

Original Research Article

Assessing the prevalence, gender differences and factors associated with human papillomavirus vaccination among medical students of a tertiary care hospital: a cross-sectional study

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ABSTRACT

Background: Human papillomavirus (HPV) vaccination protects individuals from HPV-related cancers, especially cervical cancer. Globally, we see underutilization of HPV vaccination, and the situation remains unfavorable in India, where cultural constraints along with insufficient education about HPV create significant challenges to vaccination adoption.

Methods: This cross-sectional study enrolled 350 medical students from a tertiary care hospital in Karnataka. The study assessed student's knowledge levels, vaccination state, and attitudes. Statistical calculations through statistical package for the social sciences (SPSS) v26 produced results that analyzed descriptive and inferential statistics and evaluated the relationships between variables.

Results: HPV vaccination rates among students were relatively low, with only 10% of students receiving HPV vaccination. The understanding of HPV and its vaccine showed greater levels among female students (56.8%) over male students (43.2%). Factors influencing vaccine uptake included when students had better knowledge about HPV transmission and positive views on vaccine effectiveness and cervical cancer prevention benefits. Students faced primary obstacles to vaccine adoption because they were not aware of vaccine information, had incorrect perceptions about vaccine recommendations, and were worried about social discrimination. Most of the students (72%) showed positive attitudes that vaccine benefits health in the future. Females displayed superior awareness about HPV risks, vaccine-related advantages, compared to males.

Conclusion: A total of 66% of students showed an intention to get the HPV vaccine. Medical students generally understand HPV-related diseases and prevention practices. Several knowledge gaps demand additional educational content about HPV diseases and vaccine advantages to be included in the medical learning programs.

Keywords: Human papillomavirus, Cervical cancer, Vaccination

INTRODUCTION

Cervical cancer maintains its position as a severe worldwide public health concern through severe disability and death patterns affecting female populations (morbidity and mortality among women). The World Health Organization mentions that cervical cancer positions as the fourth most common cancer in females; new cervical cancer cases reached 604,000, with 342,000 worldwide

deaths in 2020. Approximately 90 percent of cervical cancer fatalities affect people residing in countries that maintain limited access to preventative healthcare services remain limited.¹

Persistent infection with high-risk types of human papillomavirus (HPV), particularly HPV-16 and HPV-18 among high-risk types of HPV accounts for the occurrence of 70% of all cervical cancer cases; thus, HPV vaccination

serves as our central defense against primary prevention.² Despite many worldwide initiatives about HPV vaccination and advancements in vaccine technology, disparities in vaccine uptake continue to pose challenges to achieving equitable cervical cancer prevention.

India faces an excessive amount of the worldwide occurrence of cervical cancer. It is the second leading cause of cancer death figures for Indian women between 15–44 years old, with approximately 123,000 new cases and 67,000 annual deaths.³ Factors such as inadequate screening programs, including poor screening efforts as well as delayed medical assessment, socio-cultural obstacles, and limited healthcare center accessibility contribute to the impact of the outcome of cervical cancer troubling statistics.

HPV vaccination, regular screening practices, and prevention methods show great potential to decrease the disease burden. However, the Indian population does not accept HPV vaccinations due to their minimal awareness levels, cultural prejudices and limited financial accessibility.^{4,5} Nationwide HPV vaccination programs across the world have produced significant drops in HPV infection rates, precancer lesions and cervical cancer cases. High-income countries have achieved vaccination rates above 70%, as proven by examples from Australia and the United Kingdom.

Healthcare institutions have demonstrated outstanding immunization success through vaccination coverage, reaching more than 70% of the population through national immunization programs and public awareness campaigns.⁶ In contrast, in low- and middle-income countries, Current data shows that India and other similar countries cannot reach vaccination coverage at the same levels.

Although the HPV vaccine was introduced in India in 2006, it has received limited universal acceptance. Government initiatives, such as pilot programs in Punjab and Sikkim, and the recommendation of the National Technical Advisory Group on Immunization (NTAGI) to integrate the HPV vaccine under the Universal Immunization Programme. The Universal Immunization Programme, together with the HPV vaccine, constitute essential measures to improve vaccine access enhancement accessibility.^{7,8}

HPV vaccination promotion should be understood by medical students who will become critical members in promoting HPV vaccination initiatives. As future healthcare providers, their knowledge, attitudes, and vaccination status, the actions of this particular population group dramatically impact public health results. However, studies have identified barriers. Medical students' failure to adopt HPV vaccines stems from insufficient understanding and incorrect beliefs about the safety of these vaccines, together with their limited perceptions of being risk-prone to HPV infection.^{9,10} Assessing gender data regarding vaccination rates between population groups and elements

impacting vaccination decisions leads to significant healthcare findings.

