

RESEARCH ARTICLE

# Evaluation of HPV And HPV vaccines knowledge level of pharmacy students in Turkey: Pre-post test

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## Abstract

**Objective:** This study aimed to evaluate the effect of an educational intervention on pharmacy students' knowledge regarding Human Papillomavirus (HPV), vaccination and screening, as well as their beliefs about HPV vaccination. **Method:** A pre-test and post-test interventional study was conducted in February 2023 among 66 fourth-year pharmacy students at a university in Turkey. Data were collected through an electronic survey consisting of the HPV Knowledge Scale (HPV-KS), the Health Belief Model Scale for Human Papillomavirus and Its Vaccination (HBMS-HPVV), and the Pap-smear Knowledge Questionnaire, both before and after the educational intervention. To assess differences and changes between pre-test and post-test responses, the Wilcoxon test, Mann-Whitney U test, and Kruskal-Wallis H test were applied as appropriate. **Results:** The findings demonstrated a statistically significant increase in students' HPV-KS and Pap-smear Knowledge levels following the educational intervention ( $p < .001$ , for both). Notable improvements were observed in the perceived benefits ( $p = .001$ ) and perceived susceptibility ( $p < .05$ ) subdimensions of the HBMS-HPVV scale. **Conclusion:** The educational intervention proved effective in enhancing pharmacy students' knowledge and positively influencing their beliefs concerning the benefits of HPV vaccination and susceptibility to HPV infection.

## Introduction

Human papillomavirus (HPV) is a double-stranded, non-enveloped DNA virus belonging to the Papillomaviridae family. It is responsible for the development of anogenital and mucocutaneous warts, as well as various malignancies, including cervical, anal, vaginal, vulvar, penile, and oropharyngeal cancers (Kim *et al.*, 2014; Park *et al.*, 2015). HPV is one of the most common sexually transmitted diseases (Guvenc *et al.*, 2016). It is also thought to cause more than half a million cases of cancer each year in developing countries, particularly in women (Klein *et al.*, 2012). HPV infection is the most important factor known to be associated with cervical cancer. It has been reported

that HPV types 16 and 18 are responsible for 70-80% of cases of cervical cancer (Crosbie *et al.*, 2013).

The World Health Organisation (WHO) recommends cervical cancer screening every 5-10 years for women aged 30 and above, even if they have been vaccinated against HPV (World Health Organisation, 2024). Primary prevention strategies for HPV infection encompass reducing sexual risk factors and implementing prophylactic vaccination (Kahn *et al.*, 2008; Wamai *et al.*, 2013; Dany *et al.*, 2015). Secondary prevention against HPV involves screening and treating precancerous lesions, and the cervical smear screening test is one of the screening methods that allows the identification of abnormal cells (Basu *et al.*, 2018).

HPV vaccination remains the most effective preventive measure against HPV-related cancers. Therefore, there should be a high level of community belief in the importance of vaccination (Davis *et al.*, 2004; World Health Organisation, 2006). The first HPV vaccine approved by the Food and Drug Administration (FDA) was a quadrivalent vaccine targeting HPV types 6, 11, 16, and 18. Subsequently, bivalent and nonavalent vaccines have been developed (Guvenc *et al.*, 2016). Administered in three doses at 0, 2, and 6 months, these vaccines have led to a significant reduction in global HPV infection rates (Kamolratanakul & Pitisuttithum, 2021). While many European countries have integrated HPV vaccination into national immunisation programmes, Turkey has yet to do so, primarily due to high costs and the lack of government reimbursement. However, some studies have shown that even with free access to the vaccine, some parents do not consider vaccinating their children. Lack of information about the age and gender of the person to be vaccinated, doubts about the effectiveness and reliability of the vaccine, and fear of side effects related to the vaccine are barriers to vaccination. It is of great importance for health personnel to be knowledgeable about HPV vaccination and to believe in the benefits of vaccination in terms of educating the society (Güder & Güder, 2022; European Centre for Disease Prevention and Control, 2025).

