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Knowledge and Awareness of Human Papillomavirus (HPV) Vaccine in Prevention of Cervical Cancer Among Medical Students: A Cross-Sectional Study

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Abstract

Background: Cervical cancer remains a leading cause of cancer-related morbidity and mortality among women in low- and middle-income countries, including India. HPV vaccination provides effective primary prevention, yet uptake remains low even among healthcare trainees who are expected to advocate for preventive health.

Objectives: To evaluate knowledge, awareness, attitudes, and vaccination status regarding HPV and its vaccine among final-year medical students and house surgeons, and to examine the association between awareness and willingness to recommend vaccination to others.

Methods: A descriptive, cross-sectional study of 100 final-year MBBS students and house surgeons at GIMSR Hospital, Visakhapatnam, used a structured, self-administered questionnaire. Data were analysed using descriptive statistics and the chi-square test ($p<0.05$ considered significant).

Results: Awareness of HPV as a cause of cervical cancer was reported by 95% of students and awareness of the HPV vaccine by 85%; however, only 40% had been vaccinated. Among the 60 unvaccinated students, 50% were willing to be vaccinated. Awareness of the vaccine schedule (80%) and cost (74%) was high, and 88% would recommend vaccination to others. Awareness of the vaccine was significantly associated with willingness to recommend it ($p<0.05$), whereas sex was not associated with vaccination status ($p>0.05$).

Conclusion: Medical students show strong awareness of, and positive attitudes toward, HPV vaccination, but this has not translated into adequate personal uptake. Practical, vaccine-focused medical education, affordable on-campus access, and support for national strategies — including India's 2026 nationwide HPV vaccination campaign and the lower-cost indigenous vaccine — are crucial to closing this gap.

Keywords

Cervical cancer; Human papillomavirus; HPV vaccine; Medical students; Awareness; Vaccination uptake; Preventive health; Cross-sectional study.

Introduction

Cervical cancer remains a major threat to women's health worldwide despite being one of the most preventable malignancies. GLOBOCAN 2022 estimated 662,301 new cases and 348,874 deaths globally, with nearly 90% of deaths in low- and middle-income countries [1]. India accounts for nearly one-fifth of the global burden (127,356 new cases) [1], and annual cervical cancer deaths rose from an estimated 32,246 in 2019 to 35,691 in 2023 [2]. Persistent infection with high-risk HPV genotypes is the near-universal cause, with genotypes 16 and 18 responsible for approximately 70% of cases [3].

HPV vaccination is the most effective long-term strategy for primary prevention. Cervarix, Gardasil, and Gardasil-9 are available in India, and the indigenous quadrivalent vaccine Cervavac, authorised in 2022, has shown antibody responses non-inferior to Gardasil at a substantially lower price [4]. The WHO's global strategy sets "90–70–90" targets for 2030, including 90% of girls vaccinated by age 15 years [5], building on the causal link between persistent HPV infection and cervical cancer, recognised by the 2008 Nobel Prize in Physiology or Medicine [6]. Where programmes have been sustained, impact has been dramatic: vaccine-type HPV prevalence among young Australian women fell by more than 90% [7], cervical cancer rates were 87% lower in English women vaccinated at 12–13 years [8], and herd protection extended to the unvaccinated [9].

In India, however, studies of medical students consistently show high awareness but very low vaccine uptake [10-15] and a publicly funded national campaign began only in February 2026 [16]. As future physicians who will counsel patients and dispel myths, medical students' own awareness and vaccination status indicate how well the next generation will champion cervical cancer prevention. This study therefore assessed knowledge, awareness, attitudes, and vaccination status regarding HPV and its vaccine among final-year MBBS students and house surgeons at GIMSR Hospital, Visakhapatnam.

Materials and Methods

Study design

This was a descriptive, observational, cross-sectional study designed to evaluate knowledge, awareness, attitudes, and vaccination status regarding HPV and cervical cancer among medical students.

Study setting and duration

The study was conducted in the Department of Obstetrics and Gynaecology, GIMSR Hospital, Visakhapatnam — a tertiary care teaching institution with an annual intake of approximately 150 MBBS students, providing a representative cross-section of young medical trainees in coastal Andhra Pradesh. The study was carried out from January 2024 to June 2024.

