

Evaluation of Dentists' and Dental Students' Knowledge and Attitudes Regarding Human Papillomavirus and Human Papillomavirus Vaccines: A Cross-Sectional Study

Diş Hekimlerinin ve Diş Hekimliği Öğrencilerinin Human Papilloma Virüs ve Human Papilloma Virüs Aşıları ile İlgili Bilgi ve Tutumlarının Değerlendirilmesi: Kesitsel Çalışma

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ABSTRACT Objective: The incidence of Human papillomavirus (HPV)-positive oropharyngeal cancers has been rapidly increasing in recent years. The aim of this study is to evaluate the knowledge and awareness levels of dental students and dentists about HPV and the HPV vaccine. **Material and Methods:** This cross-sectional survey study included 5th-grade students studying at a dentistry faculty and dentists working at the same faculty. The HPV knowledge scale was used to measure participants' knowledge about HPV infection, HPV screening tests, HPV vaccines and vaccination programs, and the Health Belief Model Scale about HPV and vaccines was used to measure their beliefs and attitudes. The survey was applied to participants face-to-face and the results were analyzed with SPSS. **Results:** The study was conducted with 70 students and 75 dentists (Response rates of 90.9% and 90.36%, respectively). Participants were generally able to answer less than half of the questions on the knowledge scale correctly. Students' HPV screening tests, HPV vaccines and vaccination programs sub-dimension scores and Total Knowledge Scale scores were significantly lower than dentists ($p<0.001$). Similarly, the students had a more negative attitude towards HPV and HPV vaccines than the dentists ($p<0.001$). **Conclusion:** The research findings revealed that although dentists have better knowledge and attitudes about HPV and HPV vaccines than students, participants generally need training on this subject. The curriculum of dentistry education should be rearranged to include practical training modules on HPV vaccines.

Keywords: Human papillomavirus;
human papillomavirus vaccine;
dental student; dentist

ÖZET Amaç: İnsan papilloma virüsü [Human papillomavirus (HPV)] pozitif orofaringeal kanserlerin görülme sıklığı son yıllarda hızla artmaktadır. Bu çalışmanın amacı diş hekimliği öğrencileri ve diş hekimlerinin HPV ve HPV aşısı hakkındaki bilgi ve farkındalık düzeylerini değerlendirmektir. **Gereç ve Yöntemler:** Bu kesitsel anket çalışmasına bir diş hekimliği fakültesinde okuyan 5. sınıf öğrencileri ve aynı fakültede çalışan diş hekimleri dâhil edildi. Katılımcıların HPV enfeksiyonu, HPV tarama testleri ve HPV aşıları ve aşılama programları hakkındaki bilgilerini ölçmek için HPV Bilgi Ölçeği, inanç ve tutumlarını ölçmek için HPV ve aşılar hakkındaki Sağlık İnanç Modeli Ölçeği kullanıldı. Anket katılımcılara yüz yüze uygulandı ve sonuçlar SPSS ile analiz edildi. **Bulgular:** Çalışmaya 70 öğrenci ve 75 diş hekimi katıldı (Cevap oranı sırasıyla %90,9 ve %90,36). Katılımcılar genellikle bilgi ölçeğindeki soruların yarısından azını doğru cevaplayabildiler. Öğrencilerin HPV tarama testleri, HPV aşıları ve aşılama programları alt boyut puanları ve Toplam Bilgi Ölçeği puanları diş hekimlerinden anlamlı derecede düştü ($p<0,001$). Benzer şekilde, öğrenciler HPV aşılarına karşı diş hekimlerinden daha olumsuz bir tutuma sahipti ($p<0,001$). **Sonuç:** Araştırma bulguları, diş hekimlerinin HPV ve HPV aşıları hakkında öğrencilere göre daha iyi bilgi ve tutumlara sahip olmalarına rağmen, katılımcıların genellikle bu konuda eğitime ihtiyaç duyduklarını ortaya koymuştur. Diş hekimliği eğitimi müfredatı, HPV ve HPV aşıları hakkında uygulamalı eğitim modüllerini içerecek şekilde yeniden düzenlenmelidir.

