Original Article

Understanding cervical cancer, human papillomavirus (HPV), and HPV vaccine acceptance in college-going students: Institutional-based cross-sectional study from Bihar State

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Abstract

Background: Cervical cancer is the second leading cause of cancer-related deaths in Indian women, constituting a significant public health problem. Improving knowledge regarding cervical cancer, human papillomavirus (HPV), and HPV vaccines will help in increased vaccine acceptance and prevention of cervical cancer. **Material and Methods:** This cross-sectional study was conducted among 801 college-going students of Patna, Bihar, using a predesigned, semistructured, self-administered questionnaire. Data analysis was performed using the SPSS version 20 (Statistical Package for Social Sciences) software. **Results:** A total of 801 students participated in the study, and the mean (SD) age was 20.6 ± 2.2 years. The knowledge of students in the medical group was found to be higher than that in the nonmedical group. In the medical group, 93% of the students were aware of cervical cancer versus 71.3% students in the nonmedical group. Awareness regarding the etiological role of HPV in cervical cancer was 84.3% in the medical group compared to 16% in the nonmedical group. Most (82.5%) medical students knew of the existence of a vaccine against HPV in contrast to just 12.5% of the nonmedical group. Willingness to take the vaccine in the medical group was 84.3% versus 46.5% in the nonmedical group. Willingness to pay for the vaccine was reported by 55.6% and 7.5% in the medical and nonmedical groups, respectively. **Conclusion:** The comparative results of the two groups identified specific areas where awareness campaigns should be intensified for both medical and nonmedical groups. This study further highlighted nonmedical students, which also represents the general population has very less knowledge about HPV and the HPV vaccine. The findings emphasize the importance of awareness campaigns and educational interventions to improve understanding and vaccine uptake among potential beneficiaries.

Keywords: Cervical cancer, HPV, HPV vaccine, vaccine acceptance

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Introduction

Among Indian women, cervical cancer is the second leading cause of cancer-related deaths. India recorded 123,907 new cases and 77,348 deaths attributable to cervical cancer in 2020, accounting for nearly one-third of the global cervical cancer death burden.[1,2]

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In 2020, World Health Organization (WHO) launched a cervical cancer elimination initiative that aims to reduce the incidence of cervical cancer to fewer than four women per 100,000 women years worldwide. Three strategies have been endorsed to achieve this target by the year 2030: a) 90% of girls should be fully vaccinated with the human papillomavirus (HPV) vaccine by the age of 15 years; b) 70% of women should be screened using a high-performance, once by the age of 35 years and again by 45 years of age; and c) 90% of the women diagnosed with precancer must be treated and 90% of those with invasive cancer must be managed.[3] Although the WHO advocates for a "screen and treat" approach to reduce cervical cancer incidence,[4] the uptake of this approach among women is low and the complication rates are high.[5] According to the National Family Health Survey (NFHS-5), 2019–2021, just 1.9% of Indian women aged 15–49 utilized screening services for cervical cancer.[6] Therefore, vaccinating eligible groups with a full course of the HPV vaccine affords the best chance of preventing cervical cancer in the Indian setting.

Several Indian states have already begun cervical-cancer immunization programs for adolescents. In 2017, Punjab introduced the vaccine on a pilot basis in two districts for girls studying in sixth standard.[7,8] In the year 2018–2019, a major decision was taken by the Government of Sikkim, where the HPV vaccine was introduced in the state immunization schedule in all four districts, targeting school-going girls aged 9–14 years.[9] The Government of Delhi has also launched an opportunistic HPV vaccination program targeting girls aged 11–13 years.[10] Various barriers in India have hindered the introduction of HPV vaccine in the National Immunization Schedule (NIS). Notably, in 2009, seven deaths were reported during the trial of HPV vaccination in Andhra Pradesh and Gujarat. However, these deaths occurred due to other reasons, as confirmed later by the Indian Council of Medical Research (ICMR).[7] Other barriers include high costs, a lack of awareness, low self-perception of HPV risk, safety issues, poor availability of vaccine, psychosocial factors, and cultural factors among Indian parents who think that the vaccine might lead to sexual promiscuity in their daughters.[11,12]

Marking the occasion of the Cervical Cancer Month, the Serum Institute of India (SII), the Department of Biotechnology, and Biotechnology Industry Research Assistance Council (BIRAC) launched the indigenously developed quadrivalent vaccine, 'Cervavac', in collaboration with the Bill and Melinda Gates foundation on January 24, 2023. Two shots of Cervavac are said to cost lesser than Gardasil.[5,13] For optimum uptake of any vaccine, there needs to be adequate knowledge and awareness among the eligible groups. This study has therefore attempted to determine the level of knowledge and the probable reasons hindering the acceptance of this vaccine among college-going students.

