

Awareness and attitude of female university students on the human papillomavirus and vaccination: A cross-sectional study

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ABSTRACT

Introduction: Human papillomavirus (HPV) is the most common factor in causing cervical cancer. HPV vaccine is a successful strategy to prevent cervical cancer. Accordingly, the objective of this study was to examine female university students' knowledge and perceptions concerning HPV infection and its vaccine.

Materials & methods: The participants in this cross-sectional survey were female students of applied medical sciences at Imam Abdulrahman Bin Faisal University Dammam, Saudi Arabia. The study was conducted using a structured 28-multiple-choice items questionnaire. A total of 168 participants were included in the survey between September to November 2022.

Results: The average age of participants was 20.10±1.74 years. The majority of the participants (52%) had knowledge of HPV. Whereas 52% of participants showed a positive attitude toward HPV vaccine. The age of the participants was positively and significantly associated with good knowledge of HPV (OR=1.884, 95% CI 1.06-3.35). Participants from a healthcare worker's family were convinced that it could infect both men and women equally (67% vs. 42%, p=0.02).

Conclusions: Overall knowledge and attitude toward HPV and its vaccine were found adequate. It is crucial to implement an educational program within universities and awareness campaigns in community to encourage vaccination, which leads to lower incidence of cervical cancer.

Keywords: HPV, immunization, university students, Saudi Arabia

INTRODUCTION

Human papillomavirus (HPV) belongs to the *papillomaviridae* family of non-enveloped double-stranded DNA viruses. There are around 200 HPV types, amongst them 40 known to infect the reproductive organs [1]. HPV infection may cause warts including genital warts and can lead to different types of cancers. HPV genotypes are categorized into low-risk and high-risk based on their association with oncogenicity [2]. Low-risk genotypes cause genital warts, often asymptomatic, and resolve in a few months to two years after infection by host immunity. A high-risk genotype is a predominant cause of cervical cancer [3].

Cervical cancer is the second most frequent cancer among females next to breast cancer [4]. Cervical cancer claimed the lives of 12.4 and 5.2 per 100,000 women in developed and developing nations, respectively, as of the 2020 report of the International Agency for Research on Cancer [5]. Every year, approximately half of all new HPV infections occur in individuals aged between 15 to 24 years [6]. HPV infection is primarily transmitted through sexual contact and is a major risk factor for HPV-associated cancers [7]. The risk of sexual contact elevates with the age of first sexual contact, number of partners, socioeconomic status, smoking, unemployment,

marital status, and alcoholism, along with co-risk factors like co-infection with human immunodeficiency virus (HIV) [8-10]. According to World Health Organization (WHO), the most effective strategy for preventing cervical cancer is to administer HPV vaccine prior to first sexual contact [11].

Global reports indicate approximately 75% of sexually active people contract HPV during their lifetime [12]. In Saudi Arabia, the prevalence of HPV is debatable; for instance, it was reported 5.6% prevalence [13]. On the other hand, it was reported a high incidence of HPV infections, wherein 43% of cervical specimens tested positive for HPV DNA from healthy women [14]. According to a Saudi Arabian survey, 2.3% of women are infected with the high-risk genotype HPV16/18 in the general population at any one time [15]. However, there is limited data on adolescents' perception of HPV infection and vaccines in Saudi Arabia.

Therefore, adolescents are the target recipients of HPV immunization. They must be aware of HPV infection and understand the importance of vaccination, which will have a significant impact on vaccination acceptance in the future. Therefore, the study aims to evaluate the awareness and attitude of female university students on the association between HPV infection and cervical cancer, and the importance of vaccination.

MATERIALS & METHODS

Sample Size Calculation

Cochran's sample size formula was used to calculate the sample size for this, using a confidence level of 95% and a margin of error of 5% while the expected number of female students in the college of applied medical sciences at Imam Abdulrahman Bin Faisal University (IAU) is 300. This concluded the need for 169 participants for this study.

