



Evaluation of human papilloma virus knowledge levels of university students by providing training

Üniversite öğrencilerinin human papilloma virüsü bilgi düzeylerinin eğitim verilerek değerlendirilmesi

Ayşe Karacalı Tunç¹, Büşra Merve Sarıtaş², Mahdi Marzi³

¹Iğdır University, Faculty of Dentistry, Department of Basic Sciences, Iğdır, Türkiye

²Iğdır University, Vocational School of Health Services, Department of Dental Services, Iğdır, Türkiye

³Fenerbahçe University, Faculty of Pharmacy, Department of Pharmaceutical Microbiology, İstanbul, Türkiye

ABSTRACT

Aim: Human Papilloma Virus (HPV) is known to cause various cancers. Therefore, the aim of the study was to investigate the impact of HPV awareness education on university students' knowledge levels regarding HPV.

Method: The study was designed in a one-group quasi-experimental design. The HPV knowledge scale was used in the study. In this context, pre-test and post-test were applied to 66 students to evaluate their HPV knowledge levels and the sustainability of their awareness after receiving training. Under the name of HPV awareness, students were trained for a period of four weeks. The same test was reapplied two weeks later to test the retention of the student's learning. In the study, repeated measures ANOVA analysis was used to analyse the data.

Results: In the total score of the "HPV Knowledge" scale; in the sub-dimension "General HPV Knowledge" significant difference was found among the groups according to knowledge about sexually transmitted diseases and the variables of knowledge about cervical cancer ($p<0.05$). In the sub-dimension of "General HPV Knowledge" ($t=-6.715$), "HPV Screening Test Knowledge" ($t=-5.183$), "General HPV Vaccine Knowledge" ($t=-5.489$), statistically significant differences were found in favor of the posttest mean score ($p<0.05$). Moreover, significant differences were observed in the sub-dimension of "Information on the Current HPV Vaccination Program" ($t=-5.212$) as well as the total score of the scale ($t=-8.229$) ($p<0.05$).

Conclusion: In line with these results, it can be said that the education given about HPV is effective and increases the knowledge level of the students about HPV.

Keywords: cancer of the cervix; human papillomavirus; vaccination

ÖZ

Amaç: Human Papilloma Virüsü (HPV) çeşitli kanserlere neden olduğu bilinmektedir. Bu nedenle çalışmamızın amacı HPV farkındalık eğitiminin üniversite öğrencilerinin HPV hakkındaki bilgi düzeyleri üzerindeki etkisini araştırmaktır.

Yöntem: Çalışma tek gruplu yarı deneysel desende tasarlandı. Çalışmada HPV bilgi ölçeği kullanıldı. Bu kapsamda 66 öğrenciye HPV bilgi düzeyleri ve eğitim aldıktan sonra farkındalıklarının sürdürülebilirliğini değerlendirmek amacıyla ön test ve son test uygulandı. HPV farkındalığı adı altında öğrencilere dört haftalık bir sürede eğitim verildi. Aynı test öğrencinin öğrenmesinin kalıcılığını test etmek amacıyla iki hafta sonra tekrar uygulandı. Çalışmada verilerin analizi için tekrarlı ölçümlerde ANOVA analiz kullanıldı.

Bulgular: "HPV Bilgisi" ölçeği toplam puanında; "Genel HPV Bilgisi" alt boyutunda, cinsel yolla bulaşan hastalıklara ilişkin bilgi ve serviks kanserine ilişkin bilgi değişkenlerine göre gruplar arasında anlamlı fark bulunmuştur ($p<0.05$). "Genel HPV Bilgisi" ($t=-6.715$), "HPV Tarama Testi Bilgisi" ($t=-5.183$), "Genel HPV Aşısı Bilgisi" ($t=-5.489$) alt boyutunda, son test puan ortalaması lehine istatistiksel olarak anlamlı fark bulunmuştur ($p<0.05$). Ayrıca, "Mevcut HPV Aşılama Programı Hakkında Bilgi" alt boyutunda ($t=-5.212$) ve ölçeğin toplam puanında ($t=-8.229$) anlamlı fark bulunmuştur ($p<0.05$).

Sonuçlar: Bu sonuçlar doğrultusunda HPV hakkında verilen eğitimin etkili olduğu ve öğrencilerin HPV hakkındaki bilgi düzeyini artırdığı söylenebilir.

