

Awareness, standpoint, and inclinations towards human papilloma virus vaccination among University of Jordan Medical Students: a cross-sectional study

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Abstract

Introduction: Human papillomavirus (HPV) is a significant risk factor for the development of cervical malignancy. The overall death toll due to cervical carcinoma is remarkable. The HPV vaccine is a well-known primary preventive measure for HPV infections, but it has not yet been introduced in Jordan.

Aim of the research: The study aims to examine the point of view of medical students at the University of Jordan who want to be vaccinated against HPV infection.

Material and methods: This cross-sectional survey was carried out between August 2023 and April 2024, during which time 327 participants who were senior students at the School of Medicine of the University of Jordan were interviewed using a validated and structured questionnaire.

Results: Over 96% of the students were aware of cervical cancer and HPV, but only 89% knew about the HPV vaccine and its safety before participating in the study. The students showed highly favourable attitudes toward the HPV vaccine, with an acceptance rate of 84.1%. Nevertheless, some students were willing to be vaccinated but were unaware of the vaccine. However, the high cost and insufficient dissemination of HPV-related information were significant obstacles to vaccine uptake in Jordan. Most participants were female (202), while 125 were male.

Conclusions: Medical students' knowledge about the HPV vaccine was high, and they had good attitudes, which are vital in recommending the vaccine and subsequent uptake, considering the health advocate's weakness through the media.

Introduction

Human papillomavirus (HPV) is the most common sexually transmitted disease among both males and females. The rise in HPV-related tumours has been attributed to evolving sexual practices. The issue of orogenital transmission touches on deeply personal aspects of life and is often underexplored in the literature [1]. HPV infections are frequently asymptomatic and go unnoticed [2]. Most sexually active individuals are infected with HPV at least once during their lifetime, typically without awareness or the presence of symptoms [3]. The prevalence of HPV acquisition, persistence, and infection is linked to factors such as sexual behaviour, viral load, anatomical site, local immunity, and viral clearance [4]. HPV can be transmitted through various pathways across mucosal sites, including autoinoculation within the same host and interindividual transmission. Interindividual transmission includes perinatal transmission, sexual transmission via diverse orogenital practices, deep kissing (involving extensive or intensive contact of the inner lips, tongue, and teeth, particularly with prolonged

or rhythmic tongue-to-tongue contact), and indirect transmission through hand contact [5, 6]. Autoinoculation between genital, oral, and anal sites may occur via hand contact or virus shedding in the anogenital region [4]. In 2019, HPV was responsible for an estimated 620,000 new cancer cases in women and 70,000 in men worldwide [7]. Nevertheless, about 20% of infections persist with a long latency period, which may lead to malignancies, including genital tract cancers, with cervical cancer being the most common [8]. The 3 FDA-approved vaccines offer protection against different HPV types. These include the bivalent (2vHPV), quadrivalent (4vHPV), and 9-valent (9vHPV) vaccines. The 9-valent HPV vaccine, a second-generation, noninfectious recombinant vaccine available in the United States, is intended to prevent infections, diseases, and cancers caused by both low-risk and high-risk HPV types, including 6, 11, 16, 18, 31, 33, 45, 52, and 58 [9, 10].

The most clinically significant HPVs are high-risk mucosal types, including HPV 16, 18, 26, 31, 33, 35, 39, 45, 51, 52, 53, 56, 58, 59, 66, 68, 73, and 82. Early viral proteins such as E5, E6, and E7 are pivotal in develop-

ing neoplastic lesions caused by HPV infections [11]. These 3 early HPV proteins, E6, E7, and E5, are integral to oncogenesis. E6 and E7 contribute to the functional inactivation of critical cell cycle regulators, tumour suppressors, and telomerase activation, while E5 aids in keratinocyte differentiation and immune evasion [12, 13]. The WHO now advises using the 9-valent (9vHPV) vaccine in a one- or two-dose schedule for girls aged 9–14 years, a similar one- or two-dose regimen for girls and women aged 15–20 years, and 2 doses 6 months apart for women over 21 years old [5]. The efficacy and effectiveness of these vaccines are notably high in young women who were HPV seronegative before vaccination, but they are less effective in adult women aged 26–45 years. Comparable efficacy has been observed among bivalent, quadrivalent, and nonavalent vaccines against HPV 16/18. No significant differences in seroconversion between two-dose and three-dose schedules have been noted at any time point. However, the use of a single-dose HPV vaccination schedule remains a subject of debate [14].

