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Assessment of Knowledge and Attitudes toward Human Papillomavirus (HPV) among Medical Sciences Students: A Cross-sectional Study in Ardabil, Iran

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Abstract

Background

Human papillomavirus (HPV) is one of the most common sexually transmitted infections and is strongly associated with the development of precancerous lesions and cervical cancer. Positive awareness and attitudes among medical students regarding this infection play a crucial role in promoting public health and preventing its transmission. This study aimed to assess the level of knowledge and attitudes toward HPV among medical sciences students at Ardabil University of Medical Sciences, Iran.

Methods

This descriptive-analytical cross-sectional study was conducted in 2024 on 600 students from various faculties of Ardabil University of Medical Sciences. A multistage sampling method was applied. Data were collected using a standardized questionnaire developed by Pourkazemi et al., consisting of 45 items (36 items on knowledge and 9 on attitudes). Data analysis was performed using independent t-tests and one-way ANOVA in SPSS version 24.

Results

The mean knowledge score of students was 22.10 ± 2.76 out of 36. There was a statistically significant difference in knowledge scores across academic disciplines, with medical students exhibiting the highest mean scores and environmental health students demonstrating the lowest ($P < 0.001$). Regarding attitudes, 87.9% of participants believed that the sexual freedom of individuals with HPV should be restricted, 57.9% considered interaction with infected individuals to be concerning, and 33.1% agreed that infected individuals should avoid marriage.

Conclusion

Overall, students demonstrated a moderate level of knowledge and expressed negative attitudes, indicative of stigma. These findings highlight the need for evidence-based educational interventions to improve knowledge and promote more positive attitudes among medical students.

Introduction

Human papillomavirus (HPV) is a well-established cause of cervical cancer and one of the most common sexually transmitted infections (STIs). Cervical cancer remains one of the leading causes of cancer-related mortality among women [1]. The prevalence of HPV infection in women and men varies worldwide. A meta-analysis of studies published up to 2022 reported that the pooled prevalence of genital HPV infection among men ranged from 1% to 84%, with a mean prevalence of 31%. In women,

more recent studies have reported a prevalence of approximately 12%. Around 80% of sexually active women acquire HPV by the age of 50, most commonly resulting in transient infection [2, 3]. In Iranian studies, recent estimates indicate HPV positivity rates of 38.9% [4] and 31.8% [5] among participants.

The burden of HPV infection in Iran appears to be high, potentially due to limited awareness, lack of regular screening, and the absence of population-based vaccination programs—factors that may relate to vaccine availability and cost [4]. Studies from developed countries have shown that many adults and young women, including those with higher educational attainment, have limited knowledge about HPV infection [6]. Unfortunately, public education initiatives aimed at increasing awareness of HPV and its consequences are not widely available in Iran [1].

Medical education is not only a means of transferring knowledge and skills; it also shapes attitudes and expectations. Medical students, as future physicians and healthcare providers, are key stakeholders in improving awareness of the health burden associated with HPV [7]. Therefore, it is expected that medical students will be equipped with topic-focused knowledge, including HPV-related screening and the identification of precancerous lesions [8, 9]. Beyond improving knowledge about HPV itself, future healthcare providers should also understand the relationship between HPV and cancer, including cervical cancer and oropharyngeal cancer [10, 11]. Such knowledge may motivate preventive actions, including effective education, community engagement, HPV vaccination recommendations, and—through early detection of precancerous lesions—may substantially influence patient outcomes and survival [8].

However, students can only play an effective role if they have up-to-date knowledge and a positive attitude toward the benefits and risks of HPV vaccination. Evidence indicates insufficient knowledge among Iranian students [12]. Similar patterns have been reported internationally; for example, inadequate HPV awareness has been observed among students in studies by Wen (2014) [13], Patel (2024) [14], and Sharma (2020) [7]. Patel (2021) also reported discouraging levels of HPV awareness among students. Overall, these findings suggest that the issue is not solely the availability of information but also the uneven distribution of education and the prioritization of curricula, highlighting the need for targeted education and curricular improvement [15, 16].