Anahtar Kelimeler: İnsan papilloma virüsü;
insan papilloma virüsü aşısı;
diş hekimliği öğrencisi; diş hekimi

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Human papillomavirus (HPV) is the most prevalent sexually transmitted viral infection in the world. More than 70% of sexually active adults are exposed to HPV at some point in their lives, and more than 70% of these are reported to be between the ages of 15 and 24. The global prevalence of cervical HPV infection is estimated to be 12% among women, with variations based on geographical location and age. In less developed countries and in women younger than 25 years, the prevalence is 15-45%.¹ In Türkiye, various studies have reported frequencies of 4-25%.² The majority of HPV infections are asymptomatic, and transitory, and do not cause illness. However, chronic HPV infections can result in malignancies of the cervix, vulva, vagina, anus, penis, and oropharynx.³ HPV is the etiological factor of almost all cervical cancers, 91% of anal cancers, 75% of vaginal cancers, 63% of penile cancers, 69% of vulvar cancers, and 60% of oropharyngeal cancers.⁴

Cervical cancer ranks 5th in terms of incidence worldwide and 4th in women. According to Globocan-2018 data, it also ranks 4th among cancer-related deaths worldwide.⁵ According to 2016 data, cervical cancer ranks 9th among cancers seen in women of all age groups in Türkiye.⁶ It is ranked 13th among the causes of cancer-related deaths in Türkiye.⁷ Cervical cancer is associated with several risk factors, but HPV infection is the first among the risk factors.⁸ Approximately 63% of oropharyngeal malignancies in women and 72% in men are caused by HPV. Approximately 63% of oropharyngeal malignancies in women and 72% of cancers in men are caused by HPV.⁹ The prevalence of HPV-positive oropharyngeal cancers has increased significantly over the past decade. In the past, head and neck cancers were most commonly seen in elderly individuals with a history of smoking and alcohol use. Still, today, head and neck cancers are also seen in young people who do not have significant risk factors associated with HPV, such as smoking and alcohol use.¹⁰ There is evidence to suggest that the HPV vaccination may reduce the risk of oral cancer; however, the evaluation of HPV vaccination for the prevention of oral cancer remains controversial.¹¹

Prevention or early diagnosis of cervical cancer is possible with regular screening tests. Papanicolaou

(PAP) Smear, liquid-based screening, and HPV deoxyribonucleic acid (DNA) testing are used as screening methods.¹² Apart from effective screening methods, vaccination is a very effective method to prevent HPV-related infections and cancers. Gardasil®, a quadrivalent vaccine that covers HPV types 6, 11, 16, and 18, was approved by the U.S. Food and Drug Administration for girls between the ages of 9 and 26 in 2006 and for boys in the same age group in 2009. Cervarix®, a bivalent vaccine that covers HPV types 16 and 18, was approved in 2009 and is recommended only for girls between the ages of 9 and 26. Finally, in December 2014, Gardasil 9®, which covers HPV types 6, 11, 16, 18, 31, 33, 45, 52, and 58, was approved for both girls and boys between the ages of 9 and 26. In Türkiye, the quadrivalent vaccine was licensed in 2007, the bivalent vaccine in 2008, and the 9-valent vaccine in 2017. While Gardasil and Cervarix protect against HPV 16 and 18, Gardasil 9 protects against 9 HPV strains that cause cervical, vulvar, vaginal, and anal cancers. While the vaccination has very few side effects, its protective effectiveness is over 100%.¹³ It has been reported that administering these vaccines before starting sexual activity increases the protective effectiveness. For females ages 9 to 14, the World Health Organization advises receiving 2 doses of the HPV vaccination.⁸ According to 2017 data in the United States of America, the rate of adolescents aged 13-17 receiving at least 1 dose of HPV vaccine is 65.5%; the rate of those who completed all 3 doses is 48.6%. In Türkiye, studies conducted among university students found the vaccination rate of female students to be approximately 2% and in a study conducted by Ozyer et al. on 408 female students, the HPV vaccination rate was found to be 1.4%.^{14,15} Today, HPV vaccination is routinely recommended for girls and boys aged 11-12.¹⁶ Research has shown that with the introduction of HPV vaccine, the incidence of HPV infection and illness connected to HPV have declined.¹⁷ In Türkiye, within the scope of the cancer screening program, cervical cancer is screened by family physicians and Cancer Early Diagnosis, Screening and Education Centers by performing a smear and HPV-DNA test on women between the ages of 30-65 every 5 years. However, HPV vaccination is not included in

the routine vaccination schedule. The vaccination is subject to the family's request and is subject to a fee.

