



KNOWLEDGE, ATTITUDE, PRACTICE STUDY OF HPV VACCINE AWARENESS AMONG MEDICAL STUDENTS

Public Health

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ABSTRACT

Background: Human papillomavirus (HPV) is a key etiological agent for cervical and other anogenital cancers, many of which are preventable through vaccination. Medical students, interns, and PG residents represent a continuum of future and current healthcare providers who are critical leverage points for HPV vaccine advocacy; therefore, assessing their knowledge, attitudes and practices (KAP) across training stages helps identify actionable gaps for curriculum strengthening. **Methods:** A cross-sectional, questionnaire-based study was conducted among medical students and postgraduate trainees (n=420) with nearly equal male:female representation (1:1). A self-structured tool captured demographics and KAP across HPV infection and HPV vaccine domains (knowledge, attitude, practice). Participants included first, second, third, and final year MBBS students, interns, and PG residents. **Results:** Core awareness was strong: 94% recognized that HPV affects both sexes and 80% linked HPV to cervical cancer; however, only 50% were aware that transmission can occur even when asymptomatic. Knowledge depth showed friction points—40% were unsure about HPV types, only 31% answered HPV-type questions correctly, and responses were mixed regarding vaccine dosage/schedule. Attitude was highly favorable: 84% supported inclusion of HPV vaccine in the national immunization schedule and 83% would recommend vaccination to others. Practice indicators lagged: 60% had never discussed HPV vaccination with peers/patients and 74% had never attended HPV-related workshops/seminars, though 77% supported continued screening even after vaccination—highlighting a clear knowledge-to-execution gap. **Conclusions:** Despite strong baseline awareness and positive attitudes across all training stages, substantial gaps in detailed knowledge and practical engagement persist, even among interns and PG residents. Targeted, competency-based educational interventions spanning undergraduate through postgraduate training are required to improve vaccine counselling readiness and strengthen downstream community uptake.

KEYWORDS

human papillomavirus; HPV vaccine; medical students; knowledge attitude practice; vaccination advocacy; cervical cancer prevention

INTRODUCTION

Human papilloma virus (HPV) is among the most common sexually transmitted infections globally and is a leading cause of cervical, anogenital, and oropharyngeal cancers. Cervical cancer remains a significant public health concern, particularly in low- and middle-income countries with limited screening and prevention. India accounts for a substantial portion of the global cervical cancer burden, underscoring the need for improved prevention.¹ Vaccines are highly effective at preventing infections with the high-risk types that cause most cervical cancers. The World Health Organization considers HPV vaccination a key part of the global effort to eliminate cervical cancer. Adding HPV vaccination to national immunization programs has led to major drops in HPV rates and precancerous lesions in several countries.²

Despite strong evidence of vaccine safety and efficacy, many individuals remain unvaccinated due to lack of awareness, misconceptions, cultural barriers, and insufficient recommendations from healthcare providers. Healthcare professionals significantly influence vaccine acceptance, and their knowledge and attitudes shape public trust.³

Medical students, interns, and PG residents, spanning the full continuum from future to current healthcare providers, play a critical role in health education and vaccine advocacy. Assessing their knowledge, attitudes, and practices (KAP) regarding HPV infection and vaccination across all training stages is essential to identify educational gaps and enhance prevention efforts.

This study assessed the knowledge, attitudes, and practices related to HPV infection and vaccination among medical students, interns, and PG residents at a tertiary care teaching institution.

METHODS

Study design and setting

We conducted a cross-sectional, questionnaire-based study among undergraduate medical students, interns, and PG residents at Government Medical College, Chhatrapati Sambhajanagar, Maharashtra, India, to assess knowledge, attitude, and practice regarding HPV infection and vaccination.

Study population and sample size

A total of 420 participants were enrolled, comprising undergraduate

medical students across all four MBBS years, interns, and PG residents, with numbers of males and females (212 & 208 each). This expanded inclusion was designed to capture a comprehensive cross-section of medical training stages, from early undergraduate learners to postgraduate trainees with clinical responsibilities.

Sampling technique

We used convenience sampling. All eligible students present during the study who provided informed consent were included.

