

Assessment of understanding about human papilloma virus vaccination among undergraduate medical students in a developing country: Perspective from India

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ABSTRACT

Background and Aims: Human papilloma virus (HPV) infection is the most common sexually transmitted infection responsible for cervical cancer in women. There is no cure for HPV but safe and effective vaccinations before sexual debut can definitely decrease the incidence of cervical cancer. This research aims to explore the basic understanding of medical students about cervical cancer, HPV and HPV vaccination. **Methods and Material:** This was a descriptive, questionnaire based cross-sectional study conducted among the undergraduate medical students of All India Institute of Medical Sciences, Jodhpur from April 2018 to May 2018. A total of 238 respondents participated in the study. For statistical analysis, 'Z' score was used for categorical data and student t test was used for normally distributed continuous data. **Results:** Overall, 41% students had good knowledge about HPV infection and HPV vaccination while 44% students had average knowledge and 15% had poor knowledge. The majority of them (>80%) knew that HPV is responsible for cervical cancer and ano-genital warts but their awareness was not of the same order when it came to associating HPV with penile and oropharyngeal cancer (60%). Females had better knowledge as compared to males and this difference was statistically significant ($P < 0.05$). 88% of the students were willing to accept the vaccination while only 10% of females were previously vaccinated. **Conclusion:** Medical students, who are potential recipients of the HPV vaccine themselves, can play a unique role in promoting awareness about HPV vaccination in the future.

Keywords: Attitude, awareness, human papilloma virus, knowledge, vaccine

Introduction

According to the Indian statistics, cancer of the cervix is the second most common gynecological cancer following breast cancer and accounts for almost 14% of all cancer cases in women.^[1,2] The age-adjusted incidence rate (AAIR) is 27.0 per 100,000 women and age-adjusted mortality rate (AAMR) per 10,000 population is reported to be 12.4.^[3,4]

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The higher mortality rate can be attributed mainly to the lack of appropriate healthcare infrastructure in low resource settings and lack of awareness about availability of screening methods and preventable vaccine against human papilloma virus (HPV). It is one such cancer which is preventable as it is caused by persistence of a viral infection for which an effective vaccine is available. HPV infection is a sexually transmitted infection and a necessary cause of cervical cancer. In India, high-risk HPV types 16 and 18 account for approximately 80% of cervical cancers and 63% of high-grade cervical precancerous lesions.^[5,6] Two types of HPV vaccines are available in India – quadrivalent vaccine (*Gardasil, Merck, USA*, HPV4 targeting HPV types

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6,11,16 and 18) and bivalent vaccine (*Cervarix*, GSK Biologicals, Belgium, HPV2 targeting HPV types 16 and 18).^[6] The nonavalent HPV vaccine (Gardasil, Merck, USA) is not currently available in India although it was approved by United States Food and Drug Administration (U.S. FDA) in 2014 and is effective against additional five HPV genotypes. According to the Indian Academy of Pediatrics Advisory Committee on Vaccination and Immunization Practices (IAP COVI, 2020) all females aged 9–26 years who can afford the vaccine, must be offered HPV vaccine “*Category 2 of IAP categorization of vaccines*”.^[7]

For girls aged 9-14 years, 2 intramuscular doses of either of the 2 HPV vaccines (HPV4 or HPV2) at a 6-month interval is recommended, whereas 3 doses of the vaccine over a 6-month period is recommended for girls aged 15 years and older and for immunocompromised females.^[8] Whereas quadrivalent vaccine can be given to both males and females, bivalent vaccine is approved only for females. Although more than 60 countries have included the HPV vaccine in their national immunization programs, the rates of vaccination are variable. In India, establishing an HPV vaccination program is still subject to discussion.

“Medical education is not just a program for building knowledge and skills in its recipients, it is also an experience which creates attitudes and expectations”. This quote by ‘Abraham Flexner’ is quite apt in this scenario where medical students, as future doctors and health care providers, are the key stakeholders in improving awareness of HPV-related disease burden. They can motivate the general public for vaccination only if they themselves have updated knowledge about the pros and cons of HPV vaccination. Hence, it is important to assess their perspective and understanding about HPV and their readiness to accept and recommend the vaccine.

This research aims to explore about the basic understanding and awareness about cervical cancer, human papilloma virus and HPV vaccination among the undergraduate medical students so as to unravel the conundrum about HPV vaccination.

Methods

Study design

Descriptive cross-sectional study.

Study participants

All medical students studying at All India Institute of Medical Sciences, Jodhpur, who were willing to participate in the study were included. The only exclusion criteria were unwillingness to participate in the study. After obtaining administrative and ethical committee approval, the students were invited to participate in the study. Informed consent was taken from the participants to ensure the right of the subject.