The frequency of HPV in Türkiye is below European and North American values. However, in developing countries like Türkiye, the decreasing age of first sexual intercourse and the increasing risk of risky situations such as having multiple sexual partners during adolescence increase the risk of sexually transmitted diseases. Therefore, safe sexual life and HPV vaccination, which are primary protection against HPV-related infections and cancers, are important issues. Although the effectiveness of HPV vaccines has been proven, concerns arising from the lack of information about their use for protection in individuals prevent vaccination programs from reaching the desired level.¹⁸ In addition to public awareness in the fight against HPV elimination, the awareness of health workers and students in health professional education programs is also important. Studies conducted in different years with students in different health education programs such as medical school, nursing, and dentistry in our country have pointed out deficiencies in HPV awareness.¹⁹ Dentists play an important role in examining the oral cavity to identify potentially malignant lesions. In addition, dentists have an important responsibility in informing patients about HPV infections and recommending HPV vaccination, thus ensuring the success of vaccination programs. The aim of this study was to evaluate the knowledge and awareness levels of 5th-year students, research assistants and faculty members studying at our faculty about HPV and the HPV vaccine.

MATERIAL AND METHODS

This cross-sectional study was conducted in November-December 2023 at the Faculty of Dentistry, Afyonkarahisar Health Sciences University. Fifth-year dental students (n=77) studying at the faculty of dentistry in the 2023-2024 academic year and dentists (n=83) (59 research assistants and 24 academics) working at the same faculty were included in the study. The study did not involve sample selection and aimed to reach the entire universe. Permission was obtained from the Afyonkarahisar Health Sciences University, Clinical Research Ethics Committee for

the study (date: 03.11.2023, no: 2023/468) and The Declaration of Helsinki's guiding principles were followed in the conduct of the study. Permission was also obtained from the dean's office of the faculty of dentistry for the study. The study was entirely based on volunteering, the participants were informed about the study and their consent was obtained. The first part of the survey, designed to assess participants' knowledge and attitudes about HPV and HPV vaccines, included questions on sociodemographic characteristics (age, gender, marital status, professional experience, smoking and alcohol use), participants' knowledge and awareness about HPV and HPV vaccines, sources of information, and their status of getting or recommending HPV vaccines. Apart from these, the following 2 scales were used in the study:

Health Belief Model Scale regarding human papillomavirus infection and vaccination: The scale was developed by Hae Won Kim to determine health beliefs.²⁰ Its Turkish adaptation was made by Guvenc et al. in 2016.²¹ The scale consists of 14 items and 4 sub-dimensions: perceived benefits (questions 1-3), perceived susceptibility (questions 4-5), perceived seriousness (questions 6-9), and perceived barriers (questions 10-14). The scale items include 4-point Likert-type responses (1 "not at all", 2 "a little", 3 "quite a bit", 4 "a lot"). Higher scores imply a higher conviction in the dimension. Except for hurdles, all subscales are positively related to vaccination.

HPV Knowledge Scale: The scale was developed by Waller et al. in 2013 to measure individuals' knowledge levels about HPV, HPV vaccines, and screening tests.²² The Turkish adaptation of HPV-BÖ was made by Demir and Özdemir in 2019.²³ The total number of items in the original scale was 35, and the number of items was adjusted to 33 as a result of the Turkish adaptation. HPV-BÖ has 4 sub-dimensions: general information about HPV (first 16 questions), HPV screening tests (questions 17-22), HPV vaccine information (questions 23-27) and HPV vaccination program (questions 28-33). In the study, the dimensions containing HPV vaccination information and HPV vaccination program application information were combined and participant information was evaluated in 3 sub-dimensions. Each item in the scale in-

cludes the options “yes”, “no”, and “I don’t know”. In the assessment stage, every right response receives a score of 1, while wrong responses and “I don’t know” responses receive a score of 0. As with the original scale, right and erroneous answers were provided in a mixed way to avoid bias in the responses. The total score received from the scale ranges from 0 to 33, with a high score indicating a high degree of knowledge of HPV, HPV screening tests, and the HPV vaccination.

RESULTS

70 students (42 female, 28 male) aged 22-25 (mean age: 23.44 ± 0.81) and 75 dentists (50 female, 25 male) aged 25-36 (mean age: 28.21 ± 3.15) participated in the study. The response rate to the surveys was 90.9% for students and 90.36% for dentists. 72.3% of dentists were married, and 57.3% had less than 3 years in the profession. While smoking was more common among dentists, alcohol consumption was more common among students (Table 1).