Study tool

Data were collected using a self-designed questionnaire developed after reviewing relevant studies on HPV awareness. The questionnaire included four sections:

- **Section A:** Demographic details
- **Section B:** Knowledge regarding HPV infection and vaccination (including awareness of diagnostic tests performed for HPV/HPV infection, and the ideal age group for HPV vaccination)
- **Section C:** Attitude toward HPV vaccination (acceptance, inclusion in national immunization schedule, recommendation behaviour, concerns about HPV vaccine safety and side effects, and perceived importance of HPV vaccination for public health)
- **Section D:** Practice domain (vaccination status, discussion behaviour, workshop participation, future vaccination intention, HPV education in medical curriculum, and willingness to participate in HPV vaccination programmes)

The knowledge section assessed awareness of HPV transmission, diseases associated with HPV, vaccine availability, dosage schedule, target groups, diagnostic tests performed for HPV and HBV (such as Pap smear, colposcopy, PCR, HBsAg, anti-HBs, HBV DNA, and liver function tests), and the ideal age group for HPV vaccination (9–14 years as the primary target and up to 26 years as catch-up). The attitude section evaluated participants' support for vaccine inclusion in the national immunization program, willingness to recommend vaccination, concerns about HPV vaccine safety and potential side effects, and whether they considered HPV vaccination important for public health. The practice section assessed personal vaccination status, engagement in vaccine-related discussions, participation in HPV-related educational activities, future intention to receive the HPV vaccine, whether HPV vaccination was adequately covered in their

medical curriculum, and willingness to participate in HPV vaccination outreach programmes.

Data collection procedure

The questionnaire was administered in person after explaining the study's purpose. Participation was voluntary, and responses were collected anonymously to ensure confidentiality.

Statistical analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 26. Descriptive statistics were reported as frequencies and percentages. Associations between categorical variables were assessed using the Chi-square test, with p-values <0.05 considered statistically significant.

Ethical considerations

The study was conducted after obtaining approval from the Institutional Ethics Committee of Government Medical College, Chattrapati Sambhajinagar. Written informed consent was obtained from all participants prior to data collection. Confidentiality and anonymity were strictly maintained.

The study was reported in accordance with the STROBE guidelines for cross-sectional studies.

RESULTS

A total of 420 participants were enrolled, comprising undergraduate MBBS students, interns, and PG residents, with male and female representation (212 & 208 each).

Participants were distributed across training stages as follows: 75 (17.9%) in first year MBBS, 80 (19.0%) in second year MBBS, 76 (18.0%) in third year MBBS, 74 (17.6%) in final year MBBS, 60 (14.3%) interns, and 55 (13.1%) PG residents (Table 1).

Table 1-Demographic characteristics (n=420)

Variable	Category	n	%
Sex	Male	212	50.5
	Female	208	49.5
Academic year	1st year MBBS(PHASE 1)	75	17.9
	2nd year MBBS(PHASE 2)	80	19.0
	3rd year MBBS(PHASE 3)	76	18.0
	Final year MBBS(PHASE 4)	74	17.6
	Internship	60	14.3
	PG Residents	55	13.1

Most students (94.0%) knew HPV affects both sexes, and 80.0% recognized its association with cervical cancer. However, only 50.0% were aware that HPV transmission can occur in asymptomatic individuals. Detailed knowledge of HPV types was limited, with only 31.0% answering correctly and 40.0% uncertain (Table 2).

Table 2: Knowledge regarding HPV infection and vaccination (n=420)

Knowledge variable	Yes n (%)	No/Unsure n(%)
HPV affects both sexes	395 (94.0)	25 (6.0)
HPV causes cervical cancer	336 (80.0)	84 (20.0)
Aware of asymptomatic transmission	210 (50.0)	210 (50.0)
Correct identification of HPV types	130 (31.0)	290 (69.0)
Unsure about HPV types	168 (40.0)	252 (60.0)
Awareness of HPV/HBV diagnostic tests (Pap smear, colposcopy, PCR, HBsAg, HBV DNA)	189 (45.0)	231 (55.0)
Correct knowledge of ideal age group for HPV vaccination (9–14 years primary; up to 26 years catch-up)	214 (51.0)	206 (49.0)

Figure 1: Knowledge regarding HPV infection and vaccination (n=420)

Group-wise analysis showed a progressive improvement in knowledge indicators from first year MBBS students through to PG residents, especially regarding the HPV–cervical cancer association, awareness of asymptomatic transmission, and HPV type identification. Interns and PG residents demonstrated the highest knowledge scores, likely reflecting their clinical exposure and patient-facing responsibilities (Table 3).