Study population

Participants comprised final-year MBBS students and house surgeons who had completed their core clinical rotations, including postings in Obstetrics and Gynaecology. This group was selected because sufficient clinical exposure was considered necessary to meaningfully evaluate awareness of, and attitudes toward, a clinically relevant preventive intervention. Students in the first, second, and third years of the MBBS programme were excluded on account of limited clinical exposure at the time of the study.

Sample size

The minimum required sample size was estimated using the standard formula for a single-proportion prevalence study:

$$\mathbf{n = Z^2pq / d^2}$$

where Z = 1.96 (the standard normal deviate corresponding to a 95% confidence level), p = 0.5 (an expected awareness prevalence of 50%, used in the absence of prior local data to yield the most conservative, maximum sample-size estimate), q = (1 − p) = 0.5, and d = 0.1 (an acceptable margin of error of 10%). This calculation yielded a minimum required sample size of $n = (1.96)^2 \times 0.5 \times 0.5 / (0.1)^2 \approx 96.04$, i.e., approximately 96 participants, which was rounded up to 100 to allow a margin for incomplete or non-usable responses.

Sampling technique and study tool

All eligible final-year MBBS students and house surgeons who were available and willing to participate during the study period were approached, and enrolment continued until the calculated sample size of 100 was reached. Data were collected using a structured, pretested, self-administered questionnaire comprising 10 multiple-choice questions, framed in simple language after review of the existing literature on HPV vaccine-related knowledge, attitudes, and practice. The questionnaire covered five principal domains:

1. Awareness of HPV infection as a causative agent of cervical cancer.
2. Knowledge of HPV vaccines and their availability.
3. Awareness of the recommended HPV vaccine schedule and cost.
4. Personal vaccination status of participants.
5. Attitudes toward HPV vaccination and willingness to recommend it to others.

Representative items included:

- “Do you know that HPV is a causative factor for cervical cancer?” (Yes/No)
- “Are you aware of vaccines available for HPV?” (Yes/No)

- "Have you received the HPV vaccine?" (Yes/No)
- "Would you recommend HPV vaccination to others?" (Yes/No)

Data collection

The objectives of the study were explained to all eligible participants prior to enrolment, and written informed consent was obtained. Questionnaires were distributed in classroom settings and collected immediately upon completion; responses were anonymised at the point of collection to protect participant confidentiality and encourage candid responses.

Ethical considerations

Ethical clearance was obtained from the Institutional Ethics Committee of GIMSR prior to commencement of data collection (Approval No.: [to be inserted by authors]). Participation was entirely voluntary, and participants were free to withdraw at any stage without any effect on their academic standing. Confidentiality of individual responses was maintained throughout data collection, entry, and analysis.

Statistical analysis

Completed questionnaires were coded and entered into Microsoft Excel for analysis. Descriptive statistics — frequencies and percentages — were calculated for all study variables. Associations between categorical variables (for example, awareness of the HPV vaccine and willingness to recommend it, and sex and vaccination status) were tested using the chi-square test, with a p-value <0.05 considered statistically significant.

Results

A total of 100 medical students — comprising final-year MBBS students and house surgeons — completed and returned the questionnaire. The study population was evenly split by sex, with 50 (50%) male and 50 (50%) female participants, and ages ranging from 21 to 25 years.

Knowledge and awareness

Awareness that persistent HPV infection is the causative agent of cervical cancer was high, reported by 95 of 100 students (95%) (**Table 1; Figure 1**). Eighty-five students (85%) were aware that vaccines against HPV are available (**Table 2; Figure 2**). Somewhat fewer — 70 students (70%) — were aware that HPV vaccination also protects against other HPV-associated malignancies, such as anal, penile, and oropharyngeal cancers.

Response	Number (n=100)	Percentage
Yes	95	95%
No	5	5%

Table 1: Awareness about HPV being the causative agent of cervical cancer (n=100).

Response	Number (n=100)	Percentage
Yes	85	85%

Response	Number (n=100)	Percentage
No	15	15%
Total	**100**	**100%**

Table 2: Awareness of HPV vaccine availability (n=100).

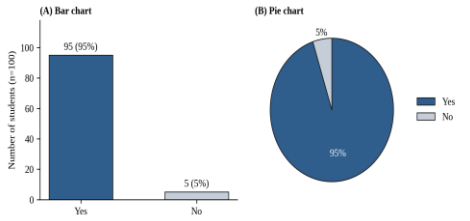

Figure 1: Awareness that HPV is the causative agent of cervical cancer (n=100). (A) Bar chart; (B) pie chart.