Subjects

All participating students belong to College of Applied Medicine at IAU. The participation was voluntary and written and informed consent was taken from each respondent. The inclusion criteria include only female students from applied medical sciences, students, and from foreign countries in the same college. Whereas exclusion criteria include male students and graduates (alumni).

Instruments

A questionnaire-style survey tool was used to collect data and divided into three sections. The questionnaire included 28 multiple-choice items that are identical to those found in previous studies [2, 4-6]. The first section has eight questions meant to gather socio-demographic data from respondents. The survey's second section includes ten questions meant to test respondents' overall knowledge of HPV infection and cervical cancer. The final section has ten questions that measure the respondents' knowledge about HPV vaccine. Responses are based on a three-point Likert scale (yes/no/do not know). A team of five subject experts validated the questionnaire by face validation. The reliability scale was used to analyze and the alpha value of 0.72 determined the acceptable range and ensured the questionnaire is appropriate for the study objective.

Procedure

The study was conducted online using Google forms. To communicate with the participants, the survey link was distributed through email and shared on social networking platforms (WhatsApp, etc.). They were requested to fill out socio-demographic information after expressing their consent. After entering their demographic information, a series of questions about HPV and cervical cancer awareness, as well as HPV Immunization attitudes and beliefs, were presented, which the participants had to answer one by one. The duration of the study data collection was September to November 2022.

Statistical Analysis

SPSS (IBM Corp. USA) for Windows, version 24.0, was used for statistical analysis. Descriptive statistics were calculated including frequency, percentages, mean, and standard deviation, where appropriate. Data were checked for the normality distribution with the Shapiro-Wilk test and a p-value greater than 0.05 confirmed the normality of the data.

Chi-square test was used to present the association between the level of a knowledge domain and parent occupation. The stepwise logistics regression was employed to evaluate the association between good knowledge and demographical characteristics. P-values less than equal to 0.05 were considered statistically significant.

Table 1. Socio-demographical characteristics of participants

Demographic variables	n	%
Marital status		
Married	16	9.5
Single	152	90.5
Live in Dammam		
Yes	112	66.7
No	56	33.3
Parents monthly income		
<10,000	41	24.4
10,000-15,000	32	19.0
15,000-20,000	44	26.2
20,000-25,000	24	14.3
>25,000	20	11.9
Father's educational level		
Illiterate	8	4.8
Complete secondary school	64	38.1
Graduate	60	35.7
Postgraduate	36	21.4
Mother's educational level		
Illiterate	16	9.5
Complete secondary school	64	38.1
Graduate	64	38.1
Postgraduate	24	14.3
Parents occupation		
Health sector	24	14.3
Non-health sector	144	85.7

Note: Age in years: 20.14 ± 1.74 (range 18-29 years) & GPA of student: 4.41 ± 0.30 (range 3.90-5.67)

RESULTS

Demographics of Participants

The average age of 168 total participants was 20.10 ± 1.74 years with the range of 18-29 years old. The majority of participants were single and lived in Dammam, Saudi Arabia 91% and 67%, respectively. Most parents earn in the range of 15K to 20K Saudi Arabia Riyal (SAR) monthly. Both parents were either college graduates or completed school and most of them are not working in the health sector (85%) (**Table 1**). More than half of the participants somehow were aware of HPV virus (55%), followed by 43% who did not hear about HPV before and 2% who just did not want to answer.

Knowledge and Awareness of HPV

The knowledge responses towards HPV are indicated in **Figure 1**. Approximately half of the participants were aware that HPV may infect both males and females (55%) and it may cause cervical cancer (52.4%). Most respondents did not believe that HPV infection can cause genital warts (61.9%) and that it can spread from skin-to-skin contact (64.3%). Similarly, 57.1% and 54.8% of the respondents did not agree that HPV infection is sexually transmitted and can be prevented, respectively. The majority of the participants thought cervical cancer cannot be detected in its early stages (74%) and also had analogous feelings that it cannot be cured (76%).