A research investigation evaluates the spread of HPV vaccinations alongside sex-based differences and their relationship factors among medical students attending a tertiary care medical facility. The generated findings can support the design of evidence-based approaches to improve vaccine acceptance by identifying vaccination coverage weaknesses and vaccine acceptance determinants. This study supports global initiatives to eliminate cervical cancer as a public health issue for 2030 under World Health Organization's (WHO) Global Strategy for cervical cancer elimination.¹¹

METHODS

Study area

The study was conducted in BLDE (DU) Shri B. M. Patil Medical College and Hospital, Vijayapura district, Karnataka.

Study period

The study was conducted for 3 months, from August to October 2024.

Study design and participants

The cross-sectional study was employed among medical students. The sample size was determined using Shetty et al considering 95% confidence level and 5% absolute precision. The sample size obtained was 350 participants.¹

Inclusion criteria

The study included medical students who were willing to participate.

Data collection

Data was collected using a self-administered, semi-structured questionnaire assessing knowledge, attitudes, and factors related to HPV vaccination. We collected data from 350 medical students using convenience sampling.

Before data collection, participants received a detailed explanation of the study's purpose, objectives and benefits. Informed verbal consent was obtained from each participant.

Data analysis

The data was presented using numbers, percentages, and chi-square tests, and results were presented in tabular form for clarity and ease of interpretation. These were done using the statistical package for the social sciences (IBM SPSS Statistics for Windows, IBM Corp., Version 26.0).

RESULTS

In our study, out of the 350 participants, 52.5% were female, and 47.5% were male. Most students (61.9%) were aged 20-25 years, followed by those aged 18-20 (37.0%), and only 1.1% were 25-30. Only 10% (n=35) of students had received the HPV vaccine (Figure 1). Among females, 52.3% agreed to take the vaccine, and 52.6% disagreed. Among males, 47.7% agreed to take the vaccine, but 47.4% disagreed.

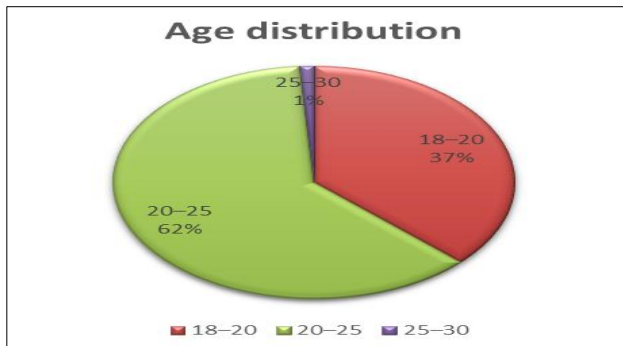


Figure 1: Age distribution among participants.

Most participants identified multiple sexual partners as the most common risk factor, with no significant gender difference. A majority believed HPV is transmitted sexually (53.6% females and 46.4% males). Participants' responses showed a high awareness of other cancers caused by HPV. Cervical cancer-causing HPV types, correct identification was significantly higher in females (58.6%) than males (41.4%) (Table 1).

A more significant proportion of females (56.8%) than males (43.2%) knew about the existence of the vaccine. An important difference was seen in recognizing the recommended age group for vaccination, with females performing better (54.8% correct). Knowledge about vaccine benefits and duration of protection varied slightly between genders, but no significant differences were observed in most cases (Table 2). Students expressed predominantly positive attitudes toward HPV vaccination; 58.8% agreed that HPV infection is severe. 62.4% supported making the vaccine affordable for adolescents. 60.3% expressed willingness to receive the vaccine if it was freely available in clinics or schools. Concerns about embarrassment or stigma related to HPV vaccination were observed but were not predominant (Table 3).

Table 1: Knowledge of cervical cancer.

