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**Original Research Article**

# Awareness on etiology and preventive measures of cancer cervix among female medical students in Rajarajeswari Medical College, Bengaluru

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## ABSTRACT

**Background:** Cervical cancer is a major cause of cancer-related morbidity and mortality among women worldwide. Persistent infection with high-risk human papillomavirus (HPV) is the primary etiological factor. Although HPV vaccination and Pap smear screening are effective preventive measures, awareness and utilization remain inadequate in many settings. This study assessed awareness regarding cervical cancer etiology and preventive measures among female medical students.

**Methods:** A cross-sectional study was conducted among 150 female medical students at Rajarajeswari Medical College, Bengaluru. Data were collected using a pretested semi-structured questionnaire assessing knowledge regarding HPV infection, risk factors, screening and HPV vaccination. Data were analyzed using SPSS software. Descriptive statistics and Chi-square test were applied.

**Results:** All participants had heard of HPV infection and cervical cancer. Awareness regarding HPV transmission through genital contact was reported by 87% of participants, while 84% identified sexually transmitted diseases as a risk factor. Pap smear as a screening method was known to 98.7% of students. Awareness regarding HPV vaccine was reported by 98.7% and 94.7% were willing to receive vaccination; however, only 38.7% had been vaccinated. Educational level showed significant association with knowledge regarding target age for HPV vaccination (p=0.035) and recommended age for first Pap smear (p=0.030).

**Conclusions:** Awareness regarding cervical cancer and preventive measures was high among medical students, but HPV vaccine uptake remained low despite high willingness. Improved educational interventions and better vaccine accessibility are needed.

**Keywords:** Cervical cancer, HPV, HPV vaccination, Medical students, Pap smear

## INTRODUCTION

Cervical cancer remains one of the most common cancers affecting women worldwide and continues to be a major public health concern. According to global cancer statistics, cervical cancer ranks as the fourth most common cancer among women globally, with a substantial burden observed in low- and middle-income countries.[1] Persistent infection with high-risk types of HPV, particularly HPV-16 and HPV-18, is recognized as the primary etiological factor responsible for the development of cervical cancer.[2] Human papillomavirus is one of the most common sexually transmitted infections worldwide and most sexually active individuals are exposed to the virus at some point in their lives.[3] Although many HPV infections resolve spontaneously, persistent infection with oncogenic HPV types may lead to the development of cervical intraepithelial neoplasia and eventually cervical cancer.[2] Early identification of risk factors and preventive measures is therefore essential for reducing cervical cancer incidence and mortality. Cervical cancer is largely preventable through effective preventive strategies such as HPV vaccination and regular

cervical cancer screening. Screening methods such as the Pap smear test have been widely used for the early detection of precancerous lesions and early-stage cervical cancer.[4] Countries that have implemented organized screening programs have shown a significant reduction in cervical cancer incidence and mortality.[5] HPV vaccination is another important preventive strategy that protects against high-risk HPV types responsible for the majority of cervical cancer cases.[6]Several studies have demonstrated that HPV vaccination can significantly reduce the incidence of HPV-related cancers and genital warts.[7] Despite the availability of these preventive measures, awareness regarding HPV infection, cervical cancer risk factors and vaccination remains inadequate in many populations.[8] Previous studies conducted among university and medical students in different countries have reported varying levels of knowledge regarding HPV infection and cervical cancer prevention. Some studies have shown relatively good awareness among healthcare students, while others have identified gaps in knowledge regarding screening guidelines and vaccination practices.[9,10] Furthermore, even when awareness is high, the uptake of HPV vaccination often remains low due to barriers such as cost, safety concerns and lack of accessibility.[11] Medical students represent an important group in cervical cancer prevention efforts because they are future healthcare providers who will play a key role in educating the community about cancer prevention strategies. Adequate knowledge among medical students regarding HPV infection, cervical cancer screening and vaccination is essential for effective health promotion and disease prevention.[12]

## METHODS

### *Study design*

This was a cross-sectional study.

### *Study setting*

The study was conducted at Rajarajeswari Medical College and Hospital, Bengaluru.