Anahtar kelimeler: aşı, insan papilloma virüsü; serviks kanseri

Introduction

Human papillomavirus (HPV) is the most common sexually transmitted viral infection. Although it plays a role in multiple cancers including genital, anal, and oropharyngeal cancers in both women and men, it is highly associated with cervical cancer (Dilley et al., 2020; Haddad et al., 2022). According to the 2020 cancer cases data of the "Global Cancer Observatory"; it is the fourth most common type of cancer among women worldwide, with 604.000 new cases and 342.000 deaths (Alışkan et al., 2023; World Health Organization [WHO], 2023). It is known that there are 400 types of HPV belonging to the Papillomaviridae family. They are grouped as low-risk HPVs (LR-HPV) responsible for the formation of anogenital and cutaneous warts, and high-risk HPV types (HR-HPV) responsible for oropharyngeal (oral,

tonsil and throat regions), cervical, anal, vulvar, vaginal and penile cancers (Düzlü et al., 2016; Kombe et al., 2021). More than 90% of cervical cancers are caused by HR-HPV (Dilley et al., 2020). HPV types with high risk for cervical cancer are reported by 16. 18. 31. 33. 35. 39. 45. 51. 52. 56. 58. 68. 73. 82. Considering that HPV has an important role in the development of cancer-related diseases, HPV screening, which is more sensitive and cost-effective than cytology-based screening tests, is strongly recommended, especially in the detection of cervical cancer. Approximately 80% of the female population will encounter HPV in their lifetime. Mortality rates have been significantly reduced with successful screening programs in developed countries (Keser & Pekiner, 2020; Tüney et al., 2017). One of the cervical cancer prevention strategies is HPV vaccination before the



first sexual contact among adolescents (American College of Obstetricians and Gynecologists, 2017). HPV vaccines consist of virus-like particles (VLP) containing HPV capsid antigens without viral DNA. These VLP mixtures are composed of the most prevalent HR-HPV subtypes, offering protection across various HPV types due to the robust antigenic specificity of HPV capsid antigens. There are currently two widely used vaccines (bivalent and quadrivalent) that protect against HPV 16 and 18 recognized as the agents behind at least 70% of cervical cancer cases. Quadrivalent vaccine also provides protection against HPV types 6 and 11, which cause anogenital warts. If both vaccines are administered before exposure to HPV, their protection is higher. For this reason, it should be preferred before the first sexual activity. The WHO recommends vaccination of girls between the ages of 9 and 14 as the most cost-effective prevention against cervical cancer (WHO, 2024; Okunade, 2020). Cervical cancer is largely preventable through HPV vaccination and screening programs. As of 2019 one hundred countries have included the HPV vaccine in their national vaccination programs. In our country, HPV vaccine has not yet been included in the national vaccination calendar. Additionally, it is not covered by health insurance. The vaccine is also on the WHO's List of Essential Medicines. In 2020 the Food and Drug Administration authorized the approved use of the Gardasil 9vHPV (HPV 9-valent Vaccine, Recombinant) vaccine in women aged 9 to 45 years and later extended this approval to include men as well (Güder & Güder, 2022).

In Türkiye, there are bivalent (2vHPV) and quadrivalent (4vHPV) HPV vaccines. Young people's knowledge about HPV in the country and preventive vaccines can have an impact on reducing disease and cancer. In a study, most of the young people incorrectly believed that HPV was a rare disease, that its signs/symptoms would be obvious, and that it could be treated with antibiotics. Evaluating the level of knowledge and awareness of young people regarding HPV infections will guide the development of appropriate vaccination and protection policies and the scope of education programs appropriate to their age and needs in this field. Young people's knowledge about HPV-related infections, preventive vaccines, and HPV awareness can have an impact on reducing the burden of disease and cancer. There are many studies showing that attitudes towards cervical cancer and HPV vaccine differ between societies (Amboree et al. 2022; Güder & Güder, 2022; Uyan, 2021). We believe that the knowledge of young people about this issue and their belief in the benefits of vaccination will be of great benefit in terms of educating society. In our study, it was aimed to increase the awareness of young people and increase their level of knowledge about HPV with a quasi-experimental study for students.

For this purpose, the following hypothesis was sought.

H0: HPV awareness education has no effect on the knowledge levels of university students about HPV.

H1: HPV awareness education has an effect on the knowledge levels of university students about HPV.

Methods

Study desing

This study employed a one-group pre-test, post-test, and follow-up quasi-experimental design to investigate the impact

of HPV awareness training on students' knowledge levels related to HPV. In this design, an independent variable was administered to a randomly selected group of participants. Measurements were conducted in three stages: pre-test, post-test, and follow-up test for retention (Karasar, 2007) The one-group pre-test-post-test design can also be described as a single-factor intra-group or repeated measures design, where the significance of the difference between the pre-test and post-test values within a single group is assessed (Büyüköztürk et al., 2014).

Study group

The study group consists of 66 students studying in the Medical Laboratory Techniques program of a state university in the fall semester of 2022-2023. The main reason for choosing this group is directly related to the purpose of the research. The study in question aims to examine the knowledge, attitude or behavior levels of vocational school students in the field of health on certain subjects. In this direction, the students of the Medical Laboratory Techniques program constitute the target audience of the research as individuals who are both receiving education in the field of health and those receiving applied vocational training. A convenient sampling method was used in the study. The appropriate sampling method is to include participants who already exist or who can easily be included in the sample (Aypay, 2015). To determine the appropriate sample size, a power analysis was conducted using G Power. Based on an effect size of 0.5, an alpha level of 0.05, and a power of 0.95, the minimum required sample size was calculated as 54. However, the study was conducted with 66 participants to enhance the reliability and generalizability of the findings.