Materials and Methods

Study design and study participants

An institution-based cross-sectional study was carried out over 4 months (July 2022 to October 2022) among college-going students of Patna, Bihar. All students aged 18 years and older enrolled in selected colleges (either medical streams or nonmedical streams), giving written consent to participate, and were able to comprehend the questionnaire included in the study.

Sample size, study setting, and sampling procedure

To determine the required sample size, the proportion of college-going students having good awareness of the HPV vaccine was taken to be 36.70% as per the study by Rashid *et al.*[14] The sample size was calculated using the Statulator web-based software at 95% confidence level and 5% absolute precision and turned out to be 363.[15] Furthermore, a design effect of 2 was applied, resulting in a sample size of 726. Adjusting for a nonresponse rate of 10%, the final sample turned out to be 799, rounded off to 800. A multistage sampling technique was employed for this study. In the first stage, two colleges were randomly selected from a total of seven institutions in Patna that offer the Bachelor of Medicine and Bachelor of Surgery (MBBS) degrees; these were the Indira Gandhi Institute of Medical Sciences, Sheikhpura, Patna, and the All India Institute of Medical Sciences Patna (AIIMS Patna). Additionally, two colleges from nonmedical streams were randomly chosen for representation, specifically Mahila College Khagaul, Patna, and Maulana Azad College of Engineering and Technology, Patna. In the second stage, each academic year batch was treated as a cluster, resulting in the identification of eight clusters from the selected medical colleges and ten clusters from the nonmedical colleges. Finally, in the third stage, students were sampled from all identified clusters using the proportional-to-size sampling (PPS) method. To facilitate this, we obtained prior information about the list of students in each year from relevant college authorities and thus ensured that the sample accurately represented the distribution of students across the clusters.

Assessment tool and data collection procedure

Data were collected using a predesigned, semistructured, self-administered questionnaire, which was developed based on an extensive review of the literature. Content validity was tested through the rating of five experts, followed by pilot testing on 40 participants. Reliability was tested by calculating Cronbach's alpha, which turned out to be 0.77, indicating good internal consistency. The questionnaire contained three sections: 1) Section A, which captured sociodemographic information like age, sex, religion, place of residence, and family income of the students; 2) Section B, which assessed knowledge related to cervical cancer, HPV and HPV vaccines; and 3) Section C, which inquired regarding the probable reasons for not taking the HPV vaccine. Students from the same college gathered in a lecture theater to fill out self- administered questionnaires for data collection. The questionnaire was provided to students in English language after taking written informed consent. The investigators present were responsible for clarifying the details to the students to ensure they comprehended all the items and for checking the questionnaires for completeness.

Statistical analysis

Data were initially entered into Microsoft Excel for cleaning and coding, followed by analysis using SPSS version 20. Descriptive statistics were calculated to summarize the data, including means and standard deviations for quantitative variables such as age and percentages for categorical variables like gender, marital status, religion, and place of residence. Additionally, descriptive statistics were applied to various components of the outcome variables, which included knowledge regarding cervical cancer, HPV, the existence of the HPV vaccine, and HPV vaccine acceptance among participants. For the assessment of significant differences in outcome variables between students from medical and nonmedical streams, a Chi-square test of proportion was performed. A *P* value of less than 0.05 was deemed statistically significant.

Ethical consideration

The study protocol received ethical approval from the Ethical Committee of AIIMS, Patna (Ref. No. AIIMS/Pat/IEC/20222/920). Information from participants was obtained only after obtaining informed consent. Participant confidentiality and ethical principles were adhered to throughout the study.