Study tool

Anonymous, self-administered and structured questionnaire and scoring scale were prepared to assess the knowledge

and attitude of students towards cervical cancer and Human papilloma virus vaccination. The questionnaire included details about the socio – demographic variables and 26 questions on knowledge of cervical cancer, HPV infection and vaccination against it. It also included questions on attitude and practice towards HPV vaccination. For evaluation of knowledge, participants had to respond to statements using ‘*Yes, or No or Do not know*’ and for the attitude, they had to respond as ‘*agree or disagree or neutral*’. To objectively quantify the knowledge, each question was given the score of 1 with a total score of 26 (≤ 9 - poor score, 10-18 as average and 19-26 as good score). It was pre-tested on a small group of randomly selected ten students for comprehensibility, accuracy, language and sensitivity of questions. Few modifications were made based on students’ responses. The final modified questionnaire along with objectives and protocol was submitted to five experts comprising of three professionals in the field of Obstetrics and Gynecology, one expert from Dermatology & Venereology and one Statistician for establishing content validity. The tool was further modified as per the suggestions of the experts and the final tool was constructed.

Data collection

The survey was conducted in the department of Obstetrics and Gynecology from April 2018 to May 2018. The pre-validated and pre-tested questionnaire was given to the participants by an Intern posted in the department who was also one of the co-investigators. A total of 350 undergraduate students were approached. Of them, only 276 showed willingness to participate in the study. They were informed about the purpose of survey and that their participation was entirely voluntary. A written informed consent was taken from the participants before distributing them the consent forms. They were given the instructions on how to fill out the questionnaire. Completed forms were kept anonymously in a collection box. 38 questionnaires were discarded as they were incomplete.

Data analysis

Data was analyzed using Statistical package for Social Sciences (SPSS) software version 21. Descriptive statistics were presented as frequencies (mean and standard deviation (SD)) for quantitative variables and as numbers and percentages for categorical variables. Continuous data was checked for normality of distribution. Z test for difference between the proportion of responses by males and females was used to compare the categorical data. Independent student t test was used to find the statistical significance in mean knowledge score of the two groups. A two-tailed *P* value less than 0.05 was considered as statistically significant.

Ethical considerations

The study was approved by the Institutional Ethics Committee of All India Institute of Medical Sciences, Jodhpur vide letter number AIIMS/IEC/2018/434, 08/03/2018.

Results

Socio-demographic details

The survey sample consisted of 238 undergraduate medical students aged between 18-30 years. The mean age of participants was 20.84 ± 1.94 years. There were 95 males and 143 females studying from first year to internship. 97.4% (232) students were residing in the hostel. All of them were unmarried. Eleven percent (26) reported to have sexual relationship with opposite sex. The majority of the participants did not smoke (94.0%) and did not consume alcohol (82.4%). The year wise distribution of participants is shown in Figure 1.

Awareness about cervical cancer

The questionnaire included five questions related to cervical cancer. Out of 238 students surveyed, majority of the (81.09%; 193) were aware that cervical cancer is the second most common gynecological cancer among females, after breast cancer. Interestingly, less than half (40.7%; 97) knew that it has the highest mortality amongst gynecological cancers. 58.4% (139) knew that the risk factors for cervical cancer are multiple sexual partners and persistent HPV infection while 59.2% (141) answered correctly that the common symptoms of cervical cancer are abnormal uterine bleeding, post coital bleeding and vaginal discharge.

Awareness about HPV infection

Table 1 shows the frequency of correct responses by the students regarding different aspects of HPV infection. In total, there were thirteen statements about HPV which were supposed to be answered by the participants. Although, majority of them (>80%) knew that HPV is responsible for cervical cancer and ano-genital warts, their awareness was not of the same order when it came to associating HPV with penile and oropharyngeal cancer (60%; 143). While 48.3% (115) answered correctly that most people with HPV infection may not have visible signs or symptoms, their knowledge was low (29.4%; 70) when asked about the self-limiting nature of the illness. A statistically significant difference ($P = 0.043$; <0.05) was noted while comparing the responses of males versus females regarding the self-limiting nature of HPV infection.

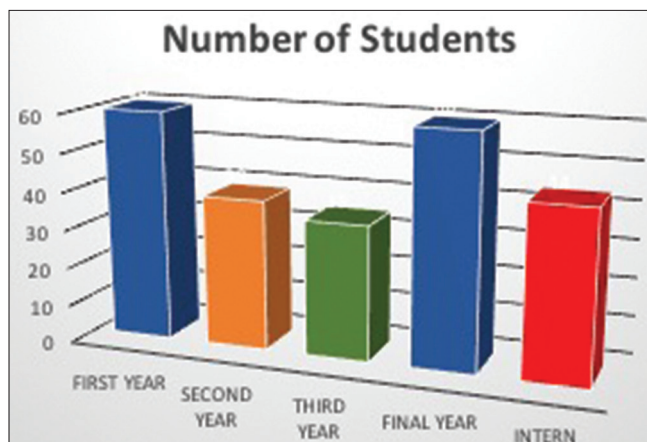


Figure 1: Year wise categorization of respondents

Awareness about HPV vaccination

Table 2 shows the frequency of correct responses by the students regarding their awareness about HPV vaccination. 57.1% (136) were aware of the recommended age range (9-26 years) for receiving the HPV vaccination. More than half of the participants (58%; 138) were incorrect in assuming that the HPV vaccine has a universal three dose schedule.