Data collection tools

Students' personal information form

This form was created as a result of literature research (Yanikkerem et al., 2010; Somera et al., 2023; Özdede et al., 2020). The form includes questions about gender, family history of cancer, level of knowledge about sexually transmitted diseases, need for health education about sexually transmitted diseases, level of knowledge about cervical cancer, and HPV vaccination status.

HPV Knowledge Scale

The scale is a 35-item scale developed by Waller et al. (2013) and used to measure the level of knowledge about HPV, HPV vaccine, and screening tests. After the Turkish adaptation of the scale by Demir Bozkurt and Özdemir (2023), the final version of the scale, comprising 33 items organized into four sub-factors, was achieved by the removal of two items from its original composition. The first factor is "General HPV Information" which consists of 16 items. High scores in this sub-factor indicate high HPV general knowledge. The second factor, "HPV Screening Test Knowledge", consists of 6 items. High scores in this factor indicate that the level of knowledge about HPV screening tests is high. The third factor is "General HPV Vaccine Information" which consists of 5 items. High scores in this factor indicate that the general level of knowledge about the protection of the HPV vaccine is high. The last factor is "Information on the Current HPV Vaccination Program" which consists of 6 items. High scores on this factor indicate a high level of knowledge about the conditions related to the administration of the HPV vaccine. In the calculation of the scale, "correct" answers get one point, while "I don't know" and "wrong" answers are scored as zero. The

scale yields scores ranging from 0 to 33, indicating that a higher score correlates with a greater level of knowledge. In the adaptation study of the scale, the reliability coefficients of the sub-factors were respectively; .93, .81, .90, .72 and .96 for the sum of the scale. In our study, Cronbach's alpha coefficient was calculated to assess the internal consistency reliability of the scale; .89 for the sum of the "HPV Knowledge" scale, .88 for the "General HPV Information" sub-dimension, .77 for the "HPV Screening Test Information" sub-dimension, .74 for the "General HPV Vaccine Information" sub-dimension and It was calculated as .73 for the sub-dimension "Information on Current HPV Vaccination Programme".

Implementation and data collection process

Under the name of HPV awareness, education was given to the students total of 8 hours over a 4-week period. Before starting the education in the first week, the students were informed about the study, and a pre-test was applied.

In the first lesson of the application, training was given about the general characteristics, viral structure, and genome of HPV. In the second week, the transmission routes of HPV and the modes of transmission according to gender differences were explained. Infections and symptoms that may occur after HPV infection in the third week were conveyed using visual materials. At the end of the fourth week, training was given on the characteristics and protection of the HPV vaccine. At the end of the training, the same data collection tool was used again. In order to test the permanence of the students' learning, data collection was carried out for the last time by using the same test again two weeks later.

Analysis of data

The data obtained in this study were evaluated via Statistical Package for the Social Sciences (SPSS) 23 package program. In order to determine the statistical method required in the analysis of the data, the normal distribution of the data was examined. Skewness and Kurtosis values were checked to determine whether the data were normally distributed. If these values are between -1.5 and +1.5, the data is considered to be normally distributed (Tabachnick & Fidell, 2013). In our research, it is seen that the skewness and kurtosis values of the scale and its sub-dimensions are between -1.5 and +1.5 and have a normal distribution. According to this result, independent groups t-test in paired groups and one-way analysis of variance (ANOVA) in groups of three or more were used to compare demographic information. Repeated measures ANOVA analysis was employed to compare the pre-test, post-test, and retention test results.

Ethical issues

Ethics committee approval was obtained from Iğdır University Scientific Research and Publication Ethics Committee (Board Decision No: 21) on 2022.

Results

Demographic characteristics of the students participating in the study are given in the Table 1.

According to Table 1, 31 of the students participating in the research are male and 35 are female. The study group generally consisted of students with a low family history of cancer. Most of the students participating in the research stated that they needed health education about sexually

Table 1. Frequency and percentage distribution of demographic characteristics of students participating in the study

Demographic Features	n	%
Gender		
Male	31	47.0
Female	35	53.0
Does anyone in your family have cancer?		
Yes	14	21.2
No	52	78.8
Do you know about sexually transmitted diseases?		
Yes	58	87.9
No	8	12.1
Do you think you need health education about sexually transmitted diseases?		
Yes	38	57.6
No idea	17	25.8
No	11	16.6
Do you know about cervical cancer?		
Yes	31	47.0
No	35	53.0
Have you ever had the HPV vaccine?		
Yes	5	7.6
No	61	92.4
Total	66	100.0

transmitted diseases. While 47% (31) of the students had information about cervical cancer, 53% (35) stated that they had no information. Moreover, the majority of students have not received the HPV vaccine.