Variables	Female		Male		X ² , p value
	Frequency	Percentage (%)	Frequency	Percentage (%)	
What is the most common risk factor for cervical cancer?					
Multiple sexual partners	130	52.4	118	47.6	0.118
Immunosuppression	19	52.8	17	47.2	
Malnutrition	5	100.0	0	0.0	
Combined OCP	29	53.7	25	46.3	
Smoking	3	27.3	8	72.7	
HPV is transmitted through?					
Sexually	155	53.6	134	46.4	0.386
Non sexual	31	47.7	34	52.3	
Which type of other cancer can HPV cause?					
Correct	158	52.8	141	47.2	0.792
Wrong	28	50.9	27	49.1	
What are the specific HPV types that cause cervical cancer?					
Correct	164	58.6	116	41.4	0.000 *
Wrong	22	29.7	52	70.3	
HPV can infect					
Correct	141	52.6	127	47.4	0.963
Wrong	45	52.3	41	47.7	
Most HPV infections are					
Correct	101	50.0	101	50.0	0.269
Wrong	85	55.9	67	44.1	
Treatment for HPV infection?					
Correct	50	46.7	57	53.3	0.149
Wrong	136	55.1	111	44.9	
Does condoms protect against HPV infection?					
Correct	14	50.0	14	50.0	0.779
Wrong	186	52.5	168	47.5	

*P value <0.05 is significant

Table 2: Knowledge of HPV vaccine.

Variables	Female		Male		X ² , p value
	Frequency	Percentage (%)	Frequency	Percentage (%)	
Do you know there exists vaccine against HPV infection?					
Correct	163	56.8	124	43.2	0.002*
Wrong	5	22.7	17	77.3	
Do not know	18	40.0	27	60.0	
Name of HPV vaccines protect against 2 or more HPV types?					
Correct	133	55.2	108	44.8	0.146
Wrong	53	46.9	60	53.1	
Vaccination should be done for					
Correct	127	48.8	133	51.2	0.021*
Wrong	59	62.8	35	37.2	
Does HPV vaccines help to clear the existing HPV infection?					
Correct	46	45.5	55	54.5	0.200
Wrong	102	56.7	78	43.3	
Do not know	38	52.1	35	47.9	
Should females get the vaccine before they become sexually active					
Correct	149	53.2	131	46.8	0.742
Wrong	8	57.1	6	42.9	
Do not know	29	48.3	31	51.7	
How long the protective effect of vaccine last?					
Correct	64	51.6	60	48.4	0.797
Wrong	122	53.0	108	47.0	
HPV vaccine is currently recommended for which age group					
Correct	176	54.8	145	45.2	0.007*
Wrong	10	30.3	23	69.7	
HPV vaccine is currently recommended for which age group					
Correct	99	52.7	89	47.3	0.963
Wrong	87	52.4	79	47.6	

*P value <0.05 is significant

Table 3: participant's attitudes towards HPV vaccination.

Attitude assessment	Agree, N (%)		Disagree, N (%)		Neutral, N (%)		Strongly agree, N (%)		Strongly disagree, N (%)	
	Fe-male	Male	Fe-male	Male	Fe-male	Male	Fe-male	Male	Fe-male	Male
I think I can be easily infected by HPV	23 (62.2)	14 (37.8)	39 (41.5)	55 (58.5)	85 (59.9)	57 (40.1)	0 (0.0)	5 (100)	39 (51.3)	37 (48.7)
I think HPV infection is a serious disease	105 (55.6)	84 (44.4)	2 (18.2)	9 (81.8)	24 (41.4)	34 (58.6)	53 (62.4)	32 (37.6)	2 (18.2)	9 (81.8)
Getting the HPV vaccine would be beneficial to a teenage girl or boy's future health	101 (60.5)	66 (39.5)	0 (0.0)	6 (100.0)	31 (47.0)	35 (53.0)	52 (51.5)	49 (48.5)	2 (14.3)	12 (85.7)
People who have only one sexual partner have a low risk of becoming infected with HPV	112 (62.2)	68 (37.8)	14 (41.2)	20 (58.8)	46 (48.9)	48 (51.1)	12 (37.5)	20 (62.5)	2 (14.3)	12 (85.7)
HPV vaccination is not necessary because a Pap test can be done to rule out cervical cancer	22 (37.3)	37 (62.7)	77 (58.8)	54 (41.2)	67 (55.8)	53 (44.2)	0 (0.0)	0 (0.0)	20 (45.5)	24 (54.5)

Continued.