Results

Sociodemographic characteristics

This study survey involved a total of 801 students, of which 401 were pursuing medical undergraduates, while 400 were pursuing nonmedical degrees. The mean (SD) age of the students who participated in this study was 20.6 ± 2.2 years. Of the 401 students in the medical group, 340 (84.8%) were aged above 20 years, while 160 (40.0%) students in the nonmedical group were aged above 20 years. Most students were unmarried (784, 97.9%) and Hindu (651, 81.3%) by religion. More than half of the students (518, 64.7%) belonged to an urban area, and 296 (37%) students reported a monthly family income of less than Indian National Rupee (INR) 25000 [Table 1].

Table 1: Sociodemographic characteristics of study participants (medical and nonmedical) (*n*=801)

Variables	Stream		Total (*n*=801) No. (%)
	Medical (n_1=401) No. (%)	Nonmedical (n_2=400) No. (%)	
Age			
Less than 20 years	61 (15.2%)	240 (60.0%)	301 (37.2%)
More than 20 years	340 (84.8%)	160 (40.0%)	500 (62.4%)
Gender			
Male	252 (62.8%)	80 (20.0%)	332 (41.4%)
Female	149 (37.2%)	320 (80.0%)	469 (58.6%)
Marital status			
Married	6 (1.5%)	11 (2.7%)	17 (2.1%)
Unmarried	395 (98.5%)	389 (97.3%)	784 (97.9%)
Religion			
Hindu	362 (90.3%)	289 (72.2%)	651 (81.3%)
Muslim	28 (7.0%)	111 (27.8%)	139 (17.4%)
Others	11 (2.7%)	0 (0.0%)	11 (1.4%)
Family			
Joint	76 (19.0%)	166 (41.5%	242 (30.2%)
Nuclear	325 (81.0%)	234 (58.5%)	559 (69.8%)
Family size			
Up to 3	22 (5.5%)	20 (5.0%)	42 (5.2%)
4 to 6	309 (77.1%)	222 (55.5%)	531 (66.3%)
More than 6	70 (17.5%)	158 (39.5%)	228 (28.5%)
Caste			
General	177 (44.1%)	150 (37.5%)	327 (40.8%)
OBC	161 (40.1%)	192 (48.0%)	353 (44.1%)
SC/ST	60 (15.0%)	51 (12.8%)	111 (13.9%)
Other	3 (0.7%)	7 (1.8%)	10 (1.2%)
Residence			
Rural	118 (29.4%)	165 (41.2%)	283 (35.3%)
Urban	283 (70.6%)	235 (58.8%)	518 (64.7%)
Monthly family income (INR)			
<25,000	106 (26.4%)	190 (47.5%)	296 (37.0%)
25,000 to 50,000	93 (23.2%)	120 (30.0%)	213 (26.6%)
50,000 to 100,000	149 (37.2%)	62 (15.5%)	211 (26.3%)
>1,00,000	53 (13.2%)	28 (7.0%)	81 (10.1%)

Knowledge of the study participants (medical and nonmedical) regarding cervical cancer, HPV, and HPV vaccines

The pattern of responses has been illustrated below [Table 2]. It was observed that 373 (93%) students in the medical group and 285 (71.3%) students in the nonmedical group had heard of cervical cancer. Awareness about the etiological role of the HPV in cervical cancer was present in 338 (84.3%) students of the medical group and 64 (16%) students of the nonmedical group. Knowledge regarding the risk factors for cervical cancer among students of the medical group was present in 221 (55.1%) for early sexual activity, 253 (63.1%) for multiple sexual partners, and 342 (85.3%) for sexually transmitted infections (STIs), while for the nonmedical group, these values were were 14 (3.5%), 58 (14.5%), and 61 (15.3%), respectively.

340 (84.8%) students in the medical group correctly responded that HPV is transmitted sexually, while only 54 (13.5%) students in the nonmedical group did so. The majority of medical students (364, 90.8%) were aware that HPV causes cervical cancer, but less than half were aware of the other cancers caused by this virus. Awareness about the cancers caused by HPV was low among the nonmedical group for all cancers, including cervical cancer. Additionally, 331 (82.5%) medical students were aware of the existence of a vaccine against HPV or cervical cancer compared to just 50 (12.5%) in the nonmedical group. Awareness about various HPV vaccines among students in the medical group was almost similar for the three vaccines – Cervarix (168, 41.9%), Gardasil (146, 36.4%), and Gardasil-9 (156, 38.9%). Furthermore, in the nonmedical group, only a handful of students were aware of the vaccines Cervarix (15,3.8%), Gardasil (18,4.5%), and Gardasil-9 (11, 2.8%). Similarly, 193 (48.1%) of students in the medical group correctly answered about the eligible age group for HPV vaccines versus 20 (5%) nonmedical students. A large chunk of students

