

RESEARCH ARTICLE

# Knowledge, attitudes and practices toward human papillomavirus infection among undergraduate pharmacy students in Saudi Arabia

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## Keywords

Cervical cancer  
HPV vaccine  
Human papillomavirus (HPV)  
Knowledge  
Pharmacy curriculum  
Pharmacy training  
Saudi Arabia

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## Abstract

**Background:** Human papillomavirus (HPV) is one of the most widespread viral infections that affect the reproductive tract. The aim of this study is to assess the knowledge, attitude, and practice toward HPV amongst pharmacy students in Saudi Arabia. **Methods:** A cross-sectional prospective online survey-based study was conducted amongst all second year to final year students enrolled in the pharmacy programme. **Results:** Female students exhibited better awareness and knowledge (87.2%) compared to male students (12.8%). The majority of respondents (92.8%) had heard about the risk of cervical cancer, with fewer respondents had heard about the HPV vaccine (35.0%). There was high ratification that vaccines help in preventing cervical cancer (64.80%), which is a good response. **Conclusion:** The pharmacy students showed an average knowledge regarding HPV infection and HPV vaccination. Considerable HPV targeted initiatives related to the offered pharmacy curriculum should be planned and executed to equip future pharmacists with proper knowledge and soft skills to perform their effective role in the prevention of HPV infection.

## Introduction

Human papillomavirus (HPV) is one of the most widespread viral infections that infect the reproductive tract and is transmitted through the skin or mucus membrane of the genital area such as the vulva, vagina, cervix, rectum, anus, penis, and scrotum as well as the mouth and throat (Almutairi *et al.*, 2019). Skin-to-skin contact is one of the paths of transmission; intercourse, therefore, is not required to transmit the HPV infection (Mayo clinic, 2020). It occurs mainly in sexually active people in multiple relationships at once. The degree of infection differs from one partner to the other and depends on the length of intercourse and frequency of unprotected vaginal, oral, or anal sex. Also, most sexually active people will get the infection at one period in their

lives; some carriers of the viruses may not express any symptoms, so the person will not realise that he/she is infected. According to the Centre for Disease Control and Prevention (CDC), because the virus is still active in a person's body throughout this time, that person may unknowingly transmit HPV. HPV is usually harmless, and nearly 90% of HPV infections are self-limiting without causing health problems or needing any medical intervention within two years unless there are genital warts or, in worse cases, leads to cervical cancer in women. Genital warts are mostly not recognised because they often look like any other skin bump infection. These warts are very prevalent, highly infectious and impact sexual life.

HPV is a small, non-enveloped double-stranded DNA virus with more than 150 types. HPV genotypes 16 and 18 are responsible for approximately 70% of cervical

cancer, with the remaining 30% caused by other carcinogenic HPV types (IARC, 2007). According to the World Health Organization (WHO), more than 500,000 women develop invasive cervical cancer yearly from persistent HPV infections worldwide, which calls for urgent action. However, in 2008, about 250,000 women were reported dead as a result of cervical cancer, which makes it the third leading cause of cancer death in women. 85% of women in low- and middle-income countries are the most affected by cervical cancer (Al-Shaikh *et al.*, 2014). Cervical cancers are cancers which occur in the cells of the cervix and in the lower end of the uterus that connects to the vagina. The transformation zone is a surface of tissue located between the native columnar epithelium and the native squamous epithelium. The transformation zone is the area where the squamous epithelium meets and replaces the endocervical canal's glandular epithelium (Schiffman *et al.*, 2011).

HPV infections are usually benign in the first case of infection regardless of age but become an issue when there is frequent reinfection. Approximately 12 carcinogenic HPV types are responsible for virtually all cases of cervical cancer. The chances of getting cervical cancer in women are very low in the lack of recurrent HPV infection or if infected once. Using lab tests to establish HPV infections to diagnose the risk of cervical cancer is more accurate than cytology or colposcopy (WHO, 2022). If the woman has a strong immune system, the progression of cervical cancer will take nearly 15 to 20 years. However, with a weakened immune system, it can take only five to ten years, such as those with untreated Human Immunodeficiency Virus (HIV) infection (Dubrow *et al.*, 2012).