Attitude assessment	Agree, N (%)		Disagree, N (%)		Neutral, N (%)		Strongly agree, N (%)		Strongly disagree, N (%)	
	Fe-male	Male	Fe-male	Male	Fe-male	Male	Fe-male	Male	Fe-male	Male
I believe that government of India must make the HPV vaccine affordable to all adolescents and young adults given the benefits it offers	93 (64.6)	51 (35.4)	0 (0.0)	9 (100.0)	39 (50.0)	39 (50.0)	52 (46.8)	59 (53.2)	2 (16.7)	10 (83.3)
I believe it would be difficult and embarrassing for me to ask for the HPV vaccine because it is associated with a sexually transmitted infection	24 (52.2)	22 (47.8)	72 (57.6)	53 (42.4)	55 (49.1)	57 (50.9)	1 (7.7)	12 (92.3)	34 (58.6)	24 (41.4)
If other people knew I received the HPV vaccine, I would be embarrassed	13 (56.5)	10 (43.5)	79 (55.6)	63 (44.4)	45 (42.1)	62 (57.9)	3 (100.0)	0 (0.0)	46 (58.2)	33 (41.8)
I believe that all physicians should recommend every teenage girl to be vaccinated and inform them about harmful effects of HPV	79 (50.6)	77 (49.4)	1 (25.0)	3 (75.0)	45 (55.6)	36 (44.4)	60 (60.0)	40 (40.0)	1 (7.7)	12 (92.3)
If this vaccine is freely available in schools/clinics, I would be willing to take the vaccine	89 (58.2)	64 (41.8)	1 (14.3)	6 (85.7)	48 (45.7)	57 (54.3)	47 (60.3)	31 (39.7)	1 (9.1)	10 (90.9)
Knowing the risks of HPV, I intend on taking HPV vaccine in the future	88 (55.7)	70 (44.3)	0 (0.0)	4 (100.0)	44 (44.9)	54 (55.1)	53 (66.3)	27 (33.8)	1 (7.1)	13 (92.9)

DISCUSSION

Our study findings showed that 10% of students received the HPV vaccine. Similarly, Shetty et al documented similar vaccine uptake at 6% despite their study participants showing better awareness of HPV and its vaccine. Rashid et al documented that 7% of participants in his research sample took the HPV vaccine. Kalra et al established that vaccination frequency reached 14.4%. The bridge between vaccine awareness and actual uptake persists because of factors such as the high cost of vaccines, cultural barriers, and insufficient health policy strategies in India.^{16,17}

The correct identification of HPV types responsible for cervical cancer was higher among females (58.6%) than males (41.4%) in our study. Still, the research by Rashid et al demonstrated that females (82.45%) showed greater awareness of cervical cancer than males (57.7%). The data in our study indicates that females demonstrated better recognition of both types of HPV that cause cervical cancer and the appropriate vaccination age range. Females exhibited more awareness of HPV-related conditions, including cervical cancer, due to their presumed higher perceived relevance of such diseases. Shetty et al similarly showed that females outperformed males in HPV knowledge tests. Still, the study did not establish

substantial distinctions in HPV understanding or cervical cancer consciousness between men and women.^{17,18}

According to Shetty et al medical trainees and students who performed clinical internships scored higher in their knowledge evaluations. Our study omitted an analysis of the effects of particular academic subjects which the study investigated.¹⁶

The present study showed that 62.4% of participants wanted vaccine affordability for adolescents, and 60.3% indicated willingness to receive it if provided for free. These results support Rashid et al's findings. Similarly, Shetty et al discovered that 65.2% of students planned to get vaccinated as positive perceptions directly influenced their intention to receive the vaccine.

A large proportion of 73.5% of participants expressed in Kalra et al's research showed their agreement to accept new vaccines if healthcare providers recommended them. Research findings show that accessible and lower-cost vaccination drives better acceptance of vaccines.^{16,17,19}

The existing gap in understanding HPV transmission methods and vaccine advantages continues to persist. Our research mirrored Shetty et al's findings that 78% of students perceived HPV transmission through sexual

contact by showing that 53.6% of female and 46.4% of male participants identified HPV as sexually transmitted.¹⁶

The main impediments among this sample were individuals' unawareness about HPV vaccination (42.7%), their worries about medical safety and adverse reactions (28.3%), and cultural bias against sexually transmitted infections inoculations (24.5%). Research done by Shetty et al revealed that participants were concerned about social stigma during vaccination, while Rashid et al. found no program coverage that matched Kalra et al's results.^{16,17,19}

Limitations

The research methodology prevents researchers from establishing cause-effect relationships. Using convenient sampling methods reduces the ability to generalize research findings to different populations. Participant-reported information could have issues with memory recall and social-desirability preference effects.

CONCLUSION

The research shows that medical students have an average understanding of HPV and have favorable impressions of the disease and vaccination protocols. Females had a superior understanding of HPV types linked with cervical cancer coupled with knowledge about vaccine availability and proper vaccination age. Despite this, the vaccination rates showed low participation because 18.6% of registered individuals received the vaccine. The survey found that persuasive majorities (60%) favored vaccine affordability and accessibility, and many medical students showed commitment to receiving the Vaccination if free availability was possible. Improving vaccination rates requires multiple strategies to overcome expenses, social discrimination, and incorrect vaccine beliefs. The research data demonstrates an urgent requirement for specific actions that will boost HPV prevention programs for young adults.