83.6% (199) participants did not know that even if a person is HPV DNA positive, the vaccine can be given. More males were incorrect than females and the difference was statistically significant ($P = 0.046$).

Knowledge score

The awareness about cervical cancer, HPV infection and HPV vaccination was summarized as knowledge score [Figure 2]. None of the participants scored full marks. The overall mean score for knowledge of cervical cancer, HPV and HPV vaccination was 15.9 out of a maximum score of 26. Student t test was applied to compare the mean knowledge score between males and females and it was observed that females were more aware about HPV and HPV vaccination and this difference was statistically significant ($P = 0.038$; <0.05) [Table 3].

Source of information

The most common source of information was medical education (76.8%) followed by internet (20.1%) and friends and public education (10.5 and 9.7%), respectively. Most of them had multiple sources of information and they answered more than one response for this question.

Attitude of medical students for HPV vaccination

Overall, the students had a positive attitude towards HPV vaccination. However, 44.7% females and 41% males had a misconception that if they are vaccinated against HPV, it is not necessary to get protected against other STIs. Although, only ten percent (15) females and none of the males were vaccinated among the study population, 88% of them were ready to accept vaccination if it was freely available and approachable. They were also willing to recommend the vaccine to their friends, colleagues and future clients [Table 4].

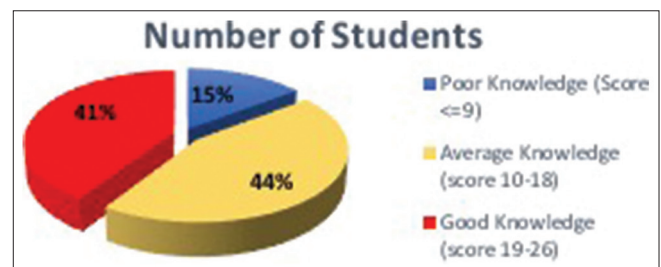


Figure 2: Knowledge score of respondents on awareness of cervical cancer, HPV infection and HPV vaccination

Table 1: Awareness about HPV infection, among the undergraduate medical students

Awareness statements on HPV infection	Males (n=95) Correct response Number (%)	Females (n=143) Correct response Number (%)	Total Correct Response n=238 (%)	P [†]
HPV is a sexually transmitted disease (True)	84 (88.4)	128 (89.5)	212 (89.0)	0.794
HPV can cause cervical cancer (True)	78 (82.1)	129 (90.2)	207 (86.9)	0.068
HPV can cause ano-genital warts (True)	77 (81.0)	119 (83.2)	196 (82.3)	0.667
HPV can cause penile cancers (True)	59 (62.1)	84 (58.7)	143 (60)	0.519
A person might be infected without knowing (True)	76 (80.0)	126 (88.1)	202 (84.8)	0.087
HPV can be cured by taking antibiotics (False)	70 (73.6)	107 (74.8)	177 (74.3)	0.841
HPV can heal by itself (True)	21 (22.1)	49 (34.2)	70 (29.4)	0.043*
Pills protect against HPV (False)	58 (61.0)	96 (67.1)	154 (64.7)	0.337
Using a condom can provide partial protection against HPV (True)	73 (76.8)	127 (88.8)	200 (84.0)	0.013*
There is a simple vaginal test to find out if you've got HPV (True)	60 (63.1)	111 (77.6)	171 (71.8)	0.015*
It's important for women to be screened for HPV (True)	75 (78.9)	133 (93)	208 (87.3)	0.001*
Most people with genital HPV-infection have visible signs or symptoms (False)	44 (46.3)	71 (49.6)	115 (48.3)	0.617
HPV is very common. (True)	48 (50.5)	94 (65.7)	142 (59.6)	0.019