Therefore, ongoing assessment of medical students' knowledge and attitudes is essential to evaluate their future professional competence, including planning educational campaigns to improve public understanding. Accordingly, this study was conducted to assess the knowledge and attitudes of medical students at Ardabil University of Medical Sciences toward HPV in 2024.

Methods

This analytical cross-sectional study was conducted in 2024. The study population consisted of all undergraduate students enrolled at Ardabil University of Medical Sciences. Based on previous studies assessing students' knowledge and attitudes toward HPV [17], the sample size was determined as 600 participants using the following formula ($p = 0.5$, $\alpha = 5\%$ and $d = 4\%$).

$$n = \frac{z^2_{1-\frac{\alpha}{2}}\, p(1-p)}{d^2}$$

Sampling was performed using a multistage method. First, the required sample size was proportionally allocated to each school (faculty) based on its share of the total student population. Next, within each faculty, participants were selected by simple random sampling according to the number of students enrolled in each field of study.

Inclusion criteria included being a currently enrolled student at Ardabil University of Medical Sciences, and exclusion criteria included unwillingness to continue participation and incomplete questionnaires.

Data were collected using a standardized questionnaire developed in the study by Pourkazemi et al. [12]. The questionnaire comprised 45 items: 36 questions assessing knowledge and 9 assessing attitude. For knowledge, each correct response (yes) was scored as 1, and an incorrect response (no) as 0. Therefore, the knowledge score for each participant ranged from 0 to 36, with higher scores indicating greater knowledge.

For attitude, items were scored using a three-point Likert scale, ranging from 1 (disagree) to 3 (agree). Higher knowledge scores indicated greater knowledge, whereas lower attitude scores reflected a more favorable attitude. The Cronbach's alpha coefficient for the entire questionnaire in this study was 0.89.

Quantitative data were reported as mean and standard deviation, and qualitative data as frequencies and percentages. After confirming normality, an independent-samples t-test and ANOVA were used for inferential analyses. All statistical analyses were conducted using IBM SPSS Statistics version 24, with a significance level set at $P < 0.05$.

Ethical considerations

The study was approved by the research ethics committee at Ardabil University of Medical Sciences with the code IR.ARUMS.REC.1403.298. The study protocol adheres to the ethical guidelines outlined in the 1975 Declaration of Helsinki, including considerations such as voluntary participation and obtaining written informed consent. Participants were assured of the privacy of their data and were informed that all data would be analyzed anonymously.

Results

The mean age of the participants was 22.52 ± 3.67 years, with no significant difference in age between female and male students (P = 0.67). The majority of participants were single (90.3%). The highest proportions of participants were observed among students of Public Health (16.2%), Nursing (10.7%), and Dentistry (10.3%) (Table 1).

Table 1
Demographic characteristics of study participants

Variable	Category	n	%
Gender	**Girl**	441	73.5%
	Boy	159	26.5%
Marital Status	**Single**	540	90.3%
	Married	58	9.7%
Field of Study	**Dentistry**	62	10.3%
	Medicine	48	8.0%
	Pharmacy	60	10.0%
	Radiology	38	6.3%
	Lab Sciences	23	3.8%
	Health IT	30	5.0%
	Nursing	64	10.7%
	Emergency Med.	6	1.0%
	Operating Room	19	3.2%
	Anesthesia	30	5.0%
	Midwifery	45	7.5%
	Public Health	97	16.2%
	Environmental Health	36	6.0%
	Occupational Health	42	7.0%
Total		600	100%

The mean knowledge score among all participants was 22.10 ± 10.22. Knowledge scores were slightly higher in male than in female students ($P = 0.052$) and were higher among single participants than among married participants ($P = 0.08$); however, these differences were not statistically significant. No statistically significant association was observed between participants' age and knowledge score ($r = 0.045,\ P = 0.27$). (Table 2).

Table 2
Mean knowledge score by demographic characteristics

Variable	Category	Mean	SD	p-value
Age	**Girl**	20.89	2.82	0.27
	Boy	21.02	2.14	
Gender	**Girl**	21.97	2.74	0.052
	Boy	22.47	2.79	
Marital status	**Single**	22.17	2.71	0.08
	Married	21.51	3.20	

The highest mean knowledge score was observed among medical students (23.62 ± 2.63), while environmental health students exhibited the lowest level of knowledge (20.67 ± 2.03). One-way ANOVA revealed a statistically significant difference in knowledge scores across different fields of study ($P < 0.001$) (Table 3).