### *Study population*

Female medical students including undergraduates, interns and postgraduate students were included in the study.

### *Sample size*

A total of 150 female medical students participated in the study.

### *Study duration*

The study duration was of 3 months from June 2025–August 2025).

### *Study tool*

Data were collected using a pretested semi-structured questionnaire consisting of sections on sociodemographic characteristics, knowledge on HPV transmission, cervical cancer risk factors and symptoms, pap smear screening, HPV vaccination awareness and acceptance.

### *Data collection*

Participants completed the questionnaire after informed consent. The questionnaire assessed knowledge related to HPV infection, cervical cancer, screening methods, vaccination awareness and barriers to vaccination.

### *Statistical analysis*

Data were entered into Microsoft Excel and analysed using SPSS software. Descriptive statistics were expressed as frequencies and percentages. The association between educational level and knowledge variables was analysed using the Chi-square test. A p value<0.05 was considered statistically significant.

## RESULTS

A total of 150 female medical students participated in the study.

### *Sociodemographic characteristics*

Most participants were between 20–30 years (96%), while only 4% were above 30 years of age. Equal distribution of participants was observed across educational levels, with 33.3% each belonging to postgraduate, intern and undergraduate categories.

### *Awareness of human papillomavirus and cervical cancer*

All participants reported that they had heard of HPV and cervical cancer.

Regarding HPV-related health conditions, 76% identified cervical cancer, while 31% recognized genital warts and 27% identified penile cancer as HPV-related diseases. About 87% correctly identified genital contact as the primary mode of HPV transmission.

### *Knowledge of cervical cancer risk factors and symptoms*

A majority of participants recognized sexually transmitted diseases (84%) as a risk factor for cervical cancer, while 30% identified HPV infection as a risk factor.

Regarding symptoms, 75% reported postcoital bleeding, 74% irregular vaginal bleeding and 68% vaginal discharge as symptoms associated with cervical cancer.

***Awareness of preventive measures***

Approximately 87% of students were aware that cervical cancer can be detected at an early stage. Nearly 69% believed that cervical cancer can be cured when detected early.

***Knowledge of pap smear screening***

Most participants (98.7%) had heard about the Pap smear test. However, only 28% correctly identified 21 years as the recommended age for the first Pap smear. About 41.3% reported that Pap smear screening should be done every three years.

***Human papillomavirus vaccination awareness***

Awareness regarding the HPV vaccine was high, with 98.7% of students reporting that they had heard about it. Approximately 80.7% correctly stated that the cervical cancer vaccine contains HPV antigens. About 66.7% knew that the HPV vaccine also prevents genital warts.

***Vaccine acceptance and barriers***

A large majority (94.7%) expressed willingness to receive the HPV vaccine. However, only 38.7% of participants had actually received the vaccine. The most commonly reported barriers to vaccination were high cost and fear of side effects.

***Association between educational level and knowledge***

Educational level showed a statistically significant association with knowledge of the primary target age group for HPV vaccination (p=0.035) and knowledge of the recommended age for the first Pap smear test (p=0.030).

**Table 1: Distribution of sociodemographic characteristics among study participants (n=150).**

| Variable | Frequency (N) | (%) |
|---|---|---|
| **Age (in years)** | | |
| < 20 | 0 | 0 |
| 20–30 | 144 | 96.0 |
| > 30 | 6 | 4.0 |
| **Educational level** | | |
| Postgraduate | 50 | 33.3 |
| Intern | 50 | 33.3 |
| Undergraduate | 50 | 33.3 |
| **Smoking status** | | |
| Ever consumed | 15 | 10.0 |
| Never consumed | 135 | 90.0 |
| **Drinking status** | | |
| Ever consumed | 41 | 27.3 |
| Never consumed | 109 | 72.7 |
| **Marital status** | | |
| Single | 128 | 85.3 |
| Married | 22 | 14.7 |