The knowledge levels of the students participating in the research are shown in Table 2. More than half of the trained participants reported that they had heard of HPV and HPV testing. However, 57.6% stated that they had no idea about the HPV vaccine.

Table 2. Frequency of the knowledge of the students participating in the study about HPV

Variables	f	%
Have you ever heard of HPV?		
Yes	37	56.1
No	29	43.9
Have you ever heard of the HPV test?		
Yes	34	51.5
No	32	48.5
Have you heard of the HPV vaccine?		
Yes	28	42.4
No	38	57.6
Total	66	100.0

In Table 3, the results of the analysis made for the comparison of the pre-test mean scores of the "HPV Knowledge" scale and its sub-dimensions according to the demographic characteristics of the students participating in the study are given. There was a significant difference between the groups in the total score of the "HPV Knowledge" scale and in the "General HPV Knowledge" sub-dimension, according to the variables of knowledge about sexually transmitted diseases and knowledge about cervical cancer ($p < 0.05$). According to the significant differences obtained, students who have knowledge about sexually transmitted diseases have higher knowledge levels about HPV. Similarly, students who have knowledge about cervical cancer have higher knowledge levels about HPV. However, there was no statistically significant difference among the groups in terms

Table 3. Comparison of pre-test mean scores of HPV knowledge scale and sub-dimensions according to demographic characteristics of students participating in the study

Variables	General HPV Information	HPV Screening Test Information	General HPV Vaccine Information	Information on Current HPV Vaccination Program	HPV Knowledge Scale Total
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Gender					
Male	8.38±3.084	3.54±.809	3.61±.954	2.19±.833	17.74±3.586
Female	9.68±2.665	3.80±1.106	3.77±.689	2.17±.746	19.42±3.583
p^a	.071	.301	.448	.910	.061
Family history of cancer disease					
Yes	8.00±3.573	3.71±.611	3.57±.851	2.35±.744	17.64±4.482
No	9.36±2.686	3.67±1.061	3.73±.819	2.13±.792	18.90±3.402
p^a	.200	.890	.524	.349	.255
State of knowledge on sexually transmitted diseases					
Yes	9.34±2.672	3.65±1.000	3.75±.823	2.20±.811	18.96±3.494
No	7.12±4.015	3.87±.834	3.25±.707	2.00±.534	16.25±4.166
p^a	.043*	.556	.101	.488	.048*
Status of need for health education on sexually transmitted diseases					
Yes	9.10±2.864	3.71±.956	3.65±.745	2.13±.811	18.60±3.522
No idea	8.82±3.025	3.58±1.064	3.82±.951	2.23±.664	18.47±3.907
No	9.36±3.202	3.72±1.009	3.63±.924	2.27±.904	19.00±4.049
p^b	.891	.902	.766	.830	.931
Information status about cervical cancer					
Yes	10.25±2.502	3.54±1.059	3.80±.872	2.32±.944	19.93±3.193
No	8.02±2.895	3.80±.900	3.60±.774	2.05±.591	17.48±3.697
p^a	.001*	.301	.312	.184	.006*
HPV vaccination status					
Yes	10.20±3.563	4.20±1.095	4.20±1.095	2.20±.447	20.80±5.167
No	8.98±2.878	3.63±.966	3.65±.793	2.18±.806	18.45±3.505
p^a	.375	.221	.156	.957	.171

*p<0.05, SD: Standard Deviation, p^a= Independent Groups t-test, p^b= One Way Variance (ANOVA).

of gender, family history of cancer, need for health education about sexually transmitted diseases, and HPV vaccination status in all sub-dimensions (p>0.05).

Table 4 presents the results of the repeated measures ANOVA analysis, examining the changes in the HPV knowledge scale and its sub-dimensions within the study group across the three measurement times. The analysis revealed statistically significant differences in the total score of the 'HPV Knowledge' scale (F=41.830; p<0.05), the 'General HPV Knowledge' sub-dimension (F=30.616; p<0.05), the 'HPV Screening Test Knowledge' sub-dimension (F=27.169; p<0.05), the 'General HPV Vaccination Information' sub-dimension (F=41.886; p<0.05), and the 'Information on Current HPV Vaccination Program' (F=17.296; p<0.05). According to these analysis results, a statistically

significant difference emerged between the pre-test, post-test, and retention test scores of the group (p<0.05). Further examination through multiple comparison tests revealed that the pre-test scores of the students in all dimensions were lower than the post-test and retention test scores (p<0.05). These findings suggest that the HPV awareness training provided to the study group had a positive impact on the HPV knowledge levels of the students. Moreover, no statistically significant difference was observed between the post-test and retention test mean scores (p>0.05), indicating that the knowledge gains were maintained over time. In line with these results, it can be said that the effectiveness of the education given about HPV continues and it provides permanent learning in the knowledge levels of the students about HPV.