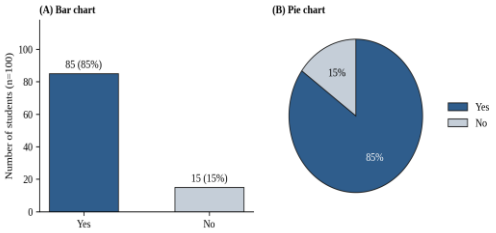

Figure 2: Awareness of HPV vaccine availability (n=100). (A) Bar chart; (B) pie chart.

Vaccination status

Despite this generally high level of awareness, only 40 of 100 students (40%) had actually received the HPV vaccine (**Table 3; Figure 3**). Among the 60 unvaccinated students, willingness to be vaccinated was evenly divided: 30 (50% of the unvaccinated group) expressed willingness to receive the vaccine in future, while the remaining 30 (50%) were unwilling (**Table 4; Figure 4**).

Response	Number (n=100)	Percentage
Vaccinated	40	40%
Not vaccinated	60	60%
Total	**100**	**100%**

Table 3: Vaccination status among students (n=100).

Response	Number (n=60)	Percentage
Willing	30	50%
Unwilling	30	50%
Total	**60**	**100%**

Table 4: Willingness to be vaccinated among unvaccinated students (n=60).

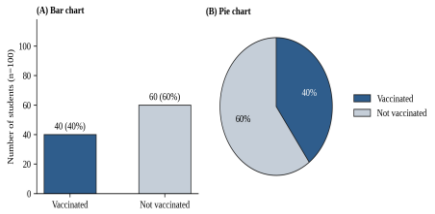

Figure 3: Vaccination status among students (n=100). (A) Bar chart; (B) pie chart.

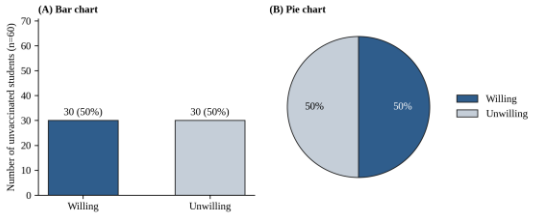

Figure 4: Willingness to be vaccinated among unvaccinated students (n=60). (A) Bar chart; (B) pie chart.

Knowledge of vaccine schedule and cost

Among all participants, 80 (80%) correctly identified the recommended HPV vaccination schedule, and 74 (74%) reported awareness of the approximate cost of the vaccine.

Attitudes toward vaccination

A large majority — 88 students (88%) — indicated that they would recommend HPV vaccination to others, including patients, friends, and family members (**Table 5; Figure 5**), reflecting generally positive attitudes toward the vaccine even among students who had not themselves been vaccinated.

Response	Number (n=100)	Percentage
Yes	88	88%
No	12	12%
Total	**100**	**100%**

Table 5: Willingness to recommend HPV vaccination to others (n=100).

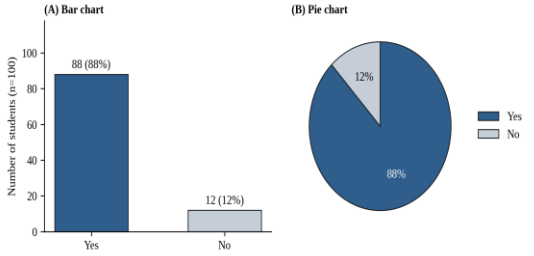

Figure 5: Willingness to recommend HPV vaccination to others (n=100). (A) Bar chart; (B) pie chart.

Statistical associations

On chi-square testing, a statistically significant association was observed between awareness of the HPV vaccine and willingness to recommend it to others ($p<0.05$), suggesting that better-informed students

were more likely to advocate for vaccination. No, statistically significant association was found between sex and actual vaccination status ($p>0.05$), indicating that male and female students were comparably likely to have been vaccinated.

Discussion

This study found a striking awareness–uptake paradox among final-year medical students and house surgeons, a population poised to enter independent clinical practice within months of graduation. Although awareness of HPV as the cause of cervical cancer (95%) and of the vaccine (85%) was high, only 40% had been vaccinated, and willingness among the unvaccinated was split evenly. Better-informed students were more willing to recommend vaccination ($p<0.05$), underscoring their potential as advocates.