Participant's Attitude Towards HPV Vaccine

Participant's attitudes toward HPV vaccine depicted in **Table 2**. Fortunately, more than half of the participants were aware of the availability of HPV vaccine (52%). But most of them were not sure if it can prevent cancer (55%). Almost 10% of them were vaccinated with HPV with no idea until what age it can be demonstrated (55%). Very few participants thought

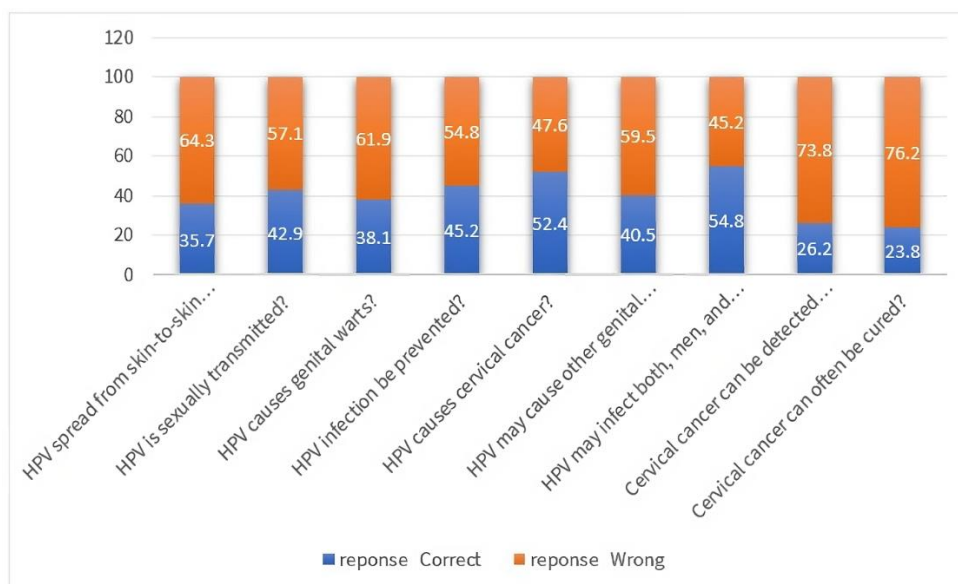


Figure 1. Knowledge and awareness of HPV among female university students (Source: Author’s own elaboration)

Table 2. Participant’s attitude & acceptability of HPV vaccine

Questions	Statement	Knowledge status		
		Yes (%)	No (%)	Do no Know
1	Did you know there is a vaccine for HPV?	88 (52.4)	28 (16.7)	52 (31.0)
2	HPV vaccine prevents cervical cancers?	44 (26.2)	32 (19)	92 (54.8)
3	Are you vaccinated against HPV?	16 (9.5)	84 (50)	64 (38.1)
4	Did you know the HPV vaccine can be given until 27 years old?	12 (7.1)	64 (38.1)	92 (54.8)
5	Does the HPV vaccine have significant side effects?	24 (14.3)	20 (11.9)	124 (73.8)
6	Can you get an HPV infection from HPV vaccination?	24 (14.3)	44 (26.2)	96 (57.1)
7	HPV vaccine is effective at preventing HPV infection?	52 (31)	16 (9.5)	96 (57.1)
8	Do you need the parent’s approval for the HPV vaccine?	40 (23.8)	52 (31.0)	76 (45.2)
9	HPV vaccine is only for sexually active people?	20 (11.9)	68 (40.5)	76 (45.2)
10	Once vaccinated, women no longer need to be screened for cervical cancer.	----	84 (50.0)	84 (50.0)

HPV vaccine is only for sexually active people (12%) and they will need their parent’s approval for getting this vaccine (24%). Not a single participant agreed with the statement that once vaccinated there will be no longer a need to screen for cancers.