**Table 2: Distribution of awareness on etiology of cervical cancer among study participants (n=150).**

| Categorical variables | N (%) |
|---|---|
| **Heard of HPV** | 150 (100) |
| **Health issues related to HPV** | |
| **Cervical cancer** | 114 (76) |
| **Penile cancer** | 41 (27) |
| **Genital warts** | 47 (31) |
| **HPV transmitted–genital contact** | 131 (87) |
| **Heard of cervical cancer** | 150 (100) |
| **Cervical cancer risk factors** | |
| **Human papilloma virus** | 42 (30) |
| **Sexually transmitted disease** | 126 (84) |
| **Contraceptive pills** | 50 (33) |
| **Cervical cancer symptoms** | |
| **Irregular vaginal bleeding** | 111 (74) |

Continued.

| Categorical variables | N (%) |
|---|---|
| **Postcoital bleeding** | 113 (75) |
| **Vaginal discharge** | 102 (68) |

**Table 3: Distribution of awareness on preventive measures of pap smear and HPV vaccination among study participants (N=150).**

| Categorical Variables | N (%) |
|---|---|
| **HPV infection can be prevented by** | |
| Vaccination | 49 (33) |
| Using condoms/protection | 95 (63) |
| Primary target population for HPV vaccination (9–16 years) | 80 (53) |
| Cervical cancer can be detected early | 131 (87) |
| Cervical cancer can be cured | 103 (69) |
| **Cervical cancer screening methods** | |
| Pap smear | 147 (98) |
| DNA testing method | 15 (10) |
| Visual inspection method | 6 (4) |
| Heard of pap smear | 148 (98.7) |
| Pap smear as screening tool for early detection | 118 (79) |
| Correct age for first pap smear | 42 (28) |
| Correct pap smear frequency (3 years) | 62 (41.3) |
| Heard of HPV vaccine | 148 (98.7) |
| Vaccine against cervical cancer contains HPV | 121 (80.7) |
| Hpv vaccine prevents genital warts | 100 (66.7) |
| **Acceptable site for vaccination** | |
| Hospitals | 132 (88) |
| Health care centres | 112 (74) |
| University clinics | 69 (46) |
| Source of information for vaccination | 121 (80.7) |
| Willing to receive HPV vaccine | 142 (94.7) |
| HPV vaccination status | 58 (38.7) |
| **Barriers to HPV vaccine** | |
| High cost | 83 (55) |
| Fear of side effects | 40 (27) |
| Perception of cervical cancer as death sentence | 83 (55) |

Note: P value<0.05- Significant.

**Table 4: Distribution of association of knowledge on cervical cancer etiology, prevention and screening with educational level among medical students.**

| Variable | Options | Postgraduate | Intern | Undergraduate | Chi-Square (df) | P value |
|---|---|---|---|---|---|---|
| **Heard of HPV** | Yes | 50 | 50 | 50 | 0 (2) | 1.000 |
| **HPV related health issue** | Cervical cancer | 40 | 38 | 37 | 0.121 (2) | 0.940 |
| **HPV transmitted** | Genital contact | 35 | 42 | 43 | 0.95 (2) | 0.621 |
| **Cervical cancer risk factor** | HPV | 36 | 44 | 46 | 0.61 (2) | 0.733 |
| **HPV infection prevention** | Vaccination | 46 | 40 | 41 | 0.48 (2) | 0.783 |
| **Target population for HPV vaccine** | 9–16 years | 30 | 34 | 16 | 6.7 (2) | 0.035 |
| **Pap smear screening knowledge** | Early detection | 37 | 45 | 36 | 4.06 (2) | 0.130 |
| **First pap test age** | 21 years | 22 | 11 | 9 | 7 (2) | 0.030 |
| **Pap smear frequency** | 3 years | 26 | 22 | 14 | 3.6 (2) | 0.164 |

## DISCUSSION

The present study assessed awareness regarding cervical cancer etiology and preventive strategies among female medical students. The findings demonstrated a high level of awareness about HPV infection, cervical cancer and screening methods among the participants.