The majority of dentists stated that they had sufficient knowledge about HPV and the HPV vaccine (82.7% and 76%, respectively), while less than half of the students (42.9% and 37.1%, respectively) re-

ported that they had sufficient knowledge, and this was a statistically significant difference ($p < 0.000$). In addition, 73.3% of dentists and only 34.3% of students answered “yes” to the question “Do you recommend the HPV vaccine to your family, relatives and patients?” ($p < 0.000$). Similarly, the status of receiving education about HPV during undergraduate studies was significantly higher among dentists than students ($p < 0.000$). 72% of dentists and 55.7% of students answered “yes” to the question “Do you have sufficient information about oral cancer?” ($p < 0.05$). On the other hand, students’ desire to receive education about HPV and HPV vaccines was significantly higher than dentists ($p < 0.05$) (Table 2).

Participants’ agreement with the statements in the Health Belief Model Scale regarding HPV infection and vaccination showed some significant differences according to the participant groups (Table 3). When the sub-dimension scores of the Health Belief Model Scale regarding HPV infection and vaccination were examined according to the participant groups, the perceived benefit and perceived susceptibility sub-dimension scores of dentists were significantly higher than those of students ($p < 0.000$). While no significant difference was observed between the participant groups in terms of perceived seriousness, the perceived barriers sub-dimension scores of dentists were significantly lower than those of students ($p < 0.000$) (Table 4). When the participants’ sources of information about HPV and HPV vaccine were examined, the 3 most important sources of information for dentists were the faculty of dentistry (18.29%), friends/family (17.37%), and health institutions (8.53%), respectively, while the 3 most important sources of information for students were the faculty of dentistry (17.9 %), friends/family (14.57%), and health institutions (14.32%) and scientific meeting (14.32%) (Figure 1).

It was observed that the correct response rates given to the questions in the Knowledge Scale regarding HPV and HPV vaccines caused some significant differences between dentists and dentistry students (Table 5). Dentists’ total HPV Knowledge Scale score was 15.29 ± 2.95 , while students’ total score was 13.32 ± 2.43 ($p < 0.000$). When the Knowledge Scale sub-dimensions were examined, stu-

TABLE 1: Sociodemographic characteristics of participants

	Dentists		Dental students	
	n	%	n	%
Age				
30<	54	72	70	100
30≥	21	28		
Gender				
Male	25	33.3	28	40
Female	50	66.7	42	60
Marital status				
Married	17	22.7		
Single	58	72.3		
Time in the profession				
0-3 Years	43	57.3		
≥3 Years	32	42.7		
Smoking				
Yes	35	46.7	29	41.4
No	40	53.3	41	58.6
Alcohol use				
Yes	14	18.7	18	25.7
No	61	81.3	52	74.3

TABLE 2: Participants' general knowledge and attitudes regarding HPV and HPV vaccines

	Dentists		Dental students		p value
	Yes n (%)	No n (%)	Yes n (%)	No n (%)	
1. Do you have enough information about HPV?	62 (82.7)	13 (17.3)	30 (42.9)	40 (57.1)	0.000**
2. Do you have enough information about the HPV vaccine?	57 (76)	18 (24)	26 (37.1)	44 (62.9)	0.000**
3. Did you know that HPV virus testing is done?	52 (69.3)	23 (30.7)	46 (65.7)	24 (34.3)	0.387
4. Have you had the HPV vaccine?	21 (28)	54 (72)	11 (15.7)	59 (84.3)	0.056
5. Would you consider getting the HPV vaccine?	23 (30.7)	52 (69.3)	27 (38.6)	43 (61.4)	0.204
6. Do you recommend the HPV vaccine to your family/relatives and patients?	55 (73.3)	20 (26.7)	24 (34.3)	46 (65.7)	0.000**
7. Can HPV cause oral cancer?	48 (64)	27 (36)	48 (68.6)	22 (31.4)	0.343
8. Can HPV cause head and neck cancer?	50 (66.7)	25 (33.3)	49 (70)	21 (30)	0.401
9. Do you have enough information about oral cancer?	54 (72)	21 (28)	39 (55.7)	31 (44.3)	0.031*
10. Have you received training about HPV during your undergraduate studies?	51 (68)	24 (32)	23 (32.9)	47 (67.1)	0.000**
11. Would you like to receive training about HPV and HPV vaccines?	52 (69.3)	23 (30.7)	59 (84.3)	11 (15.7)	0.026*