Educational interventions, including printed materials, face-to-face sessions, electronic health records, health outreach programmes, and social support groups, have been employed to improve HPV awareness and vaccine uptake (Basol *et al.*, 2019). Healthcare professionals play a pivotal role in disseminating evidence-based knowledge on HPV vaccination and cervical cancer prevention (Berenson *et al.*, 2015). At the same time, cervical cancer is a significant women's health issue, and the extent to which primary and secondary prevention approaches are understood and utilised by society is a crucial health concern (Dinas *et al.*, 2009; Genc *et al.*, 2013; Basu *et al.*, 2018).

Pharmacy students are among the future health professionals who can help increase public awareness of cervical cancer and its prevention through the availability of effective and safe HPV vaccines. In some countries, community pharmacists are authorised to administer HPV vaccines and conduct cervical cancer screenings. However, data on pharmacist-led HPV vaccination outside the United States remain scarce. In the United States, community pharmacists screen for cervical cancer and administer HPV vaccines. In addition to vaccination, public awareness and education about risk factors are crucial for prevention (Çakaloz *et al.*, 2017; Asiedu-Danso *et al.*, 2020). Given the significance of public education on risk factors and

preventive measures, evaluating pharmacy students' knowledge is essential for the development of targeted awareness programmes (Rashwan *et al.*, 2012).

Studies have shown that learning about HPV and the HPV vaccine positively increases individuals' health beliefs about HPV and the HPV vaccine (Gürdal & İlhan, 2024; Kim, 2012). The Health Belief Model (HBM) was utilised in this study to assess students' health beliefs regarding HPV and its vaccine. The HBM suggests that individuals' health behaviours are influenced by their beliefs, values, and attitudes. Identifying problematic beliefs allows for the development of suitable educational strategies (Gözüm & Çapık, 2014). The HBM used in this study will determine the factors affecting vaccine compliance by predicting adopted behaviours, such as the decision to get vaccinated (Janz & Becker, 1984; Rosenstock *et al.*, 1988; Fallucca *et al.*, 2022).

Several studies conducted in Turkey have examined students' knowledge of HPV and HPV vaccination (Özsaran *et al.*, 2011; Çakaloz *et al.*, 2017; İsgüder *et al.*, 2017; Çakır *et al.*, 2021). This study aimed to evaluate the effectiveness of an educational session on HPV and the HPV vaccine provided to 4th-year students of the Hamidiye Faculty of Pharmacy at the University of Health Sciences, Istanbul, Turkey, on their knowledge of HPV and their belief in the importance of vaccination.

## Methods

### *Study design and setting*

This pre-test and post-test interventional study was conducted in February 2023 at the Hamidiye Faculty of Pharmacy, University of Health Sciences, Istanbul, Turkey. The inclusion criteria for the study were being a 4th year student at the University of Health Sciences, Hamidiye Faculty of Pharmacy, volunteering to participate in the study, and completing both the pre-test and post-test by attending the education provided. Participants with missing data or those who withdrew from the study were excluded.

### *Educational session*

Studies have shown that there are significant relationships between HPV vaccination uptake and health beliefs in society. The educational intervention was structured to address key components of the HBM, namely perceived benefits, susceptibility, severity, and barriers to HPV vaccination (Hayes *et al.*, 2019). A two-hour interactive face-to-face session was conducted, as this approach has been shown to be more effective

than virtual learning for pharmacy students (Shoair *et al.*, 2023). The session comprised three presentations:

1. A gynaecologist provided an overview of HPV diagnosis and treatment.
2. An infectious disease specialist discussed cervical cancer and screening methods.
3. A family medicine professor presented insights on HPV in primary healthcare.

#### Data collection

Data were collected through Google Forms before and after the educational session using two separate QR codes projected onto the screen and an online connection via Google Forms.

The survey consisted of four sections: a Personal Information Form (1), the HPV Knowledge Scale (HPV-KS) (2), the Pap-smear Knowledge Questionnaire (3), and the Health Belief Model Scale for Human Papillomavirus (HPV) and Its Vaccination (HBMS-HPVV) (4).