In the present study, all participants had heard about HPV and cervical cancer, indicating a high level of general awareness among medical students. Similar findings have been reported in studies conducted among university students in different countries. For example, a study conducted among university students in Qatar reported that a majority of participants had some level of knowledge regarding HPV infection and vaccination, although detailed understanding varied among students.[1] Similarly, research conducted among female university students in Ethiopia found that awareness regarding HPV infection existed among many students, but only a proportion demonstrated good knowledge regarding its prevention and vaccination.[2]

Knowledge regarding HPV transmission was relatively high in the present study, with most participants identifying genital contact as the primary mode of transmission. This observation is consistent with previous studies among healthcare students where sexual transmission was commonly recognized as the major route of HPV infection.[3] Medical education likely contributes to better awareness of sexually transmitted infections and their associated risks. Regarding cervical cancer risk factors, a majority of participants recognized sexually transmitted diseases as an important risk factor. However, fewer students correctly identified HPV infection itself as a direct etiological factor. Similar knowledge gaps have been observed in other studies conducted among healthcare students. Research conducted among medical, dental and nursing students in South India reported that although many participants were aware of cervical cancer, detailed knowledge about HPV as the causative agent remained incomplete.[4]

In the present study, awareness of cervical cancer symptoms such as postcoital bleeding, irregular vaginal bleeding and vaginal discharge was relatively high. Early recognition of these symptoms is important because cervical cancer can often be detected and treated effectively when identified at an early stage. Awareness regarding pap smear screening was also high in the present study, with nearly all participants having heard about the test.

However, knowledge regarding the correct age to initiate screening and recommended screening intervals was comparatively lower. Similar findings have been reported in studies conducted among university students in Saudi Arabia and Pakistan, where general awareness about cervical cancer screening existed but knowledge about specific screening guidelines was limited.[5,6] HPV vaccination awareness in the present study was also very high. Nearly all participants reported that they had heard about the HPV vaccine. This level of awareness is higher than that reported in many studies conducted among general populations. For example, a study conducted among women in North India reported that awareness of HPV vaccination was relatively low and vaccination coverage was minimal.[7] These differences may be explained by the medical background of the participants in the present study. Despite high awareness and willingness to receive the vaccine, the actual vaccination coverage among the participants was relatively low. Only about one-third of participants reported being vaccinated. Similar gaps between awareness and vaccine uptake have been reported in several studies worldwide. A study conducted among university students in the United States found that although many students expressed willingness to receive the HPV vaccine, actual vaccination rates remained low due to various barriers.[8]

Cost and fear of side effects were reported as the most common barriers to vaccination in the present study. These findings are consistent with previous research conducted among university students in Morocco and Italy, where vaccine cost, safety concerns and lack of accessibility were identified as major barriers to HPV vaccine uptake.[9,10] Educational level was significantly associated with knowledge regarding HPV vaccination target age and Pap smear screening age. Students at higher academic levels demonstrated better knowledge compared to junior students. Similar findings have been reported in studies conducted among medical students in China and nursing students in India, where academic progression was associated with improved knowledge and awareness regarding HPV vaccination and cervical cancer prevention.[11,12] Overall, the findings of the present study highlight that although awareness among medical students is relatively high, gaps remain in detailed knowledge and preventive practices such as vaccination uptake. Strengthening educational interventions and improving vaccine accessibility could play an important role in enhancing cervical cancer prevention strategies among young women.

### *Strengths*

The study included participants from different levels of medical education, allowing comparison of knowledge across academic levels. The use of a structured questionnaire enabled systematic assessment of awareness regarding cervical cancer and preventive measures.

### *Limitations*

The study was conducted in a single medical college, which may limit the generalizability of the findings to other populations. In addition, the study relied on self-reported responses, which may be subject to reporting bias.

## CONCLUSION

The study demonstrated high awareness regarding HPV infection, cervical cancer and preventive measures among female medical students. However, despite high levels of awareness and willingness to receive the HPV vaccine, actual vaccination coverage remained relatively low. Strengthening educational initiatives and improving accessibility and affordability of HPV vaccination may help bridge the gap between awareness and preventive practices, ultimately contributing to cervical cancer prevention.

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