*p<0.05; **p<0.001; HPV: Human papillomavirus

TABLE 3: Participants' Health Belief Model Scale scores regarding HPV infection and vaccination

	Dentists $\bar{X} \pm SD$	Dental students $\bar{X} \pm SD$	p value
1. HPV vaccine can prevent genital warts and genital cancer.	3.56±0.68	3.01±0.60	<0.001**
2. HPV vaccine can prevent cervical cancer	3.64±0.60	2.37±0.56	<0.001**
3. I believe that HPV vaccines are effective and reliable.	3.64±0.58	3.30±0.72	0.002*
4. Those who are not vaccinated against HPV are more likely to develop genital warts.	3.66±0.55	3.10±0.59	<0.001**
5. Boys who are not vaccinated against HPV have a higher risk of developing anal and penile cancer, and girls who are not vaccinated against HPV have a higher risk of developing cervical cancer.	3.06±0.62	2.10±1.27	<0.001**
6. HPV infection is a serious disease and can disrupt school life/work life.	3.65±0.53	3.60±0.66	0.598
7. HPV infection can cause death.	3.80±0.46	3.50±0.82	0.008*
8. HPV infection can cause problems in relationships with boyfriends or spouses.	3.66±0.60	3.51±0.75	0.180
9. The thought of HPV infection scares me.	2.77±0.53	3.50±0.75	<0.001**
10. I have doubts about the effectiveness and reliability of HPV vaccines.	1.18±0.64	2.54±0.77	<0.001**
11. I have difficulty deciding to get HPV vaccine at an early age.	1.78±0.57	3.54±0.77	<0.001**
12. HPV vaccine increases the possibility of sexual intercourse at an early age.	1.76±0.51	3.54±0.73	<0.001**
13. HPV vaccine is expensive.	3.14±0.51	3.58±0.71	<0.001**
14. The possible side effects of the HPV vaccine worry me.	1.80±0.54	3.55±0.79	<0.001**

*p<0.05; **p<0.001; HPV: Human papillomavirus; SD: Standard deviation

TABLE 4: Sub-dimension scores of the Health Belief Model Scale regarding HPV infection and vaccination by participant groups

	n	Perceived benefit		Perceived susceptibility		Perceived severity		Perceived barriers	
		$\bar{X} \pm SD$	p value	$\bar{X} \pm SD$	p value	$\bar{X} \pm SD$	p value	$\bar{X} \pm SD$	p value
Dentists	75	10.84±1.04	<0.001**	6.73±0.82	<0.001**	13.89±1.09	0.334	10.36±1.35	<0.001**
Dental students	70	8.68±1.16		5.20±1.46		14.114±1.58		16.77±1.77	

**p<0.001; HPV: Human papillomavirus; SD: Standard deviation

dents' general HPV knowledge sub-dimension scores were significantly higher than dentists' (p<0.001). On the other hand, it was seen that HPV screening test knowledge, HPV vaccine and vacci-

nation program application knowledge sub-dimension scores and total Knowledge Scale scores of dentists were significantly higher than students' (<0.001) (Table 6).