Table 2: Knowledge of the study participants (medical and nonmedical) regarding cervical cancer, HPV, and HPV vaccines (n=801)

Variables	Streams		$P^{\#}$
	Medical students with 'Yes' responses (n_1=401) No. (%)	Nonmedical students with 'Yes' responses (n_2=400) No. (%)	
A. Knowledge regarding cervical cancer			
1. Have you heard of cervical cancer?	373 (93.0%)	285 (71.3%)	<0.001
2. Do you think HPV causes cervical cancer?	338 (84.3%)	64 (16%)	<0.001
3. Are hereditary factors responsible for the occurrence of cervical cancer?	6 (1.5%)	2 (0.5%)	0.156
4. Are hormonal factors responsible for the occurrence of cervical cancer?	3 (0.74%)	5 (1.25%)	0.475
5. Do you think smoking increases the risk of cervical cancer?	170 (42.4%)	41 (10.3%)	<0.001
6. Do you think oral contraceptive pills increase the risk of cervical cancer?	158 (39.4%)	14 (3.5%)	<0.001
7. Do you think early sexual activity increases the risk of cervical cancer?	221 (55.1%)	14 (3.5%)	<0.001
8. Do you think having multiple sexual partners increases the risk of cervical cancer?	253 (63.1%)	58 (14.5%)	<0.001
9. Do you think having sexually transmitted infections (STDs) increases the risk for cervical cancer	342 (85.3%)	61 (15.3%)	<0.001
B. Knowledge regarding HPV			
10. Can HPV be transmitted sexually?	340 (84.8%)	54 (13.5%)	<0.001
11. Can HPV cause cervical cancer?	364 (90.8%)	46 (11.5%)	<0.001
12. Can HPV cause anal cancer?	139 (34.7%)	12 (3.0%)	<0.001
13. Can HPV cause oropharyngeal cancer?	147 (36.7%)	7 (1.8%)	<0.001
14. Can HPV cause penile cancer?	161 (40.1%)	8 (2.0%)	<0.001
15. Can HPV cause vulval and vaginal cancer?	199 (49.6%)	34 (8.5%)	<0.001
16. Can HPV affect any age group?	316 (78.8%)	35 (8.8%)	<0.001
C. Knowledge regarding HPV vaccine			
17. Are you aware of the existence of a vaccine against HPV or cervical cancer in India?	331 (82.5%)	50 (12.5%)	<0.001
18. Are you aware of the Cervarix vaccine against HPV?	168 (41.9%)	15 (3.8%)	<0.001
19. Are you aware of the Gardasil vaccine against HPV?	146 (36.4%)	18 (4.5%)	<0.001
20. Are you aware of the Gardasil -9 vaccine against HPV?	156 (38.9%)	11 (2.8%)	<0.001
21. What age group is eligible to take these vaccines?			
<9 years	2 (0.5%)	3 (0.7%)	<0.001
9-14 years	69 (17.2%)	2 (0.5%)	
9-26 years	193 (48.1%)	20 (5.0%)	
14-26 years	5 (1.2%)	8 (2.0%)	
Don't know	132 (33%)	367 (91.8%)	
22. Which gender is eligible to take this vaccine?			<0.001
Male	3 (0.7%)	7 (1.8%)	
Female	99 (24.7%)	250 (62.5%)	
Both genders	299 (72.6%)	119 (29.8%)	
Don't know	0 (0.0%)	24 (6.0%)	

$^{\#}P$-value <0.05 considered significant for Chi-square test of association

in the medical group (299, 72.6%) reported that both genders are eligible to take the HPV vaccine compared to a very small number of students (119, 29.8%) in the nonmedical group.

Willingness to take the vaccine against HPV

A majority (338, 84.3%) of the medical group stated that they would get vaccinated against HPV if given a choice, in contrast to less than half (186, 46.5%) of the nonmedical group [Table 3]. Similarly, 390 (97.3%) students of the medical group were willing to recommend the vaccine to others compared to 205 (51.2%) students in the nonmedical group. More than half (223, 55.6%) of the medical students expressed willingness to pay for the vaccine in contrast to a minority (30, 7.5%) of the nonmedical group.