Table 4. Changes in the mean scores of the HPV knowledge scale and its sub-dimensions between measurement times

Scale	Pre-test	Post-test	Persistence test	F	p	Eta Square	Post-hoc
	Mean±SD	Mean±SD	Mean±SD				
General HPV Information	9.07±2.921	11.71±2.013	11.60±2.212	30.616	0.000*	0.320	pre<post pre<per
HPV Screening Test Information	2.68±.979	3.84±1.112	3.80±1.179	27.169	0.000*	0.295	pre<post pre<per
General HPV Vaccine Information	2.69±.822	3.90±.923	4.00±.859	41.886	0.000*	0.432	pre<post pre<per
Information on the Current HPV Vaccination Program	2.18±.782	3.04±1.101	2.93±1.175	17.296	0.000*	0.210	pre<post pre<per
Total HPV Knowledge Scale	16.62±3.656	22.49±3.178	22.33±3.496	41.830	0.000*	0.392	pre<post pre<per

*p<0.05, F: Repeated Measures ANOVA, SD: Standard Deviation.

When Figure 1 is examined, it is seen that the HPV knowledge level of the students who received education on HPV increased at the end of the education. In addition, it can be said that the post-test and permanence test scores are at a similar level, and the education provided ensures permanent learning.

In order to raise awareness about communicable diseases, education schemes should be reviewed, especially for students studying in the field of health. It is hopeful that we have gained permanent awareness against HPV with the four-week training we provided.

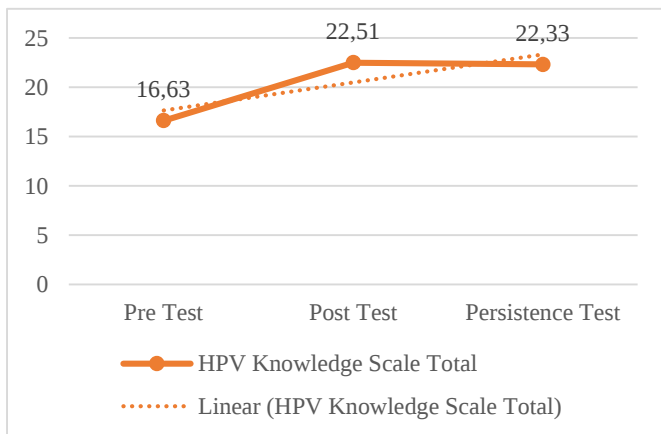


Figure 1. Change of HPV knowledge scale total scores over time

Discussion

HPV is one of the leading sexually transmitted and multiple cancer-causing infections worldwide. Vaccination against human papillomavirus is recommended to prevent infections and some cancers (Shapiro, 2022). HPV infections usually occur soon after the first sexual activity. Most new HPV infections occur in adolescents and young adults. Therefore, the Advisory Committee on Immunization Practices (ACIP) recommends routine HPV vaccination at the age of 11 or 12 (Meites et al., 2019). Cervical cancer is a type of cancer that is preventable, treatable and has the potential for significantly reduced mortality rates through proper intervention. HPV screening tests and pap smear tests are recommended by the Ministry of Health for women over 30 years old. The HPV vaccine is currently not included in the routine vaccination schedule of the Ministry of Health in Türkiye (Ministry of Health General Directorate of Public Health Cervical Cancer Screening Program, 2022). In this study, our aim was to increase awareness and enhance HPV knowledge among university students, especially within the age group where HPV is prevalent. We evaluated students' HPV awareness profiles and assessed the impact of educational interventions on their knowledge levels.

In our study, HPV knowledge of second-year students of Vocational School of Health Services was evaluated before and after the training. It is seen that the general knowledge level of HPV before the education was lower. Increasing the HPV knowledge level of the students who will serve in the field of health at the end of their education is also important for the society in which health services are provided. In a study conducted with university students in Manisa in 2010 questions about HPV were asked before and after the education, and their knowledge was evaluated. Only 21.3% of university students before education had heard of HPV. After

the training, this rate increased to 99.5%. This research and the findings of our study show that there is a statistically significant difference in the level of knowledge of the students as a result of education (Yanikkerem et al., 2010). In 2010 awareness of HPV and its vaccine was investigated among students of a state university in İzmir, and it was reported that 75.9% of them had never heard of HPV before (Durusoy et al., 2010). In a study conducted in 2015 on HPV awareness among healthcare personnel, it was reported that the HPV knowledge level of laboratory technicians was lower than that of other healthcare personnel (Görkem et al., 2015). In a study involving dentistry students and dentists, it was found that awareness about HPV and its connection with oropharyngeal cancer was high, but there was insufficient awareness about the HPV vaccine ($p < 0.05$) (Özdede et al., 2020). It can be concluded that the frequency of hearing about HPV is higher among healthcare personnel and students.