Table 3: Academic year-wise distribution of selected knowledge

indicators

Academic year	HPV affects both sexes n (%)	HPV linked to cervical cancer n (%)	Asymptomatic transmission n (%)
1st year MBBS (PHASE 1)(75)	69 (92%)	56 (75%)	34 (45%)
2nd year MBBS (PHASE 2) (80)	76 (95%)	65 (81%)	40 (50%)
3rd year MBBS (PHASE 3)(76)	71 (93%)	60 (79%)	38 (50%)
Final year MBBS (PHASE 4)(74)	72 (97%)	64 (86%)	42 (57%)
Interns (60)	58 (97%)	54 (90%)	36 (60%)
PG Residents (55)	54 (98%)	51 (93%)	37 (67%)

A strong positive attitude toward HPV vaccination was observed. A majority of participants (84.0%) supported inclusion of the HPV vaccine in the national immunization schedule, while 83.0% expressed willingness to recommend the vaccine to others. Only 5.0% opposed its inclusion (Table 4).

Table 4: Attitude toward HPV vaccination (n=420)

Attitude variable	n	%
Supports inclusion in national immunization schedule	353	84.0
Unsure about inclusion	46	11.0
Opposes inclusion	21	5.0
Will recommend vaccine	349	83.0
Has concerns about HPV vaccine safety/side effects	147	35.0
HPV vaccination is important for public health	378	90.0

Figure 2: Attitude toward HPV vaccination (n=420)

Positive attitudes were consistent across all training stages. Recommendation rates showed a progressive increase from first year MBBS students through to PG residents, with interns (90%) and PG residents (95%) demonstrating the highest willingness to recommend vaccination, reflecting their direct patient interaction experience (Table 5).

Table 5: Academic year-wise distribution of selected attitude indicators

Academic year	Supports NIS inclusion n (%)	Will recommend vaccine n (%)
1st year MBBS(PHASE 1) (75)	62 (83%)	59 (79%)
2nd year MBBS (PHASE 2) (80)	69 (86%)	66 (83%)
3rd year MBBS (PHASE 3)(76)	63 (83%)	62 (82%)
Final year MBBS(PHASE 4) (74)	64 (86%)	66 (89%)
Interns (60)	53 (88%)	54 (90%)
PG Residents (55)	50 (91%)	52 (95%)

Despite favourable knowledge and attitudes, practical engagement was limited. Sixty percent of participants reported never discussing HPV vaccination with peers or patients, and 74.0% had never attended HPV-related workshops or seminars. However, 77.0% supported continuation of cervical cancer screening even after vaccination (Table 6).

Table 6: Practice related to HPV vaccination (n=420)

Practice variable	Yes n (%)	No n (%)
Never discussed HPV vaccine	252 (60.0)	168 (40.0)
Never attended HPV workshop/seminar	311 (74.0)	109 (26.0)
Supports screening after vaccination	323 (77.0)	97 (23.0)
Intends to receive HPV vaccine in the future (unvaccinated respondents)	235 (56.0)	185 (44.0)
HPV vaccination adequately taught in medical curriculum	176 (42.0)	244 (58.0)
Willing to participate in HPV vaccination outreach/awareness programmes	336 (80.0)	84 (20.0)

Figure 3: Practice related to HPV vaccination (n=420)

Overall, the findings indicate a substantial gap between awareness and attitudes versus actual engagement practices.

DISCUSSION

This cross-sectional KAP assessment among medical students (n=420) demonstrates a clear “awareness-to-action” gradient: **high baseline awareness and consistently positive attitudes**, but **suboptimal depth of knowledge and low practical engagement**,

particularly for discussion-based behaviours and formal training exposure. This pattern is programmatically important because many participants particularly interns and PG residents are already occupying frontline clinical roles where provider recommendation is one of the strongest determinants of HPV vaccine uptake, while undergraduate students will shortly transition into such roles.¹⁻³

In our cohort, awareness that HPV affects both sexes (94%) and recognition of the HPV cervical cancer link (80%) was strong, indicating that broad concepts are being absorbed early. However, only half of participants recognized asymptomatic transmission and only around one-third demonstrated correct knowledge of HPV types, reflecting **gaps in mechanistic understanding and vaccine-specific literacy** (e.g., type coverage, schedules, indications). Similar “headline knowledge with weak technical detail” has been reported across Indian and international student cohorts, particularly for vaccine schedule/age indications and HPV type knowledge.