Source of information regarding the vaccine against HPV

The source of information for both groups regarding the vaccine against HPV is depicted in Figure 1. The sources of information for the medical group in descending order were college teachers (213, 53.12%), doctors (170, 42.40%), social media (119, 29.68%), friends (92, 22.94%), and family (31, 7.73%). Similarly, the source of information for the nonmedical group in descending order was family (31, 7.75%), doctors (27, 6.75%), social media (21, 5.25%), college teachers (18, 4.5%), and friends (6, 1.5%). Teachers in medical colleges are not only teaching but also practicing. This could be the main reason students studying in medical colleges have more knowledge compared to other groups.

Table 3: Willingness to take the vaccine against HPV among study participants (medical and nonmedical) (n=801)

Variables	Stream		Total	*P*
	Medical (n_1=401) No. (%)	Nonmedical (n_2=400) No. (%)	(n=801) No. (%)	
1. Willingness to get vaccinated given a choice				
Yes	338 (84.3%)	186 (46.5%)	524 (65.4%)	<0.001
No	63 (15.7%)	214 (53.5%)	277 (34.6%)	
2. Will you recommend this vaccine to others?				
Yes	390 (97.3%)	205 (51.2%)	595 (74.3%)	<0.001
No	11 (2.7%)	195 (48.8%)	206 (25.7%)	
3. Will you pay for the vaccine?				
Yes	223 (55.6%)	30 (7.5%)	253 (31.6%)	<0.001
No	178 (44.4%)	370 (92.5%)	548 (68.4%)	

Reasons for not taking the vaccine against HPV

The profile of reasons for not taking the vaccine against HPV groupwise is portrayed in Figure 2. A majority of students (347, 86.75%) in the nonmedical group were unaware of the vaccine, and about 55 (13.75%) of them believed that they were not at risk of infection, and hence, they did not take the vaccine. None of the students in the nonmedical group considered the vaccine to be unsafe, while 14 (3.5%) students in the medical group considered the vaccine to be unsafe. About 20 (5%) and 38 (9.48%) students in the nonmedical and medical groups, respectively, cited the high cost of the vaccine as a deterrent against vaccination. The leading reasons for not taking the vaccine against HPV in the medical group were the belief of not being at risk of HPV infection (195, 48.63%) and a lack of knowledge of the vaccine (123, 30.67%).

In this study, overall, 20 (2.5%) of participants had taken HPV vaccine and all were from the medical stream.

Discussion

Our study found that students in the medical group showcased a significantly higher level of awareness regarding cervical cancer, HPV, and HPV vaccine compared to their nonmedical counterparts. A study from Uttar Pradesh, India, on 1580 undergraduates reported similar results.[14] Furthermore, studies conducted in Turkey and Hong Kong have also shown a statistically significant difference in the knowledge levels of medical and nonmedical students.[16,17] This is unsurprising as medical students are exposed to a wide variety of medical conditions during their studies, resulting in a greater depth of knowledge.

We found that 93% of the medical group had heard of cervical cancer. Borlu *et al.*[17] and Bencherit *et al.*[20] found that 90% and 84.6% of the medical students, respectively, had heard of cervical cancer. Getaneh *et al.* and Sajan *et al.* further support these findings, although these studies included only female medical students.[21,22] Awareness regarding the causative role of HPV in cervical cancer was present in 84.3% of the medical students. A Jordanian study found that 95.6% of medical students were aware of the etiological role of HPV infection in cervical cancer.[23] Studies from Malaysia on medical and dental students have also reported similar levels of awareness.[24,25] However, a study conducted among medical students in Belagavi, India, found that just 57.57% were aware that cervical cancer is caused by a virus.[26] This difference may be due to this study being conducted only among second-year and third-year undergraduate students, while our study included final-year students and those undergoing their compulsory internship training.