The high mortality rate from cervical cancer globally can be reduced by effective interventions. Fortunately, CDC recommends giving HPV vaccines to adolescents between 11 and 12 years. The HPV vaccine can also be given at the age of nine years; females younger than 26 years of age who have not yet been vaccinated or completed the vaccine series can take the HPV vaccine. CDC has also suggested that 11 to 12-year-olds can get double doses of the HPV vaccine to protect them from HPV cancers (Mayo clinic, 2021). The vaccine ought to be taken before exposure to the virus since it is the best way to assure the safety against HPV, which will go a long way to protect women from vaginal and vulvar cancer as well as genital warts and anal cancer (Clifford *et al.*, 2017). There is a possibility that pre-university students have missed their chance at getting the vaccine. This survey also delivers some ideas on whether they would get the vaccine in the near future.

HPV infection prevalence is almost 31% in Saudi

Arabia (Hussain *et al.*, 2016). According to the World Health Statistics Report 2010 of the WHO, 6.51 million of Saudi Arabia's population are at risk of cervical cancer (Hussain *et al.*, 2016). In Saudi Arabia, Cervical cancer is the eighth most common female cancer in women aged 15 to 44 years. In addition, cervical cancer ranks the ninth leading cause of cancer deaths in females in Saudi Arabia. Hence, preventive interventions are highly recommended (Bruni *et al.*, 2021). However, inadequate information and awareness related to HPV infection, complications, screening and vaccination were found in many studies done in Saudi Arabia (Al-Shaikh *et al.*, 2014; Hussain *et al.*, 2016; Tahani Altamimi, 2020).

Proactive missions to increase public awareness regarding HPV complications and preventive strategies are roles that can be played by pharmacists (Oyedeki *et al.*, 2021). A systemic review has reported a set of barriers that could hinder the pharmacist from performing their role, such as a lack of proper knowledge and approach to inform and commend HPV vaccines (Oyedeki *et al.*, 2021). In the light of the need to prevent HPV infection and promote the protective plan, investigating the knowledge and perception of future pharmacists will aid in addressing the gaps in pharmacy curriculum and undergraduate training. In this respect, this pilot study is committed to evaluating knowledge, attitudes and practices toward human papillomavirus Infection among undergraduate Pharmacy students at a Mohammed Al-Mana College for Medical Sciences (MACHS).

## Methods

A prospective cross-sectional survey-based study was conducted amongst pharmacy students at MACHS. The main objective of the study is to assess the knowledge, attitudes and practices towards HPV amongst pharmacy students in MACHS, Saudi Arabia. To achieve the objectives of the study, a survey was conducted for a period of two months, from 1 January to 28 February 2020, among the MACHS pharmacy students.

### Sampling and sample size

An online survey-based study was conducted in MACHS. MACHS is the leading private health college located in the Eastern Province of Saudi Arabia, which is affiliated with the Ministry of Education in Saudi Arabia. The estimated enrolment in all courses for 2020 was about 1500 students, out of which nearly about 350 students were enrolled in pharmacy at a different level. A survey was carried out amongst all

students enrolled in the pharmacy course. First-year pharmacy students were excluded from the survey.

### Research instrument

A questionnaire was designed to collect the data from participants after reviewing the available research literature. The final questionnaire was translated into the Arabic language, which is the national language of Saudi Arabia. The questionnaire was divided into sections and consisted of close-ended and multiple-choice questions. The categories of variables identified were demographics of students that included age, gender, educational level, marital status, and the number of children. All of these were included in section 1 of the questionnaire. Section 2 was concerned with the assessment of pharmacy students' knowledge about HPV infection and vaccines, including questions related to their knowledge about cervical cancer, while section 3 focused on the participants' attitudes toward HPV.

### Ethical considerations

Prior to the conduction of the study, a study proposal was written and approved by the scientific research Unit (SRU) of MACHS. The ethical approval number is SR/RP/49. Furthermore, any information disclosing respondent identity was excluded from the tool. Prior to participation in the study, online consent was also obtained from the respondents who took part in the study.

### Data analysis

The responses of participants (125) were analysed using Microsoft Excel version 2019. Descriptive analysis was used to express the demographic information in frequencies and percentages. Chi-square ( $\chi^2$ ) test was done for statistical analysis. Statistical analysis of response data was done by Microsoft excel version 2019 with a significance level of  $p \leq 0.05$ .