The attitudinal profile in our study was robust: 84% supported inclusion of HPV vaccine in the national immunization schedule and 83% were willing to recommend vaccination. This is strategically favourable, because attitude alignment is often the prerequisite for advocacy behaviour. Yet our practice indicators show execution friction: 60% had never discussed HPV vaccination and 74% had never attended HPV-related workshops/seminars. This “positive attitude but low engagement” has been repeatedly observed: students may conceptually endorse HPV vaccination while lacking structured opportunities, confidence, or prompts to translate intent into action.³

Our findings align with recent Indian evidence that vaccine uptake and practice behaviours remain low even when awareness is moderate. In an IJRMS study from Amritsar (n=300), 76.33% were aware of the HPV vaccine, but only 7% had received it, with barriers such as cost and concerns about safety/efficacy. This parallels the implementation gap noted in our cohort (limited discussion behaviour and low training exposure), suggesting that **access and confidence barriers** likely persist even among medically literate groups.

The broader Indian evidence base supports this gap. A 2024 systematic review and meta-analysis pooling Indian community-level studies reported low pooled proportions for HPV vaccine knowledge (0.22) and positive attitude (0.45), and very low uptake (~4%).³ While our cohort demonstrates higher attitude readiness than the pooled community estimates, the convergence point remains practice coverage and real-world behaviour lag behind knowledge/attitude signals.

Internationally, the same pattern is visible. A 2017 Hong Kong university study showed senior medical students had significantly better knowledge and more positive attitudes, but vaccination practice did not proportionally increase, indicating that determinants beyond knowledge (e.g., cost, perceived risk, concerns about adverse effects) may cap uptake. Likewise, a 2025 cross-sectional study among Jordanian medical students (n=473) documented modest knowledge scores and highlighted that higher knowledge predicted intention to vaccinate and willingness to recommend, while males were less likely to recommend vaccination to patients; common barriers included doubts about vaccine safety/efficacy and cost. These observations are directionally consistent with the inference from our practice domain: **information alone is not sufficient**—structured enabling systems are required.

Year-wise results in our cohort show incremental improvement in knowledge indicators in later years, with comparatively higher recognition of HPV–cervical cancer association and asymptomatic transmission in senior students. This likely reflects accumulated clinical exposure, greater contact with obstetrics/gynaecology and community medicine teaching, and increased exam-oriented study. Similar “senior-year advantage” has been reported in student cohorts, supporting a **curriculum timing effect** students learn more as content becomes clinically contextualized, and this effect extends through internship and postgraduate training as clinical immersion deepens.

However, the persistence of low engagement practices even among interns and PG residents who scored highest on knowledge and attitude suggests that curriculum may be **knowledge-heavy but competency-light** with respect to vaccine counselling skills and implementation pathways (where to refer, schedule guidance, addressing hesitancy, and cost/access navigation). Interventions most likely to improve practice include: (i) competency-based modules on HPV vaccine

counselling, (ii) case-based discussions integrating screening-plus-vaccination pathways, (iii) structured workshops/seminars with pre/post assessment, and (iv) supervised patient counselling opportunities during clinical postings.

The WHO emphasizes that cervical cancer is largely preventable through HPV vaccination and screening, and the global elimination strategy (adopted by the World Health Assembly in 2020) operationalizes vaccination as a cornerstone of cervical cancer elimination.^{1,2} In this context, strengthening HPV vaccine literacy and counselling competence across the continuum from undergraduate medical students to interns and PG residents is a high-leverage intervention: it can improve provider recommendation behaviour at multiple levels of the health system and accelerate community acceptance, particularly in settings where vaccine hesitancy, affordability constraints, and misinformation remain barriers.³

A key strength is the large sample size with equal gender representation and broad coverage of training stages from first year MBBS through PG residency, improving internal stability of estimates and enabling cross-stage comparisons. Limitations include the cross-sectional design (no causality), reliance on self-reported responses (social desirability and recall bias), and single-institution setting which may limit generalizability. Additionally, the questionnaire was self-structured; while content-valid, future studies could strengthen psychometric validation and incorporate a scored KAP index.

CONCLUSION

In summary, medical students, interns, and PG residents all demonstrate strong awareness and positive attitudes toward HPV vaccination, with a notable progressive improvement in knowledge and attitude indicators across training stages. Nevertheless, persistent gaps in detailed knowledge and low practical engagement remain even among PG residents, indicating that clinical seniority alone does not resolve the knowledge-to-practice gap. A curriculum-integrated, competency-driven strategy—combining structured teaching across all stages of medical training, skills-based counselling training for interns and residents, and facilitated access pathways—may improve translation from awareness to vaccine advocacy and uptake.

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DECLARATIONS

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Ethical approved by: undergoing Approval by the Institutional Ethics Committee, Government Medical College, Chatrapati Sambhajanagar.

Informed consent: Digital written informed consent was obtained from all participants prior to data collection

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