Table 3
Knowledge score by field of study

Field of Study	n	Mean	SD	p-value
Dentistry	62	22.90	2.77	
Medicine	48	23.62	2.63	
Pharmacy	60	22.90	2.28	
Radiology	38	22.00	2.44	
Laboratory Sciences	23	22.39	3.16	
Nursing	64	21.11	2.50	p < 0.001
Emergency Medical Services	6	23.33	2.07	
Operating Room	19	22.16	2.09	
Anesthesia	30	23.27	2.82	
Midwifery	45	22.00	2.69	
Public Health	97	21.62	2.87	
Environmental Health	36	20.67	2.03	
Occupational Health	42	21.43	3.10	
Health Information Technology	30	21.47	2.94	

Regarding attitudes towards individuals with HPV, the majority of participants held conservative views. Specifically, 87.9% agreed that the freedom of sexual relationships for individuals with HPV should be restricted, while 50.5% disagreed that those infected should feel ashamed. Furthermore, 57.9% believed that interacting with infected individuals induces fear. Only 33.1% agreed that individuals with HPV should refrain from marriage (Table 4).

Table 4
Attitudes of participating students regarding HPV

Statement	Agree	Neutral	Disagree
	n (%)	n (%)	n (%)
Sexual freedom should be restricted for individuals with HPV.	525(87.9)	61(10.2)	11(1.8)
Individuals with HPV should be ashamed.	45(7.5)	252(42)	343(50.5)
Working with children by individuals with HPV poses a risk.	232(38.7)	266(44.3)	102(17)
Having contact with individuals infected with HPV causes fear.	346(57.9)	170(28.4)	82(13.7)
Individuals with HPV are considered unhygienic.	82(13.8)	230(38.6)	284(47.7)
One should avoid friendships with individuals infected with HPV.	105(17.5)	233(38.8)	262(43.7)
Individuals infected with HPV should refrain from marriage.	198(33.1)	231(38.6)	169(28.3)
Individuals with HPV should avoid having children.	187(31.2)	249(41.5)	164(27.3)
Patients with HPV should be isolated.	147(24.6)	247(42.3)	214(35.8)

These findings indicate that despite a relative level of awareness regarding HPV among students, negative attitudes and stigma towards infected individuals remain prevalent.

Discussion

In this study of 600 students, the mean knowledge score regarding HPV was 22.1 ± 2.76 (range: 0–36). The distribution of knowledge scores demonstrated significant differences across academic fields. Medical students reported the highest level of knowledge compared with other groups, whereas environmental health students had the lowest scores.

Despite the relatively moderate level of knowledge, negative and stigmatizing attitudes towards individuals infected with HPV were common among participants. This pattern—relatively adequate knowledge alongside unfavorable attitudes/stigma—suggests that increasing knowledge alone may be insufficient to improve attitudes and reduce stigma. Therefore, there is a clear need for values-based, skill-focused (approach-oriented) educational interventions and behavioral programs. These findings are

consistent with evidence from within Iran, which reported a moderate level of HPV knowledge among medical students in Tabriz and highlighted the need for further education [17].

A recent systematic review (2022) of Iranian studies also confirmed the lack of structured education and the fragmented distribution of knowledge regarding HPV. The present findings, showing moderate overall awareness and significant differences across fields of study, are consistent with these reports and suggest that educational blind spots exist in certain disciplines, which warrants targeted educational planning [1]. Similarly, the study by Pourkazemi et al. (2017) identified low levels of knowledge among students about HPV infection [12]. This alignment indicates that the challenge lies not only in the content available but also in the uneven distribution of education and curricular priorities.