Aim

The study aims to examine the point of view of medical students at the University of Jordan who want to be vaccinated against HPV infection.

Material and methods

Participants

The target population comprised medical students in their fifth and sixth years. The selection of participants was based on the student's rotation at the department. A 10-minute questionnaire was used, designed by the authors, including 4 critical areas regarding the topic. It is a validated and structured questionnaire comprising 4 extensive areas: socio-demographic characteristics, HPV knowledge, attitude, and practices regarding vaccination. The students themselves completed the questionnaire. Ethical approval was obtained from the Institutional Review Board (IRB) of JUH (#10/2023/30091), dated 03/12/2023.

Study design and materials

This was a cross-sectional study conducted between July 2023 and April 2024. The primary aim was to explore medical students' knowledge and attitudes toward HPV and HPV vaccination. The primary data collection tool was a questionnaire, which gathered information on participants' sociodemographic traits, HPV and vaccine knowledge, perceived enablers and barriers to vaccination, and their willingness to accept the HPV vaccine. This questionnaire was adapted from prior studies and standardised to align with the current research goals.

Procedure

The questionnaire was designed to ensure that participants could provide reliable answers and minimise potential bias. The survey was conducted face-to-face to ensure people understood the questions and were not influenced by anything else. The collected data were kept confidential and used solely for research purposes.

Data analysis

Descriptive statistics were performed to analyse key sections of the questionnaire; in addition, a χ^2 test of independence was conducted to examine the association between gender and attitudes toward the HPV vaccine. A p -value of less than 0.05 with a 95% confidence interval (CI) was considered statistically significant.

Results

Demographic characteristics

The study included 327 participants aged 20 to 41 years ($M = 23.77$, $SD = 2.73$). The age distribution is illustrated in Figure 1, which depicts the spread of ages across the sample. Most participants were female (61.8%, $n = 202$), while 38.2% ($n = 125$) were male. Regarding marital status, 90.8% ($n = 297$) of participants were single, 8.6% ($n = 28$) were married, and 0.6% ($n = 2$) were divorced. The gender and marital status distributions are shown together in Figure 2. A summary of participants' demographic characteristics is presented in Table 1.

Awareness of HPV among medical students

Most participants (96.9%, $n = 317$) reported having heard about HPV, while 2.1% ($n = 7$) had not, and 0.9%

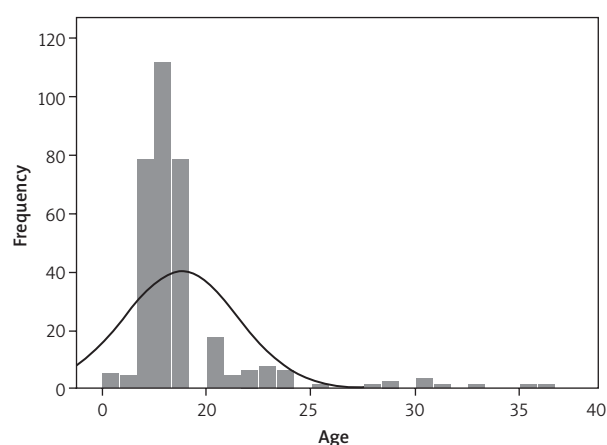


Figure 1. Age distribution of participants. This figure illustrates the distribution of ages among participants, ranging from 20 to 40 years, with a mean age of 23.77 years and a standard deviation of 2.734

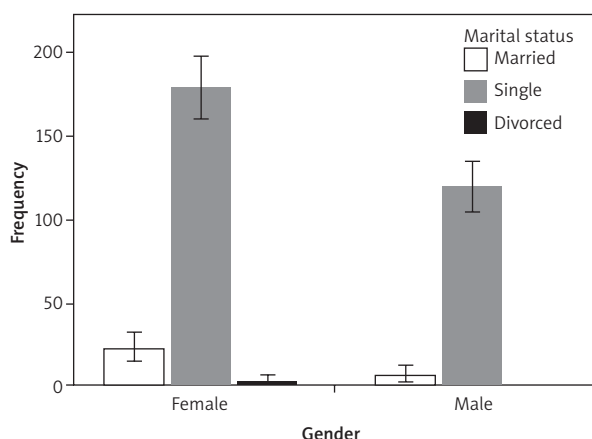


Figure 2. Gender and marital status distribution of participants. This figure shows the distribution of gender and marital status among the participants. The majority of females and males are single, with smaller proportions married or divorced