## Results

### Demographic characteristics of study participants

Males accounted for 12.8% ( $n = 16$ ) of the study sample, while females accounted for 87.2% ( $n = 109$ ). Most of the participants were aged 15 to 25. A high proportion of students in this study ( $n = 55$ , 44%) were from the fifth academic year. The sample represents all pharmacy academic year groups to compare the

knowledge of the disease among groups. 84 participants were unmarried (64.8%). Details of demographic characteristics are available in Table I.

**Table I: Participants' demographic**

| Variable                         | Respondents, n (%) |
|----------------------------------|--------------------|
| <b>Gender</b>                    |                    |
| Male                             | 16 (12.8)          |
| Female                           | 109 (87.2)         |
| <b>Age in years</b>              |                    |
| 18-25                            | 105 (84.0)         |
| >25                              | 20 (16.0)          |
| <b>Academic year</b>             |                    |
| Second                           | 16 (12.8)          |
| Third                            | 12 (9.6)           |
| Fourth                           | 42 (33.6)          |
| Fifth                            | 55 (44.0)          |
| <b>Marital and family status</b> |                    |
| Single                           | 81 (64.8)          |
| Married                          | 44 (35.2)          |
| Having children                  | 30 (24.0)          |

### Knowledge of HPV

There were 116 participants who had heard about cervical cancer (92.8%,  $p < 0.001$ ). However, 80 of them did not know about HPV vaccination (65.0%,  $p < 0.001$ ). The pharmacy students were asked how they knew about cervical cancer prevention, HPV infection and HPV vaccines, and the result showed that about 16 (19.3%) of 123 respondents got their information from friends and family and 14 of them from the internet (17.8%), these results are shown in Figure 1. 16A high percentage of students agreed that HPV could cause cervical cancer ( $n = 89$ , 71.2%,  $p < 0.001$ ). On the other hand, 72 participants had no knowledge about the prevention of HPV infection (57.6%,  $p < 0.001$ ); 53 participants (42.4%) had adequate knowledge. Also, 62.5% ( $n = 82$ ) of students were not aware if HPV is a sexually transmitted disease ( $p = 0.004$ ). About 39.2% of the participants ( $n = 42$ ) answered correctly the question of whether HPV infection can be frequent or not. Therefore, 60.8% ( $n = 76$ ) replied incorrectly ( $p < 0.001$ ) and 56% of people ( $n = 64$ ,  $p < 0.001$ ) did not have knowledge about the nature of HPV occurrence. The participants were asked if HPV infection can last for years, and the result showed that 30.40% ( $n = 39$ ) responded correctly that it could last for years, with nine participants (7.2%) responding otherwise, and 86 participants (68%) did not know.

