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**Evaluation of the Level of Knowledge and Awareness of Individuals with Health Education about HPV; a Cross-Sectional Study**

**HPV ve Ağız Kanseri Hakkında Sağlık Eğitimi Alan Öğrencilerin Bilgi ve Farkındalık Düzeyinin Araştırılması: Kesitsel bir Çalışma**

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## Abstract

**Objective:** The aim of this study was to learn the level of knowledge and awareness of health education students about HPV and oral cancers.

**Materials and Methods:** The online questionnaire was sent to medical, dental, midwifery, nursing and other healthcare students. The questionnaire consists of three sections: demographic characteristics, level of knowledge about HPV, and awareness about HPV. Chi-Square test was used for determining the difference between the groups.

**Results:** Participants' data revealed that 7.1% had received the HPV vaccine, while 68.7% were considering getting vaccinated and would recommend it to others. Furthermore, it was observed that individuals with a medical education possessed more accurate knowledge about HPV and the HPV vaccine. Additionally, women were found to have a better understanding of HPV and exhibited a more favorable attitude toward HPV vaccination.

**Conclusion:** Conducting more informative and educational activities targeting individuals with a healthcare background regarding HPV, HPV-related diseases, and the HPV vaccine will play a pivotal role in preventing HPV-related issues.

**Keywords:** Human papillomavirus, Human papillomavirus Vaccines, Oral Cancer.

## Özet

**Amaç:** Bu çalışmanın amacı, sağlık eğitimi öğrencilerinin HPV ve oral kanserler hakkındaki bilgi düzeyini ve farkındalığını öğrenmektir.

**Gereç ve Yöntemler:** Çevrimiçi anket, tıp, diş, ebelik, hemşirelik ve diğer sağlık öğrencilerine gönderildi. Anket üç bölümden oluşmaktadır: demografik özellikler, HPV hakkındaki bilgi düzeyi, HPV farkındalığı. Gruplar arasındaki farkı belirlemek için Ki-Kare testi kullanılmıştır.

**Bulgular:** Katılımcıların verileri, %7,1'inin HPV aşısı olduğunu %68,7'sinin aşı olmayı düşündüğünü ve hastalarına da önerdiğini ortaya koydu. Ayrıca, tıp eğitimi alan bireylerin HPV ve HPV aşısı hakkında daha doğru bilgiye sahip olduğu gözlemlendi. Ek olarak, kadınların HPV konusunda daha iyi bilgi düzeyine sahip olduğu ve HPV aşısına daha olumlu bir tutum sergilediği bulundu.

**Sonuç:** Sağlık geçmişi olan bireylere yönelik HPV, HPV ile ilişkili hastalıklar ve HPV aşısı hakkında daha bilgilendirici ve eğitici faaliyetlerin düzenlenmesi, HPV ile ilişkili sorunların önlenmesinde kilit bir rol oynayacaktır.

**Anahtar kelimeler:** İnsan papillomavirüsü, İnsan papillomavirüsü aşısı, Oral Kanser.

## Introduction

Human Papillomavirus (HPV) represents a diverse group of DNA-based viruses that primarily infect the skin and mucous membranes of humans. More than 200 distinct types of HPV have been identified to date, which are implicated in a variety of conditions ranging from benign skin warts to cancers.<sup>1</sup>

HPV types are generally classified into “low-risk” and “high-risk” based on their association with cancer. Low-risk HPV types, such as HPV-6 and HPV-11, can lead to conditions like genital warts and recurrent respiratory papillomatosis, whereas high-risk types, such as HPV-16 and HPV-18, are often associated with several forms of cancer, including cervical, anal, oropharyngeal, penile, and vulvar cancers.<sup>2</sup> HPV is known to be the most common sexually transmitted infection (STI) worldwide. In the United States, it is estimated that nearly all sexually active men and women will get at least one type of HPV at some point in their lives.<sup>3</sup> Despite the potential risks associated with HPV, prevention is possible through vaccination. Vaccines such as Gardasil Nine protect against the most dangerous types of HPV, particularly those most likely to cause cancer and genital warts.<sup>4</sup> HPV, particularly the high-risk type HPV-16, has been established as a significant risk factor for a subset of oral cancers, more specifically, oropharyngeal squamous cell carcinomas (OPSCC), which are cancers of the throat, tonsils, and base of the tongue.<sup>5</sup>