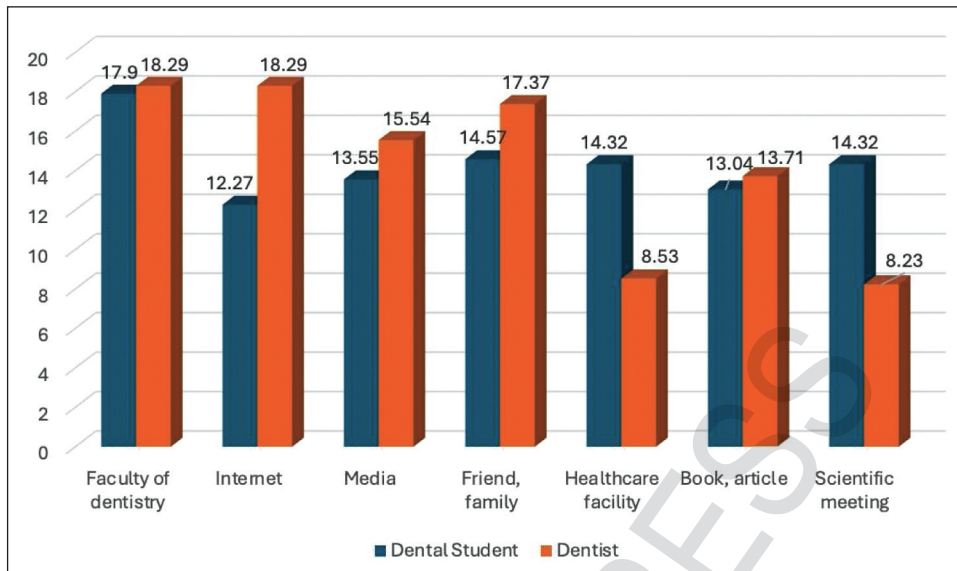


FIGURE 1: Distribution of participants' sources of information about HPV and HPV vaccines (%)

TABLE 5: Correct Responses of Participants to Questions in the HPV Knowledge Scale (%)

	Dentists n (%)	Dental students n (%)	p value
1. HPV can cause cervical cancer.	11 (14.7)	52 (74.3)	<0.001**
2. A person can live for years without knowing they have HPV.	14 (18.7)	46 (65.7)	<0.001**
3. Having more than one sexual partner increases the risk of HPV infection.	53 (70.7)	51 (72.9)	0.820
4. HPV is very rare.*	12 (16)	45 (64.3)	<0.001**
5. HPV can be transmitted during sexual intercourse.	48 (64)	51 (72.9)	0.200
6. HPV always has visible signs and symptoms.*	51 (68)	15 (21.4)	<0.001**
7. Using a condom reduces the risk of HPV infection.	10 (13.3)	40 (57.1)	<0.001**
8. HPV can cause HIV/AIDS.*	50 (66.7)	6 (8.6)	<0.001**
9. HPV can be transmitted through skin-to-skin contact in the genital area.	8 (10.7)	49 (70)	<0.001**
10. HPV does not transmit to men.*	55 (73.3)	51 (72.9)	0.346
11. Having sexual intercourse at an early age increases the risk of HPV infection.	49 (65.3)	47 (67.1)	0.673
12. There are many types of HPV.	54 (72)	44 (62.9)	0.495
13. HPV can cause genital warts.	56 (74.7)	8 (11.4)	<0.001**
14. HPV can be treated with antibiotics.*	54 (72)	10 (14.3)	<0.001**
15. Most sexually active people will be infected with HPV at some point in their lives.	5 (6.7)	50 (71.4)	<0.001**
16. HPV usually does not require any treatment.	12 (16)	51 (72.9)	<0.001**
17. If a woman's HPV test is positive, she will definitely get cervical cancer.*	48 (64)	8 (11.4)	<0.001**
18. HPV testing can be done at the same time as a PAP Smear test.	50 (66.7)	12 (17.1)	<0.001**
19. HPV testing tells you how long you have had HPV infection.*	47 (62.7)	13 (18.6)	<0.001**
20. HPV testing is used to determine whether HPV vaccination is necessary.*	46 (61.3)	15 (21.4)	<0.001**
21. When you have an HPV test, you can get your results the same day.*	11 (14.7)	9 (12.9)	0.363
22. If a woman does not have HPV, her risk of developing cervical cancer is low.	52 (69.3)	12 (17.1)	<0.001**
23. Girls who have had the HPV vaccine do not need to have a PAP Smear test at an older age.*	54 (72)	11 (15.7)	<0.001**
24. One of the HPV vaccines protects against warts in the genital area.	49 (65.3)	51 (72.9)	0.123
25. HPV vaccines protect against all sexually transmitted infections.*	45 (60)	8 (11.4)	<0.001**
26. A person who has been vaccinated with HPV will not get cervical cancer.*	13 (17.3)	11 (15.7)	0.911
27. HPV vaccines protect against most types of cervical cancer.	47 (62.7)	7 (10)	<0.001**
28. Three doses of HPV vaccine are required	51 (68)	18 (25.7)	<0.001**
29. HPV vaccines are most effective in individuals who have never had sexual intercourse.	10 (13.3)	51 (72.9)	<0.001**
30. HPV vaccine is recommended for all women ages 11-26.	48 (64)	55 (78.6)	0.005
31. HPV vaccine is licensed for women ages 30-45.*	16 (21.3)	8 (11.4)	0.258
32. Both available HPV vaccines (Gardasil and Cervarix) protect against both genital warts and cervical cancer.*	7 (9.3)	17 (24.3)	<0.001**
33. HPV vaccine is licensed for men ages 11-26.	13 (17.3)	11 (15.7)	0.816