Comparison with indian and global studies

Vaccine awareness here (85%) exceeded the 55% reported by Radhika et al [10], and was comparable to or higher than recent cohorts from Nagpur [13] and Amritsar [14]. Uptake (40%) was also considerably higher than the 7–10% reported in those studies [13,14], plausibly because our participants, as final-year students and house surgeons, had more clinical exposure and agency over their own health decisions. The same knowledge–practice gap reported by Pandey et al. [11] and Gollu et al. [12] across more than a decade suggests a structural feature of HPV vaccine delivery in India rather than a single-study artefact. In contrast, school-based, publicly funded programmes in Australia [7] and England [8] achieved large reductions in vaccine-type HPV prevalence and cervical cancer, with herd protection; [9] the difference is programmatic, not scientific, as HPV vaccination in India has largely been an opportunistic, out-of-pocket purchase.

Barriers and opportunities

Likely barriers include the high cost of imported vaccines, myths linking vaccination to infertility or premarital sexual activity, weak provider recommendation, and, until 2026, the absence of a publicly funded national programme [16]. The February 2026 campaign now offers free vaccination to girls at government facilities [16], and the lower-cost Cervavac is non-inferior to Gardasil [4]; however, because the campaign targets adolescent girls, medical trainees are unlikely to be covered, so institution-level access remains relevant.

Implications

Medical curricula should move beyond imparting knowledge to facilitating vaccination — through subsidised or free on-campus vaccination, structured teaching on vaccine hesitancy and communication in the Obstetrics and Gynaecology and Community Medicine curricula, and positive role-modelling by faculty and senior residents. Policy should extend free or subsidised access to healthcare trainees and young adults, since achieving the WHO 90–70–90 targets by 2030 [5] require the active engagement of the medical profession.

Strengths and limitations

This study focuses on the trainees closest to independent practice and directly examines the link between vaccine awareness and willingness to recommend it. Its cross-sectional, single-centre design limits causal

inference and generalisability; the convenience sample of 100 restricts subgroup precision; and self-reported vaccination status could not be verified, allowing recall or social-desirability bias. Larger multi-centre and mixed-methods studies exploring reasons for refusal, and interventional studies of educational programmes, on-campus vaccination drives, or Cervavac availability, are warranted.

Conclusion

This study demonstrates that final-year medical students and house surgeons at a tertiary teaching hospital in India possess high awareness of HPV as a cause of cervical cancer and largely positive attitudes toward vaccination, yet translate this knowledge into personal vaccination at a rate of only 40% — leaving the majority inadequately protected against a largely preventable cancer. As the physicians who will soon be responsible for recommending preventive interventions to their own patients, medical students carry a dual responsibility: safeguarding their own health and modelling the preventive behaviour they will be expected to promote. Bridging the awareness–uptake gap will require coordinated action — curricular integration of practical, vaccine-focused education; institutional facilitation of affordable or free vaccination; and sustained public health messaging — supported by emerging developments such as the 2026 nationwide HPV vaccination campaign and the availability of a lower-cost indigenous vaccine. Such measures, implemented at the medical-student level and scaled nationally, will be essential if India is to make meaningful progress toward the WHO's goal of cervical cancer elimination by 2030.

Ethical Approval: This study was approved by the Institutional Ethics Committee, GIMSR, Visakhapatnam.

Consent to Participate: Written informed consent was obtained from all participants prior to enrolment. Participation was voluntary, and responses were collected and analysed anonymously to protect participant confidentiality.

Funding: No funding

Conflict of Interest: No conflict of interest.

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Author Contributions: Dr. Alnkrita Bansal conceptualised and designed the study, collected and analysed the data, and prepared the manuscript; she was responsible for the literature review, drafting, and critical revision of the article. Dr. G. Indira provided mentorship and guidance throughout the study, supervised the research process, and contributed to the critical review and final approval of the manuscript. Dr. KSK Divya and Dr Mrdudhula contributed to academic supervision, provided valuable guidance, and reviewed the manuscript for intellectual content. Dr. Karisini assisted in data collection, entry and preliminary organisation of the study material, thereby contributing to the successful completion of this work. All authors approved the final version of the manuscript and take responsibility for the integrity and accuracy of the work.

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