1. Personal Information Form: Data were collected on the socio-demographic characteristics of the participants (gender, education, age, socioeconomic level, smoking) and health-related data (sexual experience, HPV vaccination status, and family history of cervical cancer)
2. HPV-KS: HPV-KS, developed by Kim (2012), consists of 20 questions to measure the knowledge level of individuals regarding HPV infection and HPV vaccination (Kim, 2012). In this study, the short Turkish questionnaire form containing 10 questions from HPV-KS, used in Guvenc *et al.* (2016) studies, was employed with permission (Guvenc *et al.*, 2016). For each information sentence, a correct answer (true or false) was scored as 1 point, and an incorrect answer or marked "I don't know" option was scored as 0 points. The total knowledge score was obtained by adding the number of correct answers.
3. Pap-smear Knowledge Questionnaire: This questionnaire consists of 10 questions with options of true, false, and undecided, created based on literature studies to evaluate knowledge levels about Pap-smear (Yasli, 2022) (<https://www.cdc.gov/hpv/hcp/protecting-patients.html>; accessed May 28, 2024). In the answers given to the questions, each correct answer (marked true or false) was evaluated as 1 point, and an incorrect answer or marked undecided option was evaluated as 0 points. The total knowledge score was obtained by adding the number of correct answers

4. HBMS-HPVV: The scale developed by Kim and colleagues (2012) and evaluated for validity and reliability in Turkish by Guvenc *et al.* (2016) was used in this study (Guvenc *et al.*, 2016; Kim, 2012). HBMS-HPVV was adapted into Turkish with the permission of the developers (Guvenc *et al.*, 2016). Guvenc and colleagues (2016) calculated the Cronbach  $\alpha$  value range of this scale as 0.71-0.78 (Guvenc *et al.*, 2016). HBMS-HPVV consists of 14 items to assess health beliefs regarding HPV infection and vaccination. The scale consists of four dimensions: Perceived Benefits (items 1-3), Perceived Susceptibility (items 4-5), Perceived Severity (items 6-9) and Perceived Barriers (items 10-13 and 15). The scale was evaluated with a four-point Likert type [1 (not at all); 4 (very much)]. A high benefit perception score indicates that the participant thinks the HPV vaccine is beneficial, a high susceptibility perception score indicates that the participant has a high susceptibility to HPV, a high severity perception score indicates that the participant thinks HPV infection is a serious problem, and a high barrier perception score indicates that the participant thinks the barriers to vaccination are high.

#### Sample size

The sample size was calculated using the data from the study conducted by Citak Bilgin and colleagues (2022). The required sample size for a power level of 0.99 was determined to be 60 participants ( $R=0.1$ ;  $\mu_1=4.8$ ;  $\mu_2=8.63$ ;  $\sigma_1=1.76$ ;  $\sigma_2=1.14$ ;  $\alpha=0.05$ ). Non-probability sampling (purposive) was used in this study. Participants who did not complete the questionnaire in the post-test were excluded from the study, and a total of 66 participants were included in the study.

#### Statistical analysis

Data were analysed using the IBM SPSS (Statistical Package for Social Sciences) 25 package programme. Frequency and percentage values are presented for qualitative variables. The results were evaluated at a 95% confidence interval and significance at  $p < 0.05$ . The conformity of quantitative variables to a normal distribution was tested with the Shapiro-Wilk test. Since the variables did not show normal distribution, median, minimum and maximum values are presented. The Wilcoxon test was used to compare the scores before and after education. In examining the differences in terms of changes before and after education between demographic variable categories; the Mann-Whitney U test was used for comparisons made for demographic variables with two categories, and the Kruskal-Wallis H test was used for comparisons

made for demographic variables with more than two categories. Type I error rate was taken as 0.05 in the research.

### Ethical approval

The study was approved by the University of Health Sciences Hamidiye Scientific Research Ethics Committee with the decision number 2/15 dated January 27, 2023. Participant information and consent forms were received electronically from all participants included in this study.

### Results

A total of 66 pharmacy students were included in the study, excluding students who completed the pre-test but did not participate in the education and students with incomplete information. Most participants (75.8%) were female. All participants were between the ages of 21 and 25, with a median age of 23. Table 1 displays the personal information of the participants involved in this study. According to the table, 3% of participants have a family history of cervical cancer. Additionally, 4.5% of participants have received the HPV vaccine. In previous education, 4.5% of the participants had received cervical cancer education, and 10.6% had received education on pap smear testing. Furthermore, 6.1% of the participants had had a pap smear test.