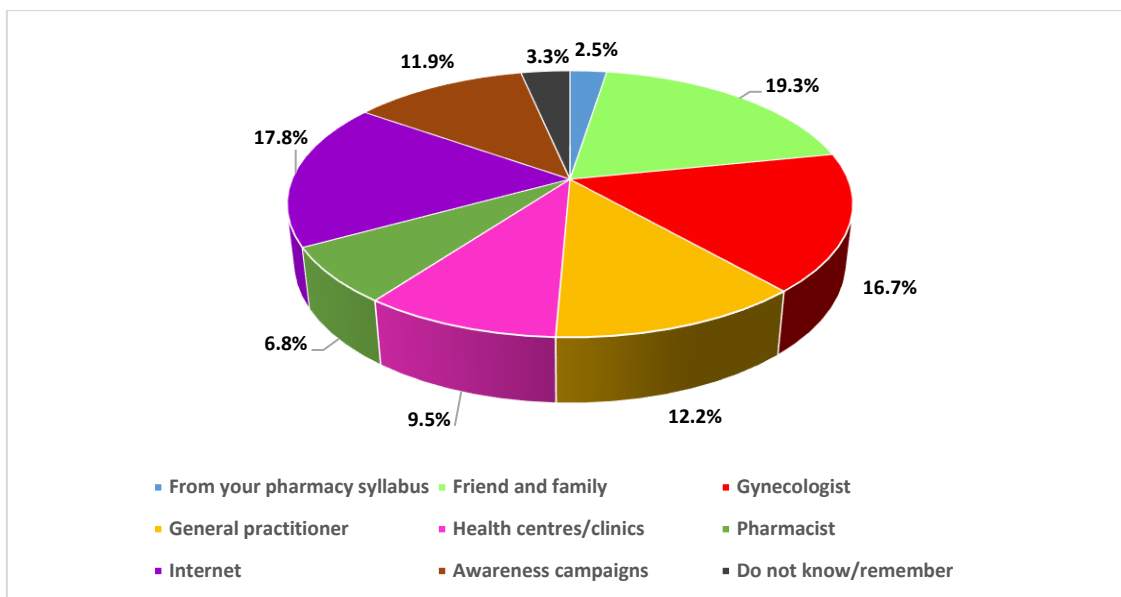


Figure 1: Disparity in the source of information collected on HPV infection and HPV vaccines (n: 123)

The survey assessed the knowledge of the participants on whether cervical cancer can cause persistent HPV infection. A total of 83 respondents (61.6%) were not aware if it caused persistent HPV infection or not. Furthermore, 44.8% of the participants (n = 56) were not aware if HPV could infect people without symptoms. 44.8% (n = 56,  $p < 0.001$ ) of the participants thought that HPV could cause genital warts, and the rest were not sure or responded otherwise. In addition, the respondent was asked if they knew that HPV could cause other cancers such as anogenital cancer, and 33.6% (n = 43) thought that HPV causes other cancers such as anogenital cancer ( $p = 0.024$ ),

but 66.4% (n = 83) of them didn't know the answer. The respondents were asked if the HPV vaccine prevents around 70% of cervical cancer: (n = 63) 53.4% were unaware, but 45.6% agreed (n = 57,  $p = 0.325$ ). When asked if a Pap smear can be a tool to screen for cervical cancer, 67 participants agreed (53.6%), nine participants disagreed (7.2%), and 33 participants were undecided (39.2%). A total of 60 respondents (48%) agreed that a Pap smear is very or relatively effective in screening for cervical cancer, and 52% of the participants had no knowledge (n = 65,  $p = 0.654$ ). Table II shows the knowledge of pharmacy students towards HPV vaccine.

Table II: Knowledge data of pharmacy students towards HPV vaccine (n = 125)

| Variable   | Correct response, n (%) | Incorrect response, n (%) | p-value |
|--|-------------------------|---------------------------|---------|
| Knows about cervical cancer  | 116(92.80)              | 9(7.20)                   | <0.001  |
| Knows about HPV vaccination  | 44(34.96)               | 80(65.04)                 | 0.001   |
| HPV can cause cervical cancer  | 89(71.20)               | 36(28.80)                 | <0.001  |
| Prevention of HPV infections   | 53(42.40)               | 72(57.60)                 | 0.089   |
| HPV is a sexually transmitted disease (STD)                                | 43(34.40)               | 82(65.60)                 | 0.004   |
| HPV infection is frequent  | 49(39.20)               | 76(60.80)                 | 0.015   |
| HPV infection can last for years   | 39(30.40)               | 86(68.80)                 | <0.001  |
| Cervical cancer is caused by persistent HPV infection                      | 42(33.60)               | 83(66.40)                 | 0.002   |
| HPV may infect both men and women  | 34(27.20)               | 91(72.80)                 | <0.001  |
| Most HPV infection resolves spontaneously                                  | 9(7.20)                 | 116(92.80)                | <0.001  |
| HPV can infect you without symptoms  | 42(33.60)               | 83(66.40)                 | 0.002   |
| HPV can cause genital warts  | 56(44.80)               | 69(55.20)                 | 0.244   |
| HPV can cause other anogenital cancers                                     | 42(33.60)               | 83(66.40)                 | 0.024   |
| HPV vaccine prevents around 70 % of cervical cancer                        | 57(45.60)               | 68(54.40)                 | 0.325   |
| Pap smear can screen for cervical cancer                                   | 67(53.60)               | 58(46.40)                 | 0.420   |
| Pap smear is very or relatively effective in screening for cervical cancer | 60(48.00)               | 65(52.00)                 | 0.654   |

The respondents were asked whether HPV vaccines were helpful in preventing cervical cancer. It was noted that while 56 participants (44.8%) agreed, 25 participants (20%) strongly agreed ( $p < 0.001$ ) as seen in Table III. Approximately 53 participants (42.2%) agreed that the HPV vaccine is safe, with 22 (17.6%) of respondents strongly agreeing. 51 participants agreed that there is less risk involved in being vaccinated than

having HPV infection (40.8%) and 19.20% ( $n=19$ ) strongly agreed, however, 44 participants (35.2%) remained undecided on this risk. A total of 54 participants (43.2%) were undecided about HPV vaccination leading to complicated sexual activities, while 28% of them ( $n = 35$ ) agreed with about 19 participants (15.2%) strongly agreeing ( $p < 0.001$ ).