Table 1. Sociodemographic characteristics of the participants

Characteristics	n	%
Male	125	38.2
Female	202	61.2
Marital status		
Single	297	90.8
Married	28	8.6
Divorced	2	0.6

($n = 3$) were unsure. Regarding the transmission of HPV, 91.7% ($n = 300$) of participants correctly identified it as a sexually transmitted virus, while 3.1% ($n = 10$) believed it was not, and 5.2% ($n = 17$) were unsure. A total of 29.1% ($n = 95$) of participants were aware that HPV can often resolve on its own without treatment, while 57.2% ($n = 187$) responded incorrectly, and 13.8% ($n = 45$) were unsure. When asked if HPV causes penile cancer, 55.4% ($n = 181$) of participants correctly stated that it does, while 11.9% ($n = 39$) did not believe so, and 32% ($n = 107$) were unsure. Among the participants, 88.1% ($n = 288$) correctly acknowledged that HPV causes cervical, vulvar, or vaginal cancer, while 2.4% ($n = 8$) disagreed, and 9.5% ($n = 31$) were unsure. In response to whether HPV causes prostate cancer, 45% ($n = 147$) correctly responded that it does not, while 16.8% ($n = 55$) believed it does, and 38.2% ($n = 125$) were unsure. A significant proportion of participants (48.3%, $n = 158$) knew that HPV causes oropharyngeal cancer, while 14.4% ($n = 47$) did not believe so, and 37.3% ($n = 122$) were unsure. Responses were mixed on whether males and females must be

screened for HPV before vaccination. A total of 42.5% ($n = 139$) believed that screening was necessary, while 31.2% ($n = 102$) correctly stated that it is not required, and 26.3% ($n = 86$) were unsure.

Barriers to HPV vaccination

The most frequently reported response was having no barriers to vaccination (41.6%, $n = 136$). Other notable barriers included not being sexually active (30.3%, $n = 99$), lack of knowledge about the disease or vaccine (10.4%, $n = 34$), fear of side effects (5.8%, $n = 19$), the perception that the vaccine is expensive (4%, $n = 13$), lack of conviction about the vaccine's efficacy (4%, $n = 13$), the belief that the vaccine is not beneficial (2.4%, $n = 8$), and opposition to vaccination (1.5%, $n = 5$).

Methods of transmission

The most frequently selected method of HPV transmission was sexual transmission ($n = 287$), followed by skin-to-skin contact ($n = 88$), during birth ($n = 64$), blood infection ($n = 46$), non-penetrative sex ($n = 30$), "not sure" ($n = 14$), and airborne infection ($n = 12$).

Behaviour toward HPV vaccination

About 77% ($n = 252$) of participants believed that the HPV vaccine prevents cervical cancer, while 13% ($n = 41$) disagreed, and 10% ($n = 34$) were unsure. Regarding penile cancer, 47% ($n = 154$) believed the vaccine prevents it, 17% ($n = 56$) disagreed, and 36% ($n = 117$) were unsure. Most participants (57%, $n = 188$) agreed that the HPV vaccine should be administered before the first sexual intercourse, while 29% ($n = 92$) were unsure, and 14% ($n = 47$) disagreed. Regarding acceptance of a free HPV vaccine, 69% ($n = 224$) expressed willingness to receive it, 17% ($n = 55$) were unsure, and 14% ($n = 48$) declined.

Gender and attitude toward HPV vaccine

A χ^2 test of independence was conducted to examine the relationship between gender and attitude toward the HPV vaccine. The association between these variables was significant, $\chi^2 (2, N = 327) = 24.8$, $p < 0.001$. As shown in Table 2, more females (90.6%) reported positive attitudes than males (73.6%). Conversely, males were more likely to report negative attitudes (22.4%) than females (4.5%). These results indicate a significant gender difference in attitudes toward the HPV vaccine. The strength of this association was assessed using Cramer's V , which revealed a moderate relationship between gender and attitude toward the HPV vaccine (Cramer's $V = 0.275$). This suggests that gender plays a meaningful role in shaping attitudes toward the HPV vaccine, with females tending to view the vaccine more favourably than males.