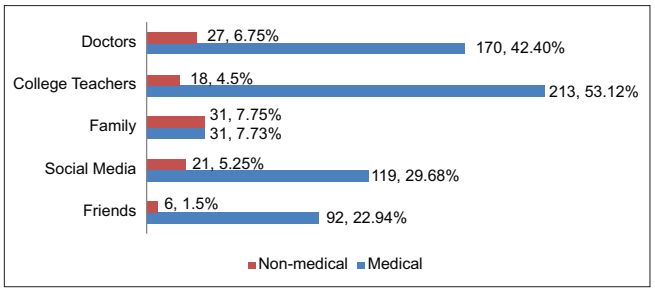

Figure 1: Source of information regarding the HPV vaccine among study participants (medical and nonmedical) (N = 801)

Almost three-fourths (71.3%) of the nonmedical group had heard of cervical cancer. Similar findings have been seen in studies from Turkey, Nigeria, China, and India.[17,27–29] Other studies from Ethiopia and India have reported a lower level of awareness.[21,30] This might be due to sociodemographic differences and the selection of different study populations. When enquired about the cause of cervical cancer, a majority (82.5%) of the nonmedical group was unaware. Other studies have showcased similar findings.[21,30–32]

In addition to HPV infection, certain risk factors can predispose an individual to cervical cancer. Awareness of these risk factors was found to range between 39.4 and 85.3% among the medical cohort in our study, while it varied between 3.5 and 15.3% in the nonmedical group. This difference is mostly due to the curriculum medical students are exposed to. For an individual to acquire HPV infection, they must come into close contact with an infected individual. Infection is commonly acquired by having oral, vaginal, or anal sex.[33] Knowledge regarding the sexual mode of transmission of HPV was present in 84.8% of medical students. Studies by Sharma *et al.* and Alsous *et al.* on medical students have shown similar results.[23,34] Conversely, just a minor fraction (13.5%) of the nonmedical group knew about the sexual transmission of HPV. These findings have a major implication on prevention as adequate knowledge regarding the etiology, risk factors, and transmission of cervical cancer is necessary for prevention strategies to be effective. Sexually naïve

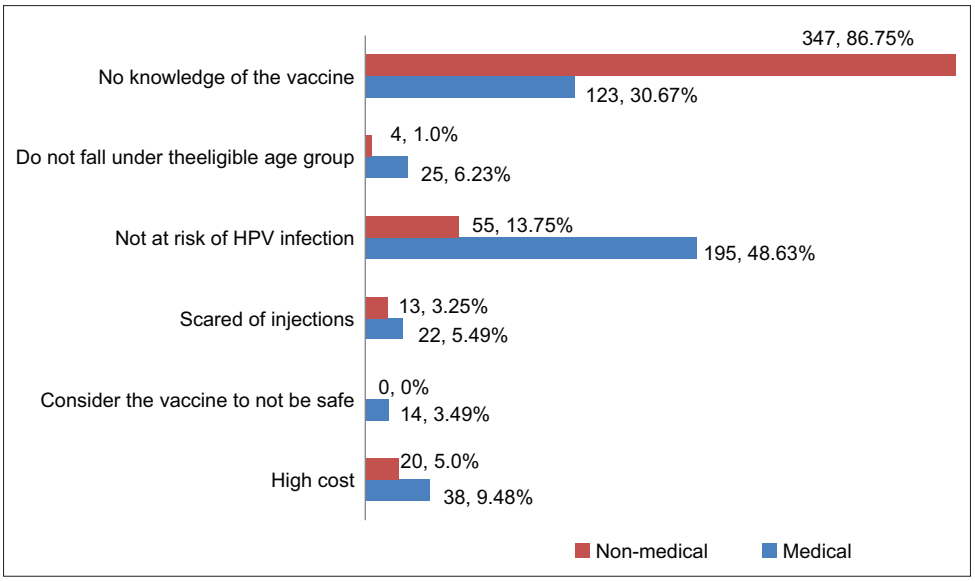

Figure 2: Reasons for not taking the HPV vaccine among study participants (medical and nonmedical) (N = 801)

individuals are especially amenable to prevention and must be the focus of interventions and strategies.

Most medical students (90.8%) were aware that HPV causes cervical cancer, but awareness regarding the full spectrum of cancers caused by the virus was found to be on the lower side. Just 34.7%, 36.7%, 40.1%, and 49.6% of them were aware that HPV can cause anal, oral, penile, vulval, and vaginal cancers. In Jodhpur, India, Sharma *et al.*[34] found that a higher proportion of medical students (60%) were aware that HPV caused penile and oropharyngeal cancers. Given their role as future physicians, efforts must be made to bridge these gaps in knowledge.