The prevalence of HPV-positive OPSCC has been on the rise in recent decades, particularly in developed countries. This trend has been attributed to changing sexual behaviors, including an increase in oral sex, which facilitates the transmission of HPV to the oral cavity.<sup>6</sup> Interestingly, HPV-positive OPSCCs have distinct clinical features compared to their HPV-negative counterparts. HPV-positive cancers are typically associated with a younger patient population and are more likely to respond favorably to treatment, leading to improved survival rates.<sup>7</sup> The link between HPV and oral cancer underscores the importance of HPV vaccination for the prevention of these cancers. Vaccination has been shown to produce robust immune responses in the oral cavity, offering a promising strategy to curb the rising incidence of HPV-related oral cancers.<sup>8</sup>

The aim of this study was to learn the level of

knowledge and awareness of health education students about HPV and oral cancers. The null hypothesis ( $H_0$ ) of our study is stated as “There is no difference in the level of knowledge and awareness about the relationship between HPV and oral cancers among individuals receiving education in different health disciplines.”

## Materials and Methods

Approval for this study was obtained from Van Yüzüncü Yıl University Non-Interventional Clinical Research Ethics Committee (2023/07/03). This questionnaire study was conducted in accordance with the provisions of the Declaration of Helsinki, and informed consent was obtained from the individuals included in the study. We conducted a post hoc power analysis using G\*Power version 3.1.9.2 (Franz Faul, University of Kiel, Germany). In the analysis, differences among individuals from various health education fields regarding HPV and related cancers were assessed using a chi-square test. With an effect size ( $w$ ) of 0.34 and an alpha error probability of 0.05, the study’s power was determined to be 95% with a sample size of 322 individuals. The online questionnaire was created on Google Forms (Alphabet, Mountain View, CA, USA) and was delivered to 581 volunteer participants via WhatsApp (WhatsApp Inc, USA) between 14 June 2023 and 14 July 2023. The questionnaire was initially developed by the faculty members involved in this study. The reliability of the questionnaire was evaluated using the test-retest method. The consistency of the questionnaire questions was assessed using the Pearson-Spearman correlation. Questions with a correlation coefficient below the accepted threshold of 0.3 were excluded from the questionnaire. At the outset of the questionnaire, it was indicated that participation in the study was entirely voluntary. Only those who consented to take part proceeded to complete the questionnaire. The final version of the survey was developed based on their feedback. The questionnaire consisted of eighteen questions in three parts and was organized. Inclusion criteria: between 18 and 35 years of age, being medical, dental, midwifery, nursing and other healthcare students (Anesthesia Technician, Health Technician, Physical Therapy and Rehabilitation, Veterinary Medicine, Nutrition and Dietetics.) Exclusion criteria were for those with physical or mechanical disabilities to answer the online questionnaire. Part 1: three

questions about demographic characteristics; Part 2: seven questions of common knowledge about HPV; Part 3: eight questions of awareness about HPV.

The data were analyzed using IBM SPSS Version 23. For the comparison of categorical variables between groups, the Chi-Square test was utilized. Analysis results were presented for quantitative variables as mean  $\pm$  standard deviation and median (minimum-maximum), while categorical data were presented as frequencies (percentages). A significance level of  $p < 0.05$  was considered.

## Results

Out of 581 participants, 53% (308) were female, 46.5% (270) were male, and 0.5% (3) chose not to specify their gender. Regarding age distribution, 85.7% (498) of participants were between the ages of 18-25, 12% (70) were aged 26-30, 1.7% (10) were over 30 years old, and 0.5% (3) were under 18 years old. In terms of educational backgrounds, 59.6% (346) of participants were dental students, 22.2% (129) were medical students, 5.2% (30) were midwifery students, 6% (35) were nursing students, and 7.1% (41) were students pursuing other healthcare-related education programs (Table 1).