*p<0.05; **p<0.001; HPV: Human papillomavirus; AIDS: Acquired Immunodeficiency Syndrome; PAP: Papanicolaou

TABLE 6: HPV Knowledge Scale sub-dimension scores by participant groups

	n	General HPV		HPV screening test		HPV vaccine and vaccine application		Total	
		$\bar{X} \pm SD$	p value	$\bar{X} \pm SD$	p value	$\bar{X} \pm SD$	p value	$\bar{X} \pm SD$	p value
Dentists	75	7.2 $\pm$ 2.01		3.38 $\pm$ 1.20		4.7 $\pm$ 1.68		15.29 $\pm$ 2.95	
Dental students	70	8.8 $\pm$ 1.76	<0.001	0.98 $\pm$ 0.85	<0.001	3.54 $\pm$ 1.33	<0.001	13.32 $\pm$ 2.43	<0.001**

HPV: Human papillomavirus; SD: Standard deviation

DISCUSSION

The demographic profile of patients with oral cancer is changing and the prevalence of HPV-positive oral cancers is rapidly increasing. Over the next 10 years, HPV is predicted to be the most prevalent risk factor for oral cancer.²⁴ Dentists are in an important position to prevent HPV-related oral cancers and can contribute to the reduction of oral cancer incidence by identifying and educating patients at high risk for oral cancer. In this study, where the knowledge and attitudes of dentists and senior dentistry students at a university's faculty of dentistry were evaluated about HPV and HPV vaccines, the results of the study revealed that the participants' knowledge and attitudes were insufficient.

It was observed that the participants generally answered only half or less than half of the questions in the HPV Knowledge Scale. Although the students' HPV knowledge subscale scores were higher than the dentists, it was observed that the HPV screening tests, HPV vaccine and vaccine application programs subscale and Total Knowledge Scale scores were lower than the dentists. The correct response rate of students to questions about screening tests varied between 11.4% and 21.4%, in other words, students were able to answer only 1 question correctly out of 6 questions on average. A similar situation was seen in questions about HPV vaccines and vaccination program applications, and very few students were able to answer some questions. For example, only 14.3% of students knew that HPV cannot be treated with antibiotics. This result was partially consistent with the lower response rate given by the students to the question "Do you have sufficient information about HPV and HPV

vaccines?" Although dentists had higher levels of knowledge about HPV screening tests and HPV vaccines than students, their general knowledge about HPV was worse than students. For example, only 14.7% of dentists knew that HPV can cause cervical cancer. Similarly, dentists gave lower correct response rates than students in questions about the transmission and treatment of HPV. Lorenzo-Pouso et al. reported that clinical students achieved significantly better correct answer percentages than pre-clinical students in their study evaluating dentistry students in terms of their knowledge about HPV (56.3% vs. 43.7%).²⁵ In the study of Yemenoglu and Köse, the knowledge level of research assistants and 5th-year students was found to be similar.²⁶ The knowledge level of 4th-year students was lower compared to them. Poelman et al. in the Netherlands in 2017; In their study on the relationship between HPV and oral cancer, they stated that postgraduate students (75%) had a better level of knowledge than undergraduate students (54.3%).²⁷

In the study, 68.6% of the students and 64% of the dentists responded yes to the question "Can HPV cause oral cancer?", but there was no statistically significant difference between the participants' responses. In a study conducted on dentistry students and research assistants studying at a dentistry faculty in Türkiye, participants reported that some HPV types can cause oral cancer at a higher rate (91.3%) than in our study.²⁶ When the agreement rates for the statement "Some HPV types cause oral cancer" were examined in the study by Keser et al., the agreement rates of 4th and 5th year dentistry students were similar (89.9% and 84.8%, respectively), while the agreement rate of 3rd year students was significantly lower

(72%).²⁸ In a study conducted by Sallam et al., most of the participants in the clinical group (clinical dentistry students, interns, and postgraduate maxillofacial surgery residents) correctly identified HPV as a risk factor for the development of oral cancer (88.2%).²⁴ In a study conducted in Spain, 75% of dentistry students believed that HPV infection was associated with oropharyngeal cancer.²⁵ In addition, only 55.7% of students and 72% of dentists in our study stated that they had sufficient knowledge about oral cancer. These results revealed that students do not have sufficient knowledge about oral cancer and HPV-related oropharyngeal cancers, and therefore, the dentistry curriculum needs to be reviewed.