Knowledge of HPV Among Healthcare & Non-Healthcare Providers

Children of healthcare workers were a little less aware of HPV infection as a disease (Table 3), but the differences were not significant (p=0.57). Participants belonging to healthcare workers’ families were certain that it can infect both males and females equally (67% vs. 42%, p=0.02). HPV may cause other gentile cancers, response was significantly higher among the non-healthcare worker’s family participants (61% vs. 50%, p=0.021), whereas 100% of participants were sure that cervical cancer can detect early-stage compared to non-healthcare families (100% vs. 70%, p=0.001).

Factor Associated With Good Knowledge of HPV

The age of the participants was positively and significantly associated with good knowledge of HPV (OR=1.884, 95% CI 1.06-3.35) whereas marital status was not significantly associated (OR=0.338, 95% CI 0.02-0.045) (Table 4). The higher-income group were negatively and significantly correlated with HPV knowledge (20K to 25K; OR=0.013, 0.001-0.268, p=0.005) and 25K<OR=0.047, 0.006-3.378, p=0.004. Participants’ knowledge of HPV was significantly correlated with either their

father’s illiteracy or lack of a college degree, respectively. (OR=0.007, 0.00-0.001, 0.013, 0.00-0.014). Parents occupations were not statistically correlated with the knowledge of HPV among the students belonging to healthcare parents (OR=0.324, 0.05-0.22) (p=0.22).

DISCUSSION

The present study aimed to evaluate the knowledge and attitude of female students on HPV immunization and their awareness of its importance. This is one of the first studies conducted on female university students in the eastern province of Saudi Arabia. The results revealed that most respondents had adequate knowledge regarding HPV. However, 47.6% were unaware that HPV causes cervical cancer, and 54.8% were unaware that HPV infection can be prevented. In contrast, a similar study conducted on university students in Hail, Saudi Arabia reported that 66.3% of the respondents had never learned of HPV and 75.1% were unaware that HPV causes cervical cancer [11]. Likewise, a study conducted on female university students in Morocco stated that 85.3% of responders were unaware of HPV [4]. In this perspective, our university students are slightly more knowledgeable about HPV. On the other hand, higher levels of awareness of HPV (95.3%) have been reported amongst college students in South Carolina [16]. This can be closely related to the presence of awareness efforts in South Carolina.

Table 3. Parent's occupation with knowledge of HPV

Knowledge		Parents occupation		
		Health care	Non-health	p-values
Had you ever heard of HPV?	Yes	50.0%	55.6%	0.570
	No	50.0%	44.4%	
HPV may infect both, men, & women.	Yes	66.7%	41.7%	0.020*
	No	33.3%	58.3%	
HPV is sexually transmitted?	Yes	50.0%	58.3%	0.293
	No	50.0%	41.7%	
HPV spread from skin-to-skin contact?	Yes	66.7%	63.9%	0.493
	No	33.3%	36.1%	
HPV infection be prevented?	Yes	50.0%	55.6%	0.386
	No	50.0%	44.4%	
Does HPV cause genital warts?	Yes	50.0%	63.9%	0.143
	No	50.0%	36.1%	
Does HPV cause cervical cancer?	Yes	33.3%	50.0%	0.097
	No	66.7%	50.0%	
HPV may cause other genital cancers.	Yes	50.0%	61.1%	0.021*
	No	50.0%	38.9%	
Cervical cancer can be detected at an early stage?	Yes	100.0%	69.4%	0.001*
	No	0.0%	30.6%	
Cervical cancer can often be cured.	Yes	83.3%	75.0%	0.272
	No	16.7%	25.0%	