**Table 1.** Distribution of demographic findings.

		n	%
<b>Gender</b>	Female	308	53
	Male	270	46.5
	Unknown	3	0.5
<b>Groups of ages</b>	<18	3	0.5
	18-25	498	85.7
	26-30	70	12
	>30	10	1.7
<b>Job</b>	dentist	346	59.6
	doctor	129	22.2
	midwife	30	5.2
	nurse	35	6
	others	41	7.1

The participants' responses to the questions are detailed in Table 2. The questionnaire included a total of 8 questions evaluating participants' opinions on HPV. These questions were analyzed for differences based on gender, age, and profession using the Chi-Square test. For questions 6, 9, 10, 11, 13, 14, and 15, no statistically significant differences were observed concerning age ( $p > 0.05$ ). However, for question 8, a statistically significant difference was observed

( $p < 0.01$ ). Regarding gender, questions 6, 9, 10, 13, and 14 showed no statistically significant differences ( $p > 0.05$ ), while questions 8, 11, and 15 revealed statistically significant differences ( $p = 0.01$ ,  $p \leq 0.05$ ,  $p < 0.01$ ). Concerning professions, questions 8, 10, 11, 13, 14, and 15 did not exhibit statistically significant differences ( $p > 0.05$ ), except for question 8, which showed a statistically significant difference based on profession ( $p < 0.001$ ), (Table 3).

**Table 2.** Response rates from patients.

		N	%
1-What is HPV ?	Virus	308	53
	Bacteria	270	46.5
	Parasite	3	0.5
	None of them	0	
2- How common do you think HPV virus is?	Not common	85	14.6
	Average prevalence	365	62.8
	Very common	131	22.5
	Cervix cancer	115	19.8
3-Which diseases do you think the HPV virus is associated with?	Oral cancer	127	21.9
	Skin cancer	16	2.8
	Skin and oral cancer	175	30.1
	Servix and skin cancer	129	5
	Oral and skin cancer	9	1.5
4- Do you know how HPV spreads in the mouth?	All of them	110	18.9
	By contact	180	31
	Sexual	302	52
	Aerosol	99	17
5- What do you think about the possibility that HPV can cause oral cancer?	I Agree	443	76.2
	I am not sure	124	21.3
	I don't agree	14	2.4
	Unknowledgeable	61	10.5
6-How knowledgeable do you feel about HPV and oral cancer?	Less knowledgeable	218	37.5
	Moderately knowledgeable	242	41.7
	Knowledgeable	51	8.8
	More knowledgeable	9	1.5
7- Do you think the HPV vaccine can reduce the risk of HPV-related cancers?	I agree	406	69.9
	I am not sure	158	27.2
	I don't agree	17	2.9
	Already vaccinated	41	7.1
8- Would you consider HPV vaccination?	I haven't, but i'm thinking about it	399	68.7
	I haven't been but I don't plan to be.	141	24.3
	Always	252	43.4
9- Do you recommend HPV vaccine to your patients?	Sometimes	286	49.2
	Never	43	7.4
	Always	224	38.6
10- Do you recommend that your patients with oral cancer receive the HPV vaccine?	Sometimes	297	51.1
	Never	60	10.3
	Yes absolutely	501	86.2
11-If the HPV vaccine is free, will it increase the percentage of vaccination for you or your patients?	No It will not	29	5
	I am not sure	51	8.8
	Female	175	30.1
12- Which gender is particularly important to vaccinate against HPV?	Male	25	4.3
	Both of them	381	65.6

13- The HPV vaccine, which is given to girls from the age of 9, can prevent cervical cancers and oral cancers that may develop with it. In light of this information, would you get it if you have a daughter?	yes	476	81.9
	no	19	3.3
	I am not sure	86	14.8
14- Do you think you need more education about HPV and oral cancer?	Yes absolutely	428	73.7
	Yes maybe	146	25.1
	no	7	1.2
	Articles ve searchings	393	17.54
	Education seminars or webinars	373	16.64
15- Which resources would you prefer to use to teach your patients more about HPV and oral cancer? (Multiple choice)	Brochures or information cards for patients	354	15.8
	Online health portals or websites	259	11.56
	Doctors or healthcare professionals	391	17.45
	Social media	254	11.33
	Books and journals	217	9.68