The rates of HPV vaccination among participants in the study (28% among dentists, 15.7% among students) were above the vaccination rates in Türkiye. Similarly, in a study conducted in Türkiye on 4th and 5th year dentistry students and research assistants, the rate of those who received HPV vaccination was found to be 26.1%. However, Lorenzo-Pouso et al. reported that 48.7% of dentistry students participating in their study were vaccinated against HPV.²⁶ In our study, it was observed that the intention to get vaccinated was low among those who had not been vaccinated (30.7% among dentists, 38.6% among students). This may be due to the fact that they felt that they were not at risk for HPV infection or they had doubts about the HPV vaccine. The rates of getting the HPV vaccine and the intention to recommend it to their relatives and patients were lower among students than among dentists. When the health belief model regarding HPV and HPV vaccines was examined, it was found that students agreed with the statements “I have doubts about the effectiveness and safety of HPV vaccines”, “Possible side effects of HPV vaccines worry me” and “I have difficulty deciding to get HPV vaccine at an early age” at a significantly higher rate ($p < 0.001$) than dentists, which explains the possible reason for this. Dentists had more positive attitudes toward HPV vaccines in the study. The perceived benefit and perceived susceptibility subscale scores were significantly higher for dentists than for students, while the perceived barriers subscale score was significantly lower. Dentists were more sensitive about HPV in-

fection than students and thought the vaccine was beneficial. Both groups thought the vaccine was expensive. Dentists’ more positive attitudes toward vaccines compared to students may be related to the fact that advanced age or changes in marital status may increase the likelihood of interaction with healthcare providers who recommend vaccines, including HPV vaccines. Students had higher levels of concern about the side effects of the vaccine and skepticism about the vaccine than dentists. Similarly, in Wright et al.’s study, dentistry students knew less about the vaccine’s major adverse effects, the ideal immunization age, and whether it’s safe to vaccinate those who had already been diagnosed with HPV.²⁹ These results suggest that some students enter the dental profession with inadequate preparation to provide accurate information about the HPV vaccine to patients and parents.

Adequate knowledge about HPV and related oropharyngeal cancers among dentists is critical because a key element in lowering the disease’s morbidity and death rate is early detection.³⁰ In dentistry faculty education in Türkiye, information about HPV is included in the content of oral microbiology, oral pathology and oral, dental and maxillofacial surgery courses. In the study, 32.9% of students and 68% of dentists reported that they received training on HPV during their undergraduate dentistry education. It is extremely important that this training be carried out in the form of patient education and counseling in addition to theoretical training. There was no such training module on HPV in the faculty where the study was conducted. Torres et al. found that only 11% of dental schools examined included patient education in their curriculum.³¹ Cotter et al. reported that a training module on HPV patient education and counseling boosted oral health students’ confidence in their capacity to advise and promote the HPV vaccine to patients.³²

In the current study, students and dentists were from a single university’s faculty of dentistry, so the results cannot be generalized to other universities. However, the use of internationally accepted scales to measure dentists’ knowledge and attitudes is a strength of this study.

CONCLUSION

It was observed that dentists and dentistry students had very low knowledge levels about HPV and HPV vaccines. Although dentistry students had better knowledge about HPV than dentists, they had very little knowledge about HPV screening tests and HPV vaccines. In addition, students had a negative attitude about HPV vaccines, especially about the effectiveness and safety of the vaccine, in proportion to their knowledge levels. In order for dentists to be able to counsel their patients and parents about HPV and HPV vaccines, they must first receive good training themselves. The study results indicate that the education curriculum should be reviewed about HPV and HPV vaccines. Practical education models that will provide consultancy services to the public about HPV and HPV vaccines should be included in the dentistry education curriculum as soon as possible. In this way, knowledgeable and equipped dentists, together with other

health professionals, can play an important role in the elimination of HPV in Türkiye.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Ömer Ekici; **Design:** Ömer Ekici; **Control/Supervision:** Ömer Ekici; **Data Collection and/or Processing:** Ömer Ekici, Selman Güler; **Analysis and/or Interpretation:** Ömer Ekici, Selman Güler; **Literature Review:** Ömer Ekici, Selman Güler; **Writing the Article:** Ömer Ekici, Selman Güler; **Critical Review:** Ömer Ekici; **References and Fundings:** Ömer Ekici; **Materials:** Ömer Ekici, Selman Güler.

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