In our study, the frequency of hearing about HPV among second-year laboratory techniques students was 56.1%, and the frequency of hearing about the HPV vaccine was 42.4%. In the province of Bitlis, the frequency of hearing about HPV among the students of the Vocational School of Health Services was 49.1%, and the frequency of hearing about the HPV vaccine was 47.3% (Alkan & Öntürk Akyüz, 2021). HPV awareness studies among university students have increased over the years. Cervical cancer screening or vaccination campaigns, which are frequently encountered in social media and society, are thought to be a factor in this regard. In a study conducted with university students, the mean scores of the total HPV knowledge scale, general HPV knowledge, and general HPV vaccination knowledge subscales were found to be significantly higher in women. In our study, however, no statistically significant difference was found between the two genders (Aslan & Bakan, 2021).

In 2020 a study was conducted in the USA that included an educational intervention about the HPV vaccine attitudes of medical students and recommending it to patients, and statistically significant differences were found between the pretest and the posttest (Berenson et al., 2020). In a study that included an educational intervention at a university in Guam in 2023. It was reported that 36.1% of the students had the HPV vaccine, there was a significant increase in HPV knowledge awareness between the pre-test and post-test, and there was no statistical difference between men and women (Somera et al., 2023). A study measuring the awareness levels of university students between the ages of 18-30 revealed that awareness levels were relatively high. However, significant gaps were seen in students' knowledge about HPV, oropharyngeal cancer, and vaccination. It is thought that knowledge about HPV and the value of vaccination may put young individuals at risk for HPV-related infections. Although a relatively high level of awareness about HPV was observed, gaps in knowledge suggest that more efforts should be made to educate young adults (Davis & Doyle 2025). In this study, it is seen that providing education about HPV increases awareness. This supports our study. In the study conducted as a medical group and a non-medical group, it was found that the knowledge level of medical students was higher. Medical students reported high awareness of cervical cancer, the existence of the HPV vaccine, their willingness to be vaccinated and their

willingness to pay for the vaccine (Krishna et al., 2025). The importance of awareness campaigns and educational interventions to improve understanding and vaccine use among potential beneficiaries is emphasized.

Limitation of the Study

Firstly, the sample of this study consisted of a limited number of participants with specific demographic characteristics. This restricts the generalizability of the findings to the wider population. The fact that participants belonged to a certain educational level, age group, or occupational category limits the representativeness of the study. The data collection tool used in the research was based on self-reporting. This may have led participants to demonstrate social desirability bias or to report their knowledge at a higher level than it actually was. Furthermore, the sustainability of the increase in knowledge after the training was not evaluated over the long term. Therefore, this study is limited to revealing the short-term effects of the training. In addition, topics such as HPV and sexually transmitted infections are considered culturally sensitive, which may have influenced participants' motivation to attend the training or their willingness to respond openly due to cultural factors. Considering all these limitations, the findings of this study may have limited applicability to individuals from different age groups, cultural backgrounds, or socioeconomic levels. Therefore, further studies with larger and more heterogeneous samples, as well as long-term follow-ups, are needed.

Conclusion

This study demonstrated that a four-week HPV awareness training program significantly improved participants' knowledge levels across multiple sub-dimensions of the HPV Knowledge Scale. Statistically significant increases were observed in areas such as General HPV Knowledge, HPV Screening Test Knowledge, General HPV Vaccine Knowledge, and Information on the Current HPV Vaccination Program, with post-test scores showing consistent improvement ($p < 0.05$). These findings underscore the effectiveness of structured educational interventions in enhancing awareness about HPV and related health issues, which are crucial for the prevention of cervical cancer and other HPV-associated conditions.

The results highlight the need for integrating similar awareness programs into broader public health strategies, particularly in populations with limited knowledge about sexually transmitted infections. In conclusion, while the training program proved to be effective in increasing HPV-related knowledge in the short term, future research should focus on long-term follow-up studies with larger, more diverse populations. This would help validate the findings and support the development of sustainable, culturally sensitive educational models to improve HPV awareness and prevention at a broader societal level.

Ethics Committee Approval

Ethics committee approval was obtained from Iğdır University Scientific Research and Publication Ethics Committee (Board Decision No: 21) on 2022.

Informed Consent

Written consent was obtained from the participants.

Peer-Review

Externally peer-reviewed.

Author Contributions

A.K.T.: Design, Data Collection, Processing, Practice, Analysis, Literature Search, Patients' Selection, Writing, Critical Review.

B.M.S.: Design, Data Collection, Processing, Practice, Analysis, Literature Search, Patients' Selection, Writing, Critical Review.

M.M.: Data Collection, Processing, Practice, Analysis, Literature Search, Patients' Selection, Writing.

Conflict of Interest

There is no conflict of interest.

Sources of Funding

No financial support was received for this study.