**Table 3.** Comparison of the distribution of answers to interpretative questions according to demographic groups.

Age	Question 6			Question 8			Question 9		
	n	x <sup>2</sup>	p	n	x <sup>2</sup>	p	n	x <sup>2</sup>	p
18<	3			3			3		
18-25	498	10.677	>.05	498	26.398	<.01	498	21.094	<.05*
26-30	70			70			70		
>30	10			10			10		
<b>Gender</b>									
Females	308			308			308		
Males	270	18.475	.001	270	12.093	>.05	270	13.277	.01*
Unknown	3			3			3		
<b>Job</b>									
Dentist	346			346			346		
Doctor	129			129			129		
Midwife	30	31.262	<.001	30	20.857	>.05	30	5.739	>.05
Nurse	35			35			35		
Other	41			41			41		
Age	Question 10			Question 11			Question 13		
	n	x <sup>2</sup>	p	n	x <sup>2</sup>	p	n	x <sup>2</sup>	p
18<	3			3			3		
18-25	498	14.431	<.05	498	11.512	>.05	498	3.217	<.05
26-30	70			70			70		
>30	10			10			10		
<b>Gender</b>									
Females	308			308			308		
Males	270	11.522	<.05	270	4.807	<.05	270	13.247	.01
Unknown	3			3			3		
<b>Job</b>									
Dentist	346			346			346		
Doctor	129			129			129		
Midwife	30	32.226	<.001	30	12.540	>.05	30	10.055	>.05
Nurse	35			35			35		
Others	41			41			41		

Age	Question 14			Question 15		
	n	x <sup>2</sup>	p	n	x <sup>2</sup>	p
18<	3			3		
18-25	498	2.734	>.05	498	252.221	>.05
26-30	70			70		
>30	10			10		
<b>Gender</b>						
Females	308			308		
Males	270	10.271	<.05	270	240.506	<.01*
Unknown	3			3		
<b>Job</b>						
Dentist	346					
Doctor	129			129		
Midwife	30	13.289	>.05	30	401.950	>.05
Nurse	35			35		
Others	41			41		

N: Number, x<sup>2</sup>: Chi-Square Test, p<0.05.

The questionnaire also included a total of seven questions assessing participants' knowledge levels. These questions were analyzed for differences based on gender, age, and profession using the Chi-Square test. For questions 1, 3, 4, 5, 7, and 12, no significant differences were observed based on gender (p>0.05). However, for question 2, women outperformed men significantly in providing correct answers (p<0.01). Regarding professions, questions 1, 2, 3, 4, and 7 displayed statistically significant differences (p<0.001, p<0.01, p<0.05, p<0.05, p<0.01), while

questions 5 and 7 did not show statistically significant differences based on profession (p=0.326, p=0.413). Furthermore, for questions 1, 3, 4, 5, 7, and 12, no significant differences were observed concerning age (p>0.05). However, for question 2, participants aged 18-25 showed a statistically significant difference (p<0.05). Table 3 presents responses to opinion-based questions, while Table 4 displays responses to knowledge-based questions based on age, gender, and profession.

**Table 4.** Accuracy rates of answers to knowledge questions.

Questions	Age Groups										x <sup>2</sup>	p
	18<		18-25		26-30		>30 yaş					
	n	%	n	%	n	%	n	%				
1	3	100	495	99.40	69	98.57	10	100	0.705	>.05		
2	1	33.33	103	20.68	22	31.43	5	50	8.669	<.05*		
3	0	0	92	18.47	12	17.14	2	20	0.765	>.05		
4	3	100	414	83.13	57	81.43	8	80	0.805	>.05		
5	3	100	373	74.90	58	82.86	9	90	4.167	>.05		
7	3	100	343	68.88	53	75.71	7	70	2.664	>.05		
12	3	100	324	65.06	45	64.29	9	90	4.328	>.05		
Questions	Jobs										x <sup>2</sup>	p
	Dentist		Doctor		Midwife		Nurse		Others			
	n	%	n	%	n	%	n	%	n	%		
1	345	99.7	129	100	30	100	35	100	38	92.68	28.5	<0.001*
2	61	17.63	46	35.66	5	16.67	8	22.86	11	26.83	18.516	0.001*
3	64	18.49	33	25.58	4	13.3	1	2.86	4	9.76	12.692	<.01*
4	272	78.61	115	89.14	27	90	32	91.43	36	87.80	11.628	<.05*
5	273	78.90	97	75.19	21	70	24	68.57	28	68.29	4.643	>.05
7	224	64.74	108	83.72	20	66.67	23	65.71	31	75.61	17.160	<.01*
12	236	68.21	83	64.34	17	56.67	22	62.86	23	56.10	3.950	>.05