**Table III: Knowledge data of pharmacy student's respondents on HPV vaccine questionnaire (n = 125)**

| Variable   | Strongly agree n(%) | Agree n(%) | Undecided n(%) | Disagree n(%) | Strongly disagree n(%) | p-value |
|--|---------------------|------------|----------------|---------------|------------------------|---------|
| Cervical cancer is a severe disease  | 40(32.0)            | 49(39.2)   | 28(22.4)       | 1(0.8)        | 7(5.6)                 | <0.001  |
| Cervical cancer is preventable   | 18(14.4)            | 60(48.0)   | 38(30.4)       | 2(1.6)        | 7(5.6)                 | <0.001  |
| HPV vaccine is helpful to prevent cervical cancer                            | 25(20.0)            | 56(44.8)   | 36(28.8)       | 5(4.0)        | 3(2.4)                 | <0.001  |
| HPV vaccine is safe  | 22(17.60)           | 53(42.4)   | 47(37.6)       | 2(1.6)        | 1(0.8)                 | <0.001  |
| There is less risk involved in being vaccinated than in having HPV infection | 24(19.20)           | 51(40.8)   | 44(35.2)       | 4(3.2)        | 2(1.6)                 | <0.001  |
| HPV vaccination will not lead to complicated sexual activities               | 19 (15.20)          | 35(28.0)   | 54(43.2)       | 15(12.0)      | 2(1.6)                 | <0.001  |

#### **Association of demographic characteristics with knowledge score**

The result shows that the mean knowledge score was significantly higher in females as compared to males

(16.75 vs 13.62,  $p < 0.001$ ). As seen in Table IV, participants within 18-25 years age as well as those in the fourth and fifth academic year had significant knowledge of HPV ( $p < 0.001$ ).

**Table IV: Knowledge score based on age, gender, and academic year**

| Characteristics      | Mean knowledge score | Standard deviation | p-value ( $\chi^2$ ) |
|----------------------|----------------------|--------------------|----------------------|
| <b>Gender</b>        |                      |                    |                      |
| Female               | 16.75                | 1.13               | <0.001*              |
| Male                 | 13.62                | 3.21               | 0.119                |
| <b>Age in years</b>  |                      |                    |                      |
| 18 – 25 years        | 14.39                | 3.19               | <0.001*              |
| >25 years            | 10.22                | 2.34               | 0.126                |
| <b>Academic year</b> |                      |                    |                      |
| Second               | 8.92                 | 3.39               | 0.127                |
| Third                | 7.38                 | 3.02               | 0.221                |
| Fourth               | 10.42                | 4.11               | <0.001*              |
| Fifth                | 11.92                | 4.03               | <0.001*              |

p-value calculated by using chi-square test. \*Significant p-value

#### **Attitudes towards HPV**

Results show that 59 participants strongly agreed that they do not want to be infected with HPV (47.2%) ( $p < 0.001$ ). There is an acknowledgement by 46 participants that the amount of information they get will help them to decide if they will get vaccinated against HPV (36.8%)

( $p < 0.001$ ). A total of 41 participants decided to get the vaccine due to their confidence in their doctors (32.8%). 32% (40) of participants agree that they will get vaccinated against HPV if the vaccine is freely available ( $p < 0.001$ ). Table V elaborates on the attitude of the respondents towards HPV vaccine.