References

- Alışkan, H. E., Ögüç, Ş.Ö., Aka, B. F., Alkaş, Y. D., & Toprak, U. (2023). Determination of human papillomavirus (HPV) genotype prevalence and distribution in Adana province: A hospital-based study between 2014-2021. *Bulletin of Microbiology*, 57(1), 119-133. <https://doi.org/10.5578/mb.20239910>
- Alkan, S., & Öntürk Akyüz, H. (2021). Determination of knowledge levels and vaccination status of health services vocational school students about Human papilloma virus infection/vaccination: Bitlis example. *ANKEM Journal*, 35(3), 63-69. <https://doi.org/10.54962/ankemderg.1048437>
- Amboree, T. L., Montealegre, J. R., Wermuth, P. P., Mgbere, O., Fujimoto, K., & Darkoh, C. (2022). Awareness of human papillomavirus and reported human papillomavirus vaccine uptake in a high-risk population. *Preventive Medicine Reports*, 28, 101853. <https://doi.org/10.1016/j.pmedr.2022.101853>
- American College of Obstetricians and Gynecologists. (2017). Committee opinion No. 704: Human papillomavirus vaccination. *Obstetrics and Gynecology*, 129, 173-178. <https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2020/08/human-papillomavirus-vaccination>
- Aslan, G., & Bakan, A. B. (2021). Identification of the knowledge level of students receiving health education about the human papilloma virus, screening tests, and human papilloma virus vaccination. *Journal Community Health*, 46(2), 428-443. <https://doi.org/10.1007/s10900-020-00888-8>
- Aypay, A. (2015). *Research methods, design and analysis*. Anı Yayıncılık.
- Berenson, A. B., Hirth, J. M., Fuchs, E. L., Chang, M., & Rupp, R. E. (2020). An educational intervention to improve attitudes regarding HPV vaccination and comfort with counseling among US medical students. *Human Vaccines & Immunotherapeutics*, 16(5), 1139-1144. <https://doi.org/10.1080/21645515.2019.1692558>
- Büyüköztürk, Ş., Kılıç Çakmak, E., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2014). *Scientific research methods*. Pegem Akademi.
- Davis, E. N., & Doyle, P. C. (2025). An assessment of young adults' awareness and knowledge related to the Human Papillomavirus (HPV), oropharyngeal cancer, and the HPV Vaccine. *Cancers*, 17(3), 344. <https://doi.org/10.3390/cancers17030344>
- Demir Bozkurt, F., & Özdemir, S. (2023). Validity and reliability of a Turkish version of the human papillomavirus knowledge scale: A methodological study. *Journal of the Turkish German Gynecological Association*, 24(3), 177. <https://doi.org/10.4274/jtgga.galenos.2023.2022-10-9>