	Gender				x <sup>2</sup>	p
	Female		Male			
	n	%	n	%		
1	307	99.68	267	98.89	1.322	>.05
2	87	28.25	44	16.30	12.644	<.01*
3	55	17.86	49	18.15	4.749	>.05
4	260	84.42	219	81.11	1.731	>.05
5	237	76.95	203	75.19	1.186	>.05
7	219	71.10	185	68.52	0.472	>.05
12	191	62.01	188	69.63	3.699	>.05

N: Number, x<sup>2</sup>: Chi-Square Test, p<.05.

### Discussion

Based on the results of our study, our null hypothesis has been rejected. This is because statistically significant differences were observed in the levels of knowledge and awareness about the relationship between HPV and oral cancers among individuals receiving education in different health disciplines.

HPV is considered one of the leading causes of cervical intraepithelial neoplasia. While there are more than 200 genotypes of HPV, approximately 20 of them are associated with cervical cancer.<sup>9,10</sup> As the prevalence of +HPV-related oral cancers continues to rise, the demographic characteristics of patients with oral cancer are also evolving. Research indicates that regular examinations by dentists and oral hygiene providers can lead to a 32% reduction in mortality rates caused by this disease for individuals at risk of oral cancer.<sup>11</sup> Therefore, dentists play a critical role in preventing HPV-related oral cancers, identifying high-risk patients, and educating them about healthy habits, ultimately contributing to a decrease in the incidence of oral cancer.

Yemenoğlu et al. assessed the knowledge levels of 69 participants, including research assistants and 4<sup>th</sup> and 5<sup>th</sup>-year dental students, regarding HPV. As a result, it was found that senior research assistants and senior students had similar levels of knowledge, while 4<sup>th</sup>-year students had a lower level of knowledge.<sup>12</sup> In the current study, students from faculties other than dentistry, such as medicine, midwifery, nursing, veterinary, and dietetics, were also included. It was observed that participants with medical education provided statistically significantly more correct answers to knowledge questions in the study. Sallam et al. conducted research on dental students' awareness and attitudes regarding HPV-related oral cancers. The majority of the participants expressed

that HPV poses a risk for oral cancer and advocated for effective oral cancer screenings. However, they had a lower level of knowledge about HPV-related oral cancers and the HPV vaccine.<sup>13</sup> In the current study, it was observed that 65% of the participants believed that it is important for both genders to receive the HPV vaccine, while 30.1% believed it is important for females, and 4.3% believed it is important for males. It was also noted that individuals receiving healthcare education in Turkey were more knowledgeable about HPV compared to Jordanian dental students.

Poelman et al. evaluated the opinions of 126 Dutch dental students regarding the prevention of HPV-related oral cancers by dentists. They reported that while there were controversial views on whether HPV causes oral cancers, the participants believed that oral cancer screenings conducted by dentists could potentially reduce the risk of oral cancer.<sup>14</sup> In the current study, 69.9% of the participants expressed the opinion that the HPV vaccine would definitely reduce the risk of developing HPV-related cancers. Furthermore, the participants expressed their views on the possibility of HPV-related oral, cervical, and skin cancers developing. Additionally, the participants' knowledge levels regarding the prevalence of the HPV virus were assessed, and it was observed that women were statistically more knowledgeable about this topic compared to men. This is thought to be due to information disseminated through social media and public spaces, highlighting that HPV vaccines significantly reduce the risk of developing HPV-related cervical cancers, especially in women. Studies conducted in the Netherlands and Jordan have shown that individuals receiving healthcare education in Turkey are more knowledgeable about the HPV vaccine and HPV-related cancers compared

to other countries. In fact, 86.22% of the participants expressed the opinion that making the HPV vaccine free of charge in our country would increase the likelihood of getting vaccinated.