Recommendations

The school curriculum should incorporate comprehensive HPV education to fix misunderstandings and explain the value of Vaccination. State governing bodies should plan for HPV vaccination inclusion in their country-wide immunization services. The vaccine program should be supported by making it affordable through student school programs that provide free accessible vaccinations. The goal of educational campaigns should be to normalize HPV vaccination and reduce stigma by directly addressing false connections between Vaccination and sexually transmitted infections to boost male student acceptance. The advocacy work for HPV vaccination should be supported among vaccinated students and healthcare professionals who can share their experiences to promote peer engagement and demonstrate the protective benefits of the Vaccination.

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REFERENCES

1. World Health Organization. Global strategy to accelerate the elimination of cervical cancer as a public health problem. 2020. Available at: <https://www.who.int/publications/i/item/9789240014107>. Accessed on 10 September 2025.
2. Bruni L, Albero G, Serrano B, Mena M, Gómez D, Muñoz J, et al. Human Papillomavirus and Related Diseases Report. ICO/IARC HPV Information Centre. Am J Med Sci Med. 2020;8(1):21-33.
3. Ferlay J, Colombet M, Soerjomataram I, Parkin DM, Piñeros M, Znaor A, Bray F. Cancer statistics for the year 2020: An overview. Int J Cancer. 2021;5.
4. Pandey D, Vanya V, Bhagat S, Binu VS, Shetty J. Awareness and attitude towards human papillomavirus vaccine among medical students in a premier medical school in India. PLoS One. 2012;7(7):e40619.
5. Mehta S, Rajaram S, Goel G, Goel N. Awareness about Human Papilloma Virus and its Vaccine Among Medical Students. Indian J Community Med. 2013;38(2):92-4.
6. Drolet M, Bénard É, Pérez N, Brisson M; HPV Vaccination Impact Study Group. Population-level impact and herd effects following the introduction of human papillomavirus vaccination programmes: updated systematic review and meta-analysis. Lancet. 2019;394(10197):497-509.
7. Ministry of Health and Family Welfare, Government of India. Pilot introduction of HPV vaccine in India: Lessons learned. New Delhi: MoHFW. 2022.
8. National Technical Advisory Group on Immunization (NTAGI). Recommendations for HPV vaccine inclusion in the Universal Immunization Programme. New Delhi: MoHFW. 2022.
9. Basu P, Malvi SG, Joshi S, Bhatla N, Muwonge R, Lucas E, et al. Vaccine efficacy against persistent human papillomavirus 16/18 infection at 10 years after one, two, and three doses of quadrivalent HPV vaccine in girls in India: a multicentre, prospective, cohort study. Lancet Oncol. 2021;22(11):1518-29.
10. Swarnapriya K, Kavitha D, Reddy GM. Knowledge, Attitude and Practices Regarding HPV Vaccination Among Medical and Para Medical in Students, India a Cross Sectional Study. Asian Pac J Cancer Prev. 2015;16(18):8473-7.

11. World Health Organization. Cervical cancer elimination initiative: Progress and goals. 2021. Available at: <https://www.who.int/initiatives/cervical-cancer-elimination-initiative>. Accessed on 10 September 2025.
12. Kangmennaang J, Malik J, Peace J, Meyer SB, Elliott SJ. HPV vaccine acceptance among young adults in low-income countries: A scoping review. *BMC Public Health*. 2020;20(1):1565.
13. Coursey K, Muralidhar K, Srinivas V, Jaykrishna P, Begum F, Ningaiah N, et al. Acceptability of HPV vaccination for cervical cancer prevention among emerging adult women in rural Mysore, India: a mixed-methods study. *BMC Public Health*. 2024;24:2139.
14. Dempsey AF, Davis MM. Overcoming barriers to adherence to HPV vaccination recommendations. *Am J Manag Care*. 2006;12:S484-91.
15. Gavi, the Vaccine Alliance. HPV vaccines: Boosting uptake in developing countries. Geneva: Gavi. 2022. Available at: <https://www.gavi.org/types-support/vaccine-support/human-papillomavirus>. Accessed on 10 September 2025.
16. Shetty S, Prabhu S, Shetty V, Shetty AK. Knowledge, attitudes and factors associated with acceptability of human papillomavirus vaccination among undergraduate medical, dental and nursing students in South India. *Hum Vaccin Immunother*. 2019;15(7-8):1656-65.

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