International evidence demonstrates comparable patterns. In line with our findings, several studies have reported insufficient HPV-related knowledge among university students, with medical students generally performing better than non-medical students [18]. Wen et al. (2014) also found poor knowledge regarding HPV infection and vaccination among medical students in southwest China [13]. Patel (2024) reported disappointingly low awareness of HPV among university students [14], and as well as Sharma [7] found only moderate levels of knowledge. Another multicenter study revealed that many students and young professionals still possessed limited information about HPV [19]. Although Shetty et al. reported good overall awareness regarding HPV-related diseases and prevention, substantial knowledge gaps remained in several domains [20]. Consistent with these results, a recent cross-national study comparing medical students worldwide showed significant variation in knowledge of clinical and preventive aspects of HPV. Students from the United States, Eastern and Western Europe demonstrated markedly better understanding of risk factors, early symptoms of cervical cancer, and HPV infection compared to students from African and Asian countries [11].

Therefore, our findings—showing superior knowledge among medical students yet inadequate attitudes—are concordant with global trends, underscoring the worldwide need for comprehensive and integrative educational programs that address both knowledge and attitude domains. The current level of HPV-related awareness among medical students, who will later serve as public health educators, is concerning. Similarly, Gismondi et al. (2021) emphasized the necessity of intensified training to improve medical students' understanding and awareness of HPV infection [11]. Possible explanations for disciplinary differences in HPV knowledge may include variability in curricular content, clinical exposure to related patients, educational priorities, access to informational resources, and differences in university curricula. Clinically oriented disciplines (such as medicine and emergency care) are likely to receive more HPV-related education due to their direct engagement with clinical outcomes and patient management, whereas health-oriented programs (e.g., environmental health) may focus on broader public health issues, resulting in lower awareness.

In contrast, the prevalence of negative and stigmatizing attitudes may stem from sociocultural beliefs, insufficient ethical and communication training, and fear of social consequences. The current study found that a majority of participants expressed conservative views toward individuals with HPV — for

instance, 87.9% agreed that their sexual freedom should be restricted. This pattern suggests that, despite a moderate level of knowledge, negative and stigmatizing attitudes remain widespread, consistent with previous studies. Grigore et al. reported that only 50.7% of women held positive attitudes toward HPV vaccination [21], whereas Chowdhury et al. found overall favorable attitudes among students (75.88%), with female students showing more positive perceptions than males [19].

The findings of this study have specific implications for medical education and public health policy. First, HPV-related topics—including epidemiology, prevention, vaccination, stigma, and professional communication—should be incorporated into the curricula across all health disciplines to reduce inter-field disparities. Second, educational interventions should go beyond information delivery to include training in empathy, communication skills, and stigma reduction, as increasing knowledge alone may not transform negative attitudes. Finally, targeted HPV vaccination programs for medical and health sciences students, coupled with well-structured awareness campaigns and myth-dispelling efforts, could enhance vaccine acceptance and promote health professionals as positive role models. Evidence also demonstrates that structured educational interventions can effectively improve both knowledge and attitudes [15].

Strengths and Limitations

The strength of this study lies in its inclusion of students from multiple health-related disciplines, which allowed for meaningful inter-field comparisons. Conversely, several limitations should be acknowledged. First, the self-reported nature of the questionnaire may have introduced social desirability bias. Second, the cross-sectional design precludes causal inference. Third, the generalizability of the findings may be limited to other universities or to future generations of students.

These limitations are consistent with those reported in similar national and international studies, and future research using longitudinal or interventional designs is warranted to complement and extend the current findings.

Conclusion

Although the overall level of knowledge about human papillomavirus (HPV) among medical science students at Ardabil University of Medical Sciences was relatively moderate, their attitudes toward individuals infected with HPV remained negative and conservative, reflecting the persistence of stigma and misconceptions surrounding the infection. Therefore, the design and implementation of targeted, evidence-based educational programs within universities are essential for enhancing students' knowledge and promoting more informed and empathetic attitudes toward individuals affected by HPV.

Abbreviations

HPV Human Papillomavirus

Declarations

Ethics approval and consent to participate

The study was approved by the research ethics committee at Ardabil University of Medical Sciences with the code IR.ARUMS.REC.1403.298. The study protocol adheres to the ethical guidelines outlined in the 1975 Declaration of Helsinki, including considerations such as voluntary participation and obtaining written informed consent. Participants were assured of the privacy of their data and were informed that all data would be analyzed anonymously

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

AM designed the initial proposal and manuscript. F.M collected data. YP was responsible for data analysis. AM and YP wrote the main manuscript text. All authors reviewed and approved the final version of the paper.

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