Table 2. Gender and attitude toward HPV vaccine

Parameter	Attitude						Total	
	Negative attitude		Neutral attitude		Positive attitude		Count	%
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
Gender								
Female	9	4.5%	10	5.0	183	90.6	202	100.0
Male	28	22.4%	5	4.0	92	73.6	125	100.0
Total	37	11.3%	15	4.6%	275	84.1	327	100.0

Note. The percentages represent the proportion of individuals within each corresponding gender category (female or male).

Discussion

The results highlight a high level of awareness about HPV among medical students, with most participants correctly identifying it as a sexually transmitted virus and understanding its role in causing various cancers, including cervical and penile cancers. However, areas of misinformation persist, particularly regarding the resolution of HPV infections without treatment and misconceptions about its connection to prostate cancer. Most participants demonstrated a positive attitude toward HPV vaccination, reflecting strong support for its preventive benefits, particularly regarding cervical cancer. This finding underscores the importance of gender-specific strategies to address the concerns of different groups. Research has established that HPV infection is the primary cause of carcinomatous changes in the cervix, driving efforts to develop a vaccine to prevent the disease and its progression to cancer [15, 16]. Despite the breakthrough represented by the HPV vaccine, its optimal impact in reducing genital cancer cases and mortality rates has not yet been fully achieved [17, 18]. Parental factors, including HPV-related health behaviour and awareness, were found to influence decisions to vaccinate daughters against HPV significantly. To improve vaccine uptake at the recommended age of 12 years, parental awareness must be enhanced through public communication supported by scientific evidence [19–22]. The implementation of education policies and training programs on HPV should be mandatory across medical institutions to ensure that future healthcare professionals are well-equipped with knowledge about the vaccine, the disease, and HPV's role in developing cancers. This preparation would enable them to guide the general population toward accepting the vaccine, thereby reducing HPV-related mortality rates [23–26]. A similar study in Lebanon among medical students revealed a strikingly low vaccination rate (16.4%) due to numerous barriers and promoting vaccination, especially among future healthcare providers and policymakers [27–30]. A study by Farsi *et al.* in Saudi Arabia reported that male medical students had low HPV knowledge [31, 32]. Similarly, a survey

by Cheema *et al.* in Qatar reported comparable findings, emphasising the importance of incentivising healthcare professionals to increase their knowledge of HPV and communication skills [33].

In Jordan, the HPV vaccine is accessible only through the private sector, making it expensive and thus unaffordable for many middle-income families. This was reflected in the study data, where only 43 out of 327 respondents (13.15%) had been vaccinated against HPV before the study. Many of these students were born and attended primary school outside Jordan. This finding aligns with a survey among female college students in Lebanon, where 16.7% of the 215 participants had been vaccinated before the study [23]. We propose adopting mandatory HPV vaccination instead of limiting it to emergency use, as seen during the COVID-19 pandemic [34]. HPV infections generally take 15 to 20 years to progress to cancer [35, 36]. Studies by Chen *et al.* (2021) and Heimbecker *et al.* (2024) revealed that males generally have lower knowledge levels about HPV compared to females [37, 38]. In high-income countries, widespread screening strategies and HPV vaccination programs have been instrumental in reducing the incidence of HPV infections and related cancers [38].

One weakness of this manuscript is that the survey did not ask the medical students if they know about the availability of the vaccine in Jordan. This study's limitations include use of a cross-sectional survey design and self-reported measures. Additionally, the sample consists only of those who self-selected to participate. However, the final sample was representative of the university's population.

Conclusions

While medical personnel's awareness and attitudes toward HPV vaccination are generally positive, targeted efforts are needed to address gaps in knowledge, particularly regarding HPV transmission methods, and to tailor educational and communication strategies based on gender differences in vaccine attitudes. We recommend implementing comprehensive educational and training programs on HPV with-

in the country's medical institutions to strengthen awareness and encourage vaccine acceptance. Ensuring that current and future healthcare providers possess robust knowledge, positive attitudes, and clear intentions regarding HPV and its vaccines will help guide the general population and ensure the success of national vaccine delivery initiatives.

Author contributions

All authors contributed to the manuscript equally.

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Ethical approval

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Conflict of interest

The authors declare no conflict of interest.

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