Note. *Calculated from Chi-square test

Table 4. Different factors associated with good knowledge of HPV

Factors	Exp (B)	95% CI for Exp (B)		p-value	
		Lower	Upper		
Age	1.884	1.060	3.350	0.031*	
Marital status	Married		Ref.		
	Single	0.338	0.020	0.451	0.451
Live in Dammam	No		Ref.		
	Yes	1.765	0.460	0.405	0.405
Parents income	<10,000		Ref.		
	10,000-15,000	0.992	0.180	0.993	0.993
	15,000-20,000	2.605	0.620	0.190	0.190
	20,000-25,000	0.013	0.001	0.268	0.005*
	>25,000	0.047	0.006	0.373	0.004*
Father education	Postgraduate		Ref.		
	Illiterate	0.013	0.000	0.014	0.014*
	Complete secondary school	0.007	0.000	0.001	0.001*
	Graduate	0.280	0.020	0.392	0.392
Mother education	Postgraduate		Ref.		
	Illiterate	11.106	0.260	0.208	0.208
	Complete secondary school	2.375	0.090	0.610	0.610
Parents occupation	Graduate	0.350	0.010	0.535	0.535
	Non-health sector		Ref.		
	Health sector	0.324	0.050	0.222	0.222

In the current study, participants' attitudes towards HPV vaccine were found positive with 52% being aware of the obtainability of HPV vaccine and 9.5% are vaccinated. Nevertheless, 55% were not sure that HPV vaccine can prevent cancer. These findings are in line with a study conducted in Malaysia, which found that 50.8% were aware of HPV vaccine [17]. In contrast, in a study from Morocco, only 8% of students were aware of HPV vaccine [4]. On the other hand, only 40.5% of responders agreed that HPV vaccine is not only for sexually active people. In this regard, a similar rate of response was documented from university of Hail, Saudi Arabia [11].

This suggests that there is an urgent need to implement an educational program on HPV and cervical cancer prevention that is suitable for young women. None of the responders agreed that once vaccinated, women no longer need to be screened for cervical cancer; this indicates that cancer

awareness among responders is very good and might be due to number of years spend in the university and study subjects.

A significant association was found between age and knowledge of HPV infection and causes of cervical cancer. This might be explained as a reflection of the educational level and topics covered pertaining to virus and cancers in study subjects. Similar results were reported from Tanzania and Thailand [18-20]. In present, parents' income exceeding 20,000 SAR had significant association with the good knowledge of HPV. This is due to the fact that having a high socioeconomic status has a favorable impact on one's ability to learn both in the direct and indirect ways by providing family members with better educational options and a greater desire to learn, regardless of whether one's parents work in the medical field. Participants from healthcare workers' families were very certain that HPV can infect both males and females and were aware that cervical cancer can be detected in early stage.

This might be because of the knowledge gained from parents' profession. For instance, the responses to the question "Does HPV cause genital warts?" were higher from non-healthcare worker's family students. This may be attributed to good academic performing students. Also, participant father's literacy has a significant association with the knowledge of HPV. Similarly, a Malaysian study found that students with tertiary-educated parents had better understanding of cervical cancer prevention than students with less educated parents [21]. Most likely, educating parents are more concerned to their wards and well aware of government initiatives and awareness programs.

The limitations of our study included:

- (a) A small sample size with the study population being exclusively limited to female students and mainly urban residents
- (b) The study was conducted in only one college rather than the entire university.

CONCLUSIONS

The overall knowledge and attitude toward awareness of HPV and its vaccine were found adequate compared to previous surveys from developing countries. However, it is much less when compared to the students of developed countries. Participants' age and parents' literacy and income were significantly associated with knowledge toward HPV. It is important to increase awareness of HPV infection and cancer to next levels. It is recommended to develop an educational program periodically within universities and community to promote vaccination among young women to prevent HPV infection and to decline risk of cervical cancer incidence.

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Ethical statement: Authors stated that Imam Abdulrahman Bin Faisal University's Institutional Review Board granted ethical approval (Ref: No IRB/2022-03-335). To maintain confidentiality, participant's name was not included in the survey questionnaires.

Declaration of interest: No conflict of interest is declared by the author.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the author.

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