- Dilley, S., Miller, K. M., & Huh, W. K. (2020). Human papillomavirus vaccination: Ongoing challenges and future directions. *Gynecologic Oncology*, 156(2), 498-502. <https://doi.org/10.1016/j.ygyno.2019.10.018>
- Durusoy, R., Yamazhan, M., Taşbakan, M.I., Ergin, I., Aysin, M., Pullukçu, H., & Yamazhan, T. (2010). HPV vaccine awareness and willingness of first-year students entering university in Western Turkey. *Asian Pacific Journal of Cancer Prevention*, 11(6), 1695-1701.
- Düzlü, M., Karamert, R., Bakkal, F. K., Cevizci, R., Tutar, H., Zorlu, M. E., Dilci, A., & Eravcı, F.C. (2016). The demographics and histopathological features of oral cavity cancers in Turkey. *Turkish Journal of Medical Sciences*, 46(6), 1672-1676. <https://doi.org/10.3906/sag-1510-97>
- Görkem, Ü., Toğrul, C., İnal, H.A., Salman Özgü, B., & Güngör, T. (2015). Knowledge levels and attitudes of allied health personnel working in a university hospital about Human Papilloma Virus and its vaccine. *The Turkish Bulletin of Hygiene and Experimental Biology*, 72(4), 303-310. <https://doi.org/10.5505/TurkHijyen.2015.35556>
- Güder, S., & Güder, H. (2022). Investigating the knowledge and belief level of health personnel about hpv vaccine: A cross-sectional study. *Türkiye Klinikleri Journal of Dermatology*, 32(1), 37-46. <https://doi.org/10.5336/dermato.2021-86521>
- Haddad, S. F., Kerbage, A., Eid, R., & Kourie, H. R. (2022). Awareness about the human papillomavirus (HPV) and HPV vaccine among medical students in Lebanon. *Journal of Medical Virology*, 94(6), 2796-2801. <https://doi.org/10.1002/jmv.27509>
- Karasar, N. (2007). *Scientific research method: Concepts, principles, techniques*. Nobel Yayın Dağıtım.
- Keser, G., & Pekiner, F. N. (2020). Awareness of human papillomavirus vaccine among dental students. *Clinical and Experimental Health Sciences*, 10(4), 395-399. <https://doi.org/10.33808/clinexphealthsci.731725>
- Krishna, E., Patil, S. K., Nirala, S. K., Naik, B. N., Kumar, V., Singh, C. M., & Kumar, V. (2025). Understanding cervical cancer, human papillomavirus (HPV), and HPV vaccine acceptance in college-going students: Institutional-based cross-sectional study from Bihar State. *Journal of Family Medicine and Primary Care*, 14(1), 363-370. https://doi.org/10.4103/jfmpc.jfmpc_1277_24
- Kombe, A. J., Li, B., Zahid, A., Mengist, H. M., Bounda, G. A., Zhou, Y., & Jin, T. (2021). Epidemiology and burden of Human Papillomavirus and related diseases, molecular patogenezi, and vaccine evaluation. *Frontiers in Public Health*, 20(8), 552028. <https://doi.org/10.3389/fpubh.2020.552028>
- Meites, E., Szilagyi, P.G., Chesson, H.W., Unger, E.R., Romero, J.R., & Markowitz, L.E. (2019). Human papillomavirus vaccination for adults: Updated recommendations of the advisory committee on immunization practices. *Morbidity and Mortality Weekly Report*, 68(32), 698-702. <https://doi.org/10.15585/mmwr.mm6832a3>
- Ministry of Health General Directorate of Public Health (2022). Cervical cancer screening program national standards. https://hsgm.saglik.gov.tr/depo/birimler/kanser-db/Dokumanlar/Raporlar/Turkey_NCCP_18_April_2022.pdf
- Okunade, S. K. (2020). Human papillomavirus and cervical cancer. *Journal of the Institute of Obstetrics and Gynaecology*, 40(5), 602-608. <https://doi.org/10.1080/01443615.2019.1634030>
- Özdede, M., Bağcı, N., Gündüz, T., & Peker, I. (2020). Evaluation of knowledge and awareness of dentists and dental students about human papillomavirus vaccination and oropharyngeal cancer relationship. *Clinical and Experimental Health Sciences*, 10(3), 309-315. <https://doi.org/10.33808/marusbed.752850>
- Shapiro, G. K. (2022). HPV vaccination: An underused strategy for the prevention of cancer. *Current Oncology*, 29(5), 3780-3792. <https://doi.org/10.3390/curroncol29050303>
- Somera, L. P., Diaz, T., Mummert, A., Badowski, G., Choi, J., Palaganas, H., & Ayson, K. (2023). Cervical cancer and hpv knowledge and awareness: an educational intervention among college students in guam. *Asian Pacific Journal of Cancer Prevention*, 24(2), 443-449. <https://doi.org/10.31557/APJCP.2023.24.2.443>
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics*. Pearson.
- Tüney, İ., Altay, A., Ergünay, K., Önder, S. Ç., Usubütün, A., Salman, M. C., Bozdayı, G., Karabulut, E., Badur, O. S., Yüce, K., & Pinar, A. (2017). HPV types and E6/E7 mRNA expression in cervical samples from Turkish women with abnormal cytology in Ankara, Turkey. *Turkish Journal of Medical Sciences*, 47(1), 194-200. <https://doi.org/10.3906/sag-1508-155>
- Aksoy, H., Dağcıoğlu, K., Durmuş M., Uyan, D. D., Sarı, E., Fidancı, İ. Başer, D. A., & Cankurtaran, M. (2021). The knowledge level of medical students about cervical cancer and their attitudes towards Human Papilloma Virus vaccine. *The Journal of Turkish Family Physician*, 12(2), 66-75. <https://doi.org/10.15511/tjtfp.21.00266>
- Waller, J., Ostini, R., Marlow, L. A., McCaffery, K., & Zimet, G. (2013). Validation of a measure of knowledge about human papillomavirus (HPV) using item response theory and classical test theory. *Preventive Medicine*, 56(1), 35-40. <https://doi.org/10.1016/j.ypmed.2012.10.028>
- World Health Organization (2023). *Global strategy towards the elimination of cervical cancer as a public health problem*. 22 May, 2023, <https://www.who.int/campaigns/cervical-cancer-elimination-day-of-action/2023>
- World Health Organization (2024). *Human papillomavirus and cancer*. 5 March, 2024. <https://www.emro.who.int/noncommunicable-diseases/campaigns/cervical-cancer-awareness-month-2023.html?fbclid=IwAR0-iIBT3i5dt1EhnOr64kyCWTCLFXODjg0gvt9hmLNTG6z8xmuy8FKR3hM&gclid=4820177003>
- Yanikkerem, E., Piyan, G., Kavlak, T., & Karadeniz, G. (2010). Assessing the role of education on Turkish university students' knowledge about HPV and related diseases. *Asian Pacific Journal of Cancer Prevention*, 11(6), 1703-1711.