The risk of HPV infection can be reduced by having a single trust-worthy sex partner and by using condoms. However, condoms cannot prevent infection in uncovered areas.[33] The most effective measure against HPV infection and its health problems is vaccination. Studies indicate that HPV vaccines are safe and highly efficacious and confer protection on the individual for a long period.[35] As of November 2023, four vaccines against HPV are available in India, namely, Cervarix, Gardasil, Gardasil-9, and Cervavac.

Studies done earlier in India document a high level of awareness among medical students regarding the availability of a vaccine against HPV vaccination, which is consistent with our result.[26,36] Lower awareness was reported by a study in Gujarat, which could be due to the inclusion of paramedical students in the study population.[37] High levels of awareness are desirable as medical students can serve as strong advocates for vaccination and help break down barriers among friends and families and in healthcare settings. Not unlike other studies, awareness was found to be poor in the nonmedical group with most being unaware of the vaccine.[20,37] Poor knowledge regarding the vaccine can serve as a barrier to its uptake and must therefore be remedied through targeted actions.

Regarding the willingness to get the vaccine against HPV, we found that the majority of those in the medical group were willing to get vaccinated and ready to recommend the vaccine to others. A little over half of the medical students also replied affirmatively when asked if they would pay to get the vaccine. In contrast, over half of the nonmedical group reported being unwilling to get vaccinated and 48.8% reported they would not recommend the vaccine to others. A Chinese study among medical students found that willingness to get vaccinated was positively associated with knowledge regarding HPV.[18,19,38] This could explain the unwillingness to get vaccinated among the nonmedical cohort, who had a lower level of HPV-related knowledge compared to the medical group.

The main sources of information in our study among medical groups regarding the HPV vaccine were teachers, doctors, and social media. Another study conducted in India among medical undergraduates noted that schools, lectures, and social media were key sources of information for the HPV vaccine.[39] The main sources of information for the HPV vaccine among non-medical-stream students were family, doctors, and social media.

Strengths

The strength of this study lies in its large sample size, which includes an equal representation of students from both medical and nonmedical backgrounds. This comparison of students from two distinct groups—one group comprising potential educators and the other representing the general population—provides a broader perspective on HPV vaccine awareness and willingness to vaccinate. Notably, out of 801 participants, only 20 students had received the HPV vaccine, and all of them were from the medical background. This finding highlights the necessity of understanding the factors influencing vaccine uptake across different educational streams, allowing for a more meaningful

interpretation of the data. Data were collected from multiple institutions in Patna, which lends further strength to our findings. All attempts were made by investigators to educate students at the end of data collection. Thus, this survey has successfully attempted to spread awareness about cervical cancer, HPV, and the HPV vaccine among college students of Patna.

Limitations

This study has several limitations that should be acknowledged. First, the assessment of knowledge regarding cervical cancer and HPV was conducted using a self-administered questionnaire, which may have introduced response bias. Participants might have overestimated their knowledge or provided socially desirable answers rather than their true understanding. Second, the authors did not explore the knowledge and acceptance of the HPV vaccine among students from nonmedical streams that includes diverse educational backgrounds.

Conclusion and Recommendations

In conclusion, while medical students exhibit a commendable awareness of cervical cancer and HPV, there remains a significant knowledge gap regarding the availability of HPV vaccines in India, with only two out of five students being informed about them. Moreover, the actual uptake of the vaccine within this group is notably low. Although there is a strong willingness to receive the vaccine, many students express concerns about covering the associated costs. This study underscores the importance of addressing these knowledge gaps in cervical cancer, HPV, and HPV vaccine acceptance among college students in Bihar state. Using this knowledge, policymakers can develop effective implementation strategies aimed at increasing vaccine uptake. Furthermore, primary care providers at Primary Health Centers (PHCs) and Community Health Centers (CHCs) can utilize these insights to bolster their efforts in raising awareness. By organizing outreach programs in schools and colleges and distributing informative booklets to patients visiting the Outpatient Department (OPD), physicians can effectively communicate the importance of screening programs and the availability of HPV vaccination. These initiatives are essential to mitigate the public health impact of cervical cancer among women.

Ethical considerations

The study protocol received ethical approval from the Ethical Committee of AIIMS, Patna (Ref. No. AIIMS/Pat/IEC/20222/920). Information from participants was obtained only after obtaining informed consent. Participant confidentiality and ethical principles were adhered to throughout the study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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