The comparison of HPV-KS, Pap-smear knowledge test, and HBMS-HPVV scores between the pre-test and post-test is displayed in Table II. The HPV-KS score of pharmacy students was significantly higher in the post-test compared to the pre-test ( $p < .001$ ). Pap-smear Knowledge score after the education showed a significant increase compared to the pre-education test ( $p < .001$ ). Significant differences were observed in the perceived susceptibility and perceived benefits scores before and after the educational session ( $p < .05$ ). However, changes in the other two subscales,

perceived severity and perceived barriers, were not significant ( $p > .05$ ).

**Table I: Personal information of the participants**

	n (%)
<b>Gender</b>	
Male	16 (24.2)
Female	50 (75.8)
<b>Relationship status</b>	
I have never been in a relationship	28 (42.4)
I have a partner	20 (30.3)
Currently single	18 (27.3)
<b>Prevention if you are sexually active</b>	
Contraceptive pill	2 (10.5)
Withdrawal	2 (10.5)
Condom	13 (68.4)
Other	2 (10.5)
<b>Family history of cervical cancer</b>	
No	64 (97)
Yes	2 (3)
<b>HPV vaccination status</b>	
No	63 (95.5)
Yes	3 (4.5)
<b>Education of cervical cancer (ever in life)</b>	
No	63 (95.5)
Yes	3 (4.5)
<b>Education of pap-smear test (ever in life)</b>	
No	59 (89.4)
Yes	7 (10.6)
<b>History of pap-smear</b>	
No	62 (93.9)
Yes	4 (6.1)
	<b>Median (min-max)</b>
<b>Age</b>	23 (21-25)
<b>Number of sexual partner last 3 years</b>	0 (0-10)

**Table II: Pre and post-test comparisons scores**

	Pre-test med (min-max)	Post-test med (min-max)	Z	p
<b>HPV-KS*</b>	5 (2-8)	8 (2-9)	-5.614	<b>&lt;0.001</b>
<b>HBMS-HPVV † (Total)</b>	23.5 (0-42)	28 (0-42)	-2.555	<b>0.011</b>
Perceived benefits	6 (0-9)	6.5 (0-9)	-3.411	<b>0.001</b>
Perceived susceptibility	4 (0-6)	4 (0-6)	-2.184	<b>0.029</b>
Perceived severity	8 (0-12)	8 (0-12)	-1.702	0.089
Perceived barriers	5 (0-15)	5 (0-15)	-0.201	0.840
<b>Pap-smear knowledge</b>	6 (0-12)	10 (0-12)	-5.899	<b>&lt;0.001</b>

\*HPV-KS: HPV Knowledge Scale; †HBMS-HPVV: Health Belief Model Scale for Human Papilloma Virus (HPV) and its vaccination

Socio-demographic characteristics were not found to be associated with changes in knowledge or beliefs (Table III).

**Table III: Comparisons between demographic variable categories in terms of changes in HPV knowledge scores and HBM scores**

	HPV knowledge comparison			HBM comparison		
	Change med (min-max)	Z	p	Change med (min-max)	Z	p
<b>Gender</b>						
Male	0.5 (-2-6)	1.847	0.065	0 (-14-14)	0.832	0.405
Female	2 (-3-5)			1.5 (-26-28)		
<b>Relationship status</b>						
I have never been in a relationship	3 (0-6)	5.902	0.052	2 (-26-28)	1.145	0.564
I have a partner	1 (-3-4)			0 (-6-28)		
Currently single	1.5 (-1-6)			1 (-14-12)		
<b>Education of pap-smear test</b>						
No	2 (-3-6)	-0.695	0.487	1 (-26-28)	-0.657	0.511
Yes	1 (0-3)			-1 (-3-9)		

## Discussion

The study revealed that after receiving education on HPV and the HPV vaccine, pharmacy students' knowledge and beliefs about these topics increased significantly. There are many studies in the literature showing that short educations on HPV, HPV vaccine and cervical cancer increase the knowledge of university students (Chang *et al.*, 2013; Berenson *et al.*, 2015; Staples *et al.*, 2018; Indracanti *et al.*, 2021).