**Table V: Attitude data of respondents towards HPV vaccine (n=125)**

| Variable   | Strongly agree<br>n(%) | Agree<br>n(%) | Undecided<br>n(%) | Disagree<br>n(%) | Strongly disagree<br>n(%) | p-value |
|--|------------------------|---------------|-------------------|------------------|---------------------------|---------|
| I would not want myself to be infected with HPV  | 59(47.2)               | 30(24.0)      | 24(19.2)          | 7(5.6)           | 5(4.0)                    | <0.001  |
| Information on HPV helps me to decide whether I should be vaccinated against HPV               | 46(36.8)               | 35(28.0)      | 37(29.6)          | 4(3.2)           | 3(2.4)                    | <0.001  |
| If my doctor thinks HPV vaccination is a good idea, I would have myself vaccinated against HPV | 41(32.8)               | 37(29.6)      | 7(5.6)            | 27(21.6)         | 13(10.4)                  | <0.001  |
| I would have myself vaccinated against HPV if the vaccination is freely available              | 41(32.8)               | 33(26.4)      | 40(32.0)          | 9(7.20)          | 2(1.6)                    | <0.001  |

## Discussion

HPV is an infectious disease that is contracted through sexual contact with other infected people and may lead to cervical cancer in women. HPV vaccines, however, help to prevent this disease. There has been no study conducted among pharmacy students regarding HPV. However, a study was conducted by Rashwan and authors (2012) on pharmacy students in Malaysia and the study's demographic data indicated that all the respondents are females. Meanwhile, this study recorded 87.2% female respondents and 12.8% male respondents. In the present study, 64.8% of respondents were unmarried, while Rashwan and authors (2012) reported 100% study respondents as being unmarried. Goodman (2015) revealed that there was a similarity in the participants' ages (18-25 years old) between both groups. There is low knowledge among both groups about HPV vaccine (65.0%) (Goodman, 2015). In contrast to a study conducted in other regions of Saudi Arabia, most of them included medical students and physicians. More prevalence and high acknowledgement were shown in senior students in both groups.

Knowledge about HPV-related risk of cervical cancer was higher among physician and medical students than with pharmacy students, a lesser acknowledgement was observed overall. Both agree that HPV can be an asymptomatic infection. A positive attitude toward vaccination can be seen. This study showed a low number of people who disagreed with taking vaccines, which means that more than half of the respondents agreed that vaccines are effective against HPV. Most of the respondents agreed that the HPV vaccine is safe which will definitely translate to the willingness to get vaccinated against HPV.

Moreover, a high number agreed that vaccines have fewer side effects. There are a few participants who fear getting vaccinated in the other study which shows that more education is needed to maximise the

uptake of the HPV vaccine. According to a study done in Brazil which was focused mainly on female participants, specifically on adolescents and mothers knowledge of HPV, the outcome showed that there was a low knowledge about the relationship between HPV and cervical cancer especially in adolescent girls; however, this prevalence is high among the sample used which shows better acknowledgement.

The awareness that Pap smears are used is similar in both samples, most mothers/guardians correctly described how they were done and knew what they were for (Burd, 2003; Vallès *et al.*, 2009; Faridi *et al.*, 2011; Almutairi *et al.*, 2019). A previous study among Cameroonian healthcare workers reported almost a similar result to the result from this study. Also, it was pointed out that the effectiveness of HPV vaccine in preventing cervical cancer is equal to this study. However, there are differences in other parts such as the ways of transmission.

Overall the present study showed less knowledge about the subject matter compared to previous studies, indicating the need for more education and promotion of HPV vaccination in schools (Santos *et al.*, 2020; McCarey *et al.*, 2021). These outcomes dictate the urgent need to assess the present pharmacy curriculum specifically microbiology, therapeutics and pharmacy practice-related courses to focus on and expand knowledge linked to HPV infection, complications and preventive strategies. In addition, undergraduate pharmacy training programmes in community pharmacies and extra-curriculum activities can also develop communication skills and awareness of future pharmacists to address proactively and efficiently HPV's complications and vaccination to the public.

## Conclusion

In conclusion, this survey indicates that senior pharmacy students at MACHS College are more knowledgeable than junior pharmacy students regarding HPV infection, HPV vaccine and cervical cancer. This study's results also reveal that two major sources for getting information among pharmacy students were family and friends and the internet whereas schools and universities had no role in educating students. These results will help to establish educational policies on HPV-related topics in universities in Saudi Arabia. It will also help educators to plan and implement appropriate education campaigns for undergraduate pharmacy students to reduce HPV infections and consequently, the incidence of and mortality from cervical cancer in Saudi Arabia. Early improvements in education and training can assist future pharmacy students to treat and reduce the incidence of HPV through the provision of inclusive information on the risk of HPV transmission.

## Conflict of interest

All author(s) declared no conflict of interest.

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