Khamisy-Farah et al. administered a survey to a group of 139 healthcare professionals, consisting of child health specialists, gynecologists, and internal medicine specialists, to assess their knowledge about HPV, the HPV vaccine, and HPV-related diseases. They found that the level of knowledge among Israeli healthcare personnel about HPV was at a moderate level, with approximately 20% of them advocating that there is no need to administer the HPV vaccine to male children.<sup>15</sup>

However, in this study, it was observed that 65% of individuals receiving healthcare provider education believed that the HPV vaccine should be administered to both genders. Stanley et al. conducted a survey among 63 male gynecologists and male ear, nose, and throat (ENT) specialists, revealing that these healthcare professionals advocated for HPV vaccination despite not being vaccinated themselves.<sup>16</sup> Akalin et al. investigated the views and knowledge levels of 638 medical and nursing students regarding HPV and the HPV vaccine. It was found that although the percentage of participants who had received the vaccine was low, they had a positive attitude toward vaccination. Differences in knowledge levels were observed based on gender, place of residence, faculty (departments), and year of education.<sup>17</sup> In the current study, the knowledge levels of individuals receiving healthcare education were assessed concerning HPV, the HPV vaccine, and HPV-related lesions. While the majority had not been vaccinated, 68.7% expressed an intention to get vaccinated, and 7.1% were already vaccinated. Interestingly, this situation did not vary significantly across different educational departments. Regarding the question about what HPV is, participants with medical, midwifery, and nursing education all provided correct answers, while the group categorized as "other healthcare providers" had the lowest rate of correct responses. When asked about the prevalence of HPV, HPV-related lesions, and the effectiveness of the HPV vaccine, individuals with medical education provided the highest rate of correct answers. For the question related to HPV transmission, nursing students, followed by midwifery students, provided more correct responses.

Özdede et al. studied the differences in knowledge about the link between HPV and oral cancers among 209 individuals, including 82 dentists and 127 dental students. Their research revealed that both groups had comparable levels of understanding regarding the relationship between HPV and oral cancers. However, it was noted that dental students were more supportive of vaccination than dentists.<sup>18</sup> In our study, although we did not assess the impact of graduation on knowledge levels about this topic, we observed differences among those with healthcare education. Specifically, individuals with medical training showed significantly more knowledge about HPV and its association with oral cancers compared to other fields. Additionally, women were significantly more inclined to receive the HPV vaccine than men, while no significant differences were found among various professional disciplines.

In the study by Daley et al., it was reported that only 9% of dentists discuss HPV vaccination with their female patients, and 81% of dentists possess insufficient information about the HPV vaccine.<sup>19</sup> In the study by Arnell et al., it was found that dentists feel they lack sufficient information about HPV vaccination, leading them to avoid discussing the topic with their patients.<sup>20</sup> In our study, the vast majority of individuals with dental and medical education believe that the vaccine will prevent HPV-related cancers.

Das et al. investigated the level of knowledge regarding HPV and associated cancers among a sample of 1000 individuals undergoing health education in India. The findings revealed that these individuals lacked sufficient knowledge on the subject.<sup>21</sup> In contrast, our study concluded that individuals were more willing and knowledgeable about both HPV and associated cancers, as well as HPV vaccination, compared to studies documented in the literature.

Lockwood et al. evaluated changes in awareness and knowledge levels over a twelve-month period among 763 Indigenous Australian individuals who had received the HPV vaccine compared to those who had not. The results showed that vaccinated individuals had significantly higher awareness of both the virus and HPV-related oral cancers.<sup>22</sup> This indicates that increased informational messages and education about HPV can improve vaccination rates,



potentially leading to reductions in the prevalence of HPV-related oral and cervical cancers.

### **Conclusion**

Conducting more informative and educational activities targeting individuals with a healthcare background regarding HPV, HPV-related diseases, and the HPV vaccine will play a pivotal role in preventing HPV-related issues.

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The authors received no financial support for the research.

### **Conflicts of Interest**

The authors declare that they have no conflict of interest.

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### **Authors' Contribution**

Concept/Idea: K.S, K.A Design: K.S Supervision/ Consultation: K.S Analysis and/or Interpretation: K.S Literature Search: K.S Manuscript Writing: K.S, K.A Critical Review: K.S, K.A

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