In studies, although university students were aware of the risks of developing cervical cancer and HPV, their awareness and attitudes did not improve. HBM tried to evaluate and predict individuals' health-related behaviours and attitudes by examining them (Donadiki *et al.*, 2014; Di Giuseppe *et al.*, 2023). The sub-dimensions of the HBM scale, perceived benefits and perceived susceptibility are associated with increased HPV vaccination behaviour. Perceived barriers are associated with decreased HPV vaccination behaviour. In the study, after the education, students' beliefs about HPV vaccination, their perceptions of the vaccine's usefulness, and their perceptions of susceptibility increased. However, there was no change in perceived barriers or perceived severity. Similar to the current study, pharmacy students who received education reported higher perceived benefits of HPV vaccination than students who did not receive education and no significant effect on perceived severity was found. However, unlike the current study, in the study by Hayes and colleagues (2019), students

who received an education reported lower perceived barriers than students who did not receive an education. In the study conducted by Lee and Park (2011) with female university students in Korea, it was found that the least perceived aspects were susceptibility and barriers, similar to this study. It is thought that, since the HPV vaccine is not included in Turkey's national immunisation programme, is not reimbursed and is expensive, students continue to perceive these factors as barriers to vaccine access even after the education provided. The authors believe that in future studies, by providing education to policy makers in Turkey, policy makers' awareness can be increased, and these negative factors that prevent society from accessing the vaccine can be eliminated.

Although a significant correlation between HBMS-HPVV and HPV-KS levels and gender was identified in studies conducted in Turkey and other countries worldwide, this was not the case in this study (Berenson *et al.*, 2020; Gautreaux *et al.*, 2024). Other studies conducted in Turkey have shown that female students have higher HPV-KS levels than male students (Ergün, 2023; Varer & Alanya, 2023).

In the study by Bennett and colleagues (2015), the level of knowledge about the HPV vaccine was evaluated by providing education only to female students. However, the authors aimed to increase the knowledge level of all students by providing education without discrimination in terms of gender. In this study, the rate of students who had an HPV vaccination was 4.5%. In

the studies among university students in Turkey, this rate similarly varies between 2.7% and 6.9% (Ergün, 2023; Gürsoy & Sağtaş, 2023; Varer & Alanya, 2023; Sezgin *et al.*, 2024). Staples and colleagues found that in the United States, 53% of university students were vaccinated against HPV (Staples & Duska, 2019). This rate is 16.5% in Lebanon and 41.7% in France (Dany *et al.*, 2015). For the reasons mentioned earlier, it can be said that low.

The increase in Pap-smear Knowledge levels among pharmacy students following the education provided in this study is consistent with the existing literature. Cervical cancer is one of the most common types of cancer, and promoting Pap-smear testing is crucial. The increase in the knowledge level of pharmacy students will play a significant role in reducing cervical cancer deaths through increased awareness, prevention and vaccination when they graduate as pharmacists (Dignan *et al.*, 1998; Shahnaz *et al.*, 2023).

If HPV infections and HPV vaccines are included in the curriculum, or seminars are offered on this subject, pharmacy students can provide this service to their patients in their professional lives after graduation and play a role in improving public health. In future studies, the number of participants should be increased, and more research should be done with multi-centre studies.

One of the strengths of this study is that it demonstrates that a total of two hours of an interactive educational programme is effective in significantly increasing the knowledge of pharmacy students regarding HPV and HPV vaccines. Another strength of the study is that it included the education of students of all genders, not just females. However, the study has limitations, including being single-centred, online surveys, a small sample size, a single-session education approach, and a lack of reflection on the long-term effects of the education. Therefore, it is difficult to generalise the results to other universities and faculties.

## Conclusion

A single educational session on HPV and its vaccinations significantly enhanced pharmacy students' knowledge and improved their beliefs about the benefits of HPV vaccination and HPV susceptibility. However, there was no improvement in students' perceptions of the seriousness of HPV or their perceptions of barriers to vaccination. It is hoped that in the future, with the inclusion of HPV vaccine in the national immunisation programme, students' perceptions of barriers to HPV vaccines will decrease. Additionally, incorporating HPV

education into pharmacy curricula in Turkey may empower future pharmacists.

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