of HPV-related cancers. *Curr Probl Cancer*. 2018;42(5):493-506.
4. T.C. Ministry of Health. Turkey cancer statistics 2017. Ankara: Ministry of Health Publishing; 2021.
5. WHO. International agency for research on cancer. Global cancer statistics. 2020. <https://gco.iarc.fr/today/data/factsheets/populations/792-turkey-fact-sheets.pdf> Accessed 17 August 2021.
6. Brotherton JML, Bloem PN. Population-based HPV vaccination programmes are safe and effective: 2017 update and the impetus for achieving better global coverage. *Best Prac & Res Clin Obst and Gyn*. 2018;47(3):42-58.
7. Dikbaş L. Human papilloma virus vaccines: Current controversies. *Duzce Med Jour* 2017;19(3):81-5.
8. Emre N, Özşahin A, Edirne T. Pamukkale University Medical Faculty students' knowledge level of human papilloma virus infection and vaccine. *Euras J Fam Med* 2020;9(1):42-50.
9. Özşaran Z, Demirci S, Aras AB. Tıp fakültesi öğrencileri arasında HPV aşısı bilgi düzeyini değerlendiren anket çalışması. *Türk Ji Onkol Derg* 2011;14(2):40-4.

10. Albright AE, Allen RS. HPV misconceptions among college students: The role of health literacy. *J Com Health* 2018;43(6):1192-1200.
11. Aslan G, Bakan AB. Identification of the knowledge level of students receiving health education about the human papilloma virus, screening tests, and human papilloma virus vaccination. *J Com Health* 2021;46(2):428-33.
12. Villanueva S, Mosteiro-Miguéns DG, Domínguez-Martís EM, López-Ares D, Novío S. Knowledge, attitudes, and intentions towards human papillomavirus vaccination among nursing students in Spain. *Int J Environ Res Public Health* 2019;16:4507.
13. Barnard M, George P, Perryman ML, Wolff LA. Human papillomavirus (HPV) vaccine knowledge, attitudes, and uptake in college students: Implications from the Precaution Adoption Process Model. *PLoS One* 2017;12(8):e0182266.
14. Dönmez S, Öztürk R, Kısa S, Karaoz Weller B, Zeyneloğlu S. Knowledge and perception of female nursing students about human papillomavirus (HPV), cervical cancer, and attitudes toward HPV vaccination. *J Am Coll Health* 2019;67(5):410-7.
15. Bal Yılmaz H, Koniak Griffin D. Knowledge, behaviors, and attitudes about human papilloma virus among nursing students in Izmir, Turkey. *J Canc Educ* 2018;33:814-20.
16. Farsi NJ, Baharoonb AH, Jiffri AE, Marzoukic HZ, Merdada MA, Merdada LA. Human papillomavirus knowledge and vaccine acceptability among male medical students in Saudi Arabia. *Hum Vaccin Immunother* 2021; 17(7):1968-74.
17. Dodd RH, McCaffery KJ, Marlow LAV, et al. Knowledge of human papillomavirus (HPV) testing in the USA, the UK and Australia: an international survey. *Sexual Transm Infect.* 2014;90:201-7.
18. Nur Eke R, Atsız Sezik H, Öze M. Are female doctors aware of cervical cancer? *Anatol Jour Med* 2016;26(1):53-7.
19. Medical Faculty - National Core Curriculum. *Tıp Eğitimi Dönüşümü* 2020;19(57-1):1-146.
20. Davis K, Dickman ED, Ferris D, Dias JK. Human papillomavirus vaccine acceptability among parents of 10 to 15-year-old adolescents. *Obstet Gynecol Surv* 2004;59:820-2.
21. Erdem HA, Işıkgöz Taşbakan M, Şanlıdağ G, Kanpak EC, Pulukçu H. We Get vaccinated, but do we really know why?: Evaluation of knowledge on HPV infection and vaccination in medical school students with HPV vaccine. *FLORA* 2020;25(1):62-8.
22. Daniel CL, McLendon L, Green CL, Anderson KJ, Pierce JY, Perkins A et al. HPV and HPV vaccination knowledge and attitudes among medical students in Alabama. *Jour of Can Edu* 2021;36:168-77.
23. Çeşmeci Y, Köylü B, Sulaiman J, Sancak E, Şenel S, Baki HE et al. HPV infection and HPV vaccine through the eyes of interns. *Türk Jin Onkol Derg* 2015;18(3):85-92.
24. Waller J, Ostini R, Marlow LA, McCaffery K, Zimet G. Validation of a measure of knowledge about human papillomavirus (HPV) using item response theory and classical test theory. *Prev Med* 2013;56(1):35-40.
25. Demir F. Human papilloma virüsü (HPV) bilgi ölçeğinin Türkçe geçerlik ve güvenilirliği. Sağlık Bilimleri Üniversitesi Gülhane Sağlık Bilimleri Enstitüsü Halk Sağlığı Hemşireliği Anabilim Dalı Yüksek Lisans Tezi; 2019.
26. Tabachnick BG, Fidell LS. *Using multivariate statistics.* (sixth ed.) Boston: Pearson, 2013.
27. Sherman SM, Bartholomew K, Denison HJ, Patel H, Moss EL, Douwes J et al. Knowledge, attitudes and awareness of the human papillomavirus among health professionals in New Zealand. *PLoS One* 2018;13:e0197648.
28. Yıldırım M, Düzovalı Ö, Kanık A, Kırık Ö. Knowledge and Attitudes of The Pediatricians in Turkey Regarding Human Papillomavirus (HPV) Vaccine. *J Pediatr Inf* 2009;3:62-8.
29. Turkey drug depot price list. <https://www.selcukecz.com.tr/sayfa/ilac-fiyat-ve-barkod-arama/ilac-ve-barkod-arama?barcode=&firma=0&ilacname=gardasil&kdv=0&gun=01&ay=01&yil=2018> Accessed 18 August 2021.
30. Aras S, Orcin E, Ozan S, Semin S. Sexual behaviours and contraception among university students in Turkey. *Jour of Bio Sci* 2007;39(1):121.
31. Yaşan A, Essizoglu A, Yildirim EA. Predictor factors associated with premarital sexual behaviors among university students in an Islamic culture. *Inter Jour of Sexual Health* 2009;21(3):145-52.
32. Topçu S, Ulukol B, Emüler DS, Topçu HO, Ceyhun Peker G, Dökmeci F et al. Awareness of human papillomavirus and acceptability of human papillomavirus vaccine: a survey of Turkish university students. *J Clin Anal Med* 2017;8(suppl 4):292-5.
33. Özçelik S, Kılıç FA. Human papillomavirus vaccination: review of the current evidence. *Mucosa* 2019;2(4):8