[†]Z test for difference in proportions; *P<0.05, statistically significant

Table 2: Awareness about HPV vaccine among the undergraduate medical students

Awareness statements on HPV vaccination	Males (n=95) Correct response Number (%)	Females (n=143) Correct response Number (%)	Total Correct Response n=238 (%)	P [†]
HPV vaccine prevents HPV infection (True)	60 (63.15)	85 (59.4)	145 (60.9)	0.561
HPV vaccine prevents cervical cancer (True)	63 (66.3)	111 (77.6)	174 (73.1)	0.053
HPV vaccine prevents genital warts (True)	56 (58.9)	80 (55.9)	136 (57.1)	0.645
Approved age for vaccine is 9-26 years (True)	54 (56.8)	82 (57.3)	136 (57.1)	0.936
Required number of doses for vaccine is 3 universally (False)	41 (43.1)	59 (41.2)	100 (42.0)	0.771
If a person is HPV DNA positive, the vaccine is not recommended (False)	10 (10.5)	29 (20.2)	39 (16.3)	0.046*
There are three types of HPV vaccines available (True)	43 (45.2)	72 (50.3)	115 (48.3)	0.441
Vaccine is contraindicated in lactating/breast feeding females (False)	14 (14.7)	22 (15.3)	36 (15.1)	0.888

[†]Z test for difference in proportions; *P<0.05, statistically significant

Table 3: Difference in mean score for knowledge of the participants about cervical cancer, HPV infection and HPV vaccination

Variable	All students	Males	Females	t-test	P
Knowledge Score (Mean±SD)	15.9±5.35	15.02±5.80	16.48±4.92	-2.08591	0.038*

*P<0.05, statistically significant

Discussion

HPV vaccine is a recombinant vaccine prepared from the purified virus-like particles (VLPs) of the major capsid (L1) protein of HPV types 6, 11, 16, 18, 31, 33, 45, 52, and 58. It does not treat existing HPV infection or cervical intraepithelial neoplasia (cervical pre-cancers) but only helps in primary prevention. All HPV vaccines have been found to have high efficacy (close to 100%) for prevention of HPV vaccine type-related persistent infection, cervical intraepithelial neoplasia (CIN) 2/3, and adenocarcinoma *in situ* (AIS) in clinical trials.^[9,10]

Overall, the students had average knowledge about HPV infection and vaccination. Similar results have been reported by other studies where students had low to average knowledge.^[11-15] The majority of the participants in our study knew that HPV is a STI and can cause cervical cancer and ano-genital warts, while 143 (60%; n = 238) were unaware that HPV can also cause oropharyngeal and penile cancers. Similar poor understanding about other malignancies were noted in a study by Kamini *et al.*^[13]

More than 50% students were aware of the HPV vaccine and its role in prevention of cervical cancer and genital warts. Interestingly, females had a better knowledge score as compared to males despite the common teaching curriculum and facilities and this difference in knowledge and awareness was statistically significant. This was supported by other studies also whereby male students had poor awareness of cervical cancer, HPV disease and vaccine as compared to females.^[13,16-18] This may be because the causal relationship between HPV and cervical cancer is more well-known than its causal relationship with other cancers like penile cancer and anal cancer and females suffer the main brunt of infection. However, few studies from other centers did not support this observation.^[5,11]

Table 4: Attitude of medical students towards HPV vaccination

Statements on Attitude	Females (n=143), Males (n=95), number (%)		
	Agree	Disagree	Neutral
I think my parents/guardians could pay for the vaccine	130 (90.9); 80 (84.2)	11 (7.6); 11 (11.5)	2 (1.3); 4 (4.21)
I would get the vaccine if it were for free.	128 (89.5); 82 (86.3)	11 (7.6); 9 (9.4)	4 (2.7); 4 (4.21)
I would pay for the vaccine if I could.	138 (96.5); 76 (80)	5 (3.4); 16 (16.8)	0; 3 (3.1)
I would be embarrassed to ask my parents/guardians about vaccination	10 (6.9); 29 (30.5)	133 (93.0); 63 (66.3)	0; 3 (3.1)
It's not necessary for me to get the vaccination	10 (6.9); 24 (25.2)	129 (90.2); 69 (72.6)	4 (2.7); 2 (2.1)
Vaccinating young people against HPV would encourage them to become sexually active	20 (13.9); 30 (31.5)	131 (91.6); 63 (66.3)	2 (1.3); 2 (2.1)
If I get the vaccination, it's not necessary for me to be protected against other sexually transmitted infections.	64 (44.7); 39 (41.0)	79 (55.2); 55 (57.8)	0; 1 (1.05)
Only sexually active women should receive the vaccine.	16 (11.1); 15 (15.7)	127 (88.8); 79 (83.1)	0; 1 (1.05)
My parents would not allow me to get the vaccine.	3 (2.0); 18 (18.9)	140 (97.9); 76 (80.0)	0; 1 (1.05)
I wish to get more information about HPV and HPV-vaccination.	142 (99.3); 84 (88.4)	1 (0.6); 10 (10.5)	0; 1 (1.05)
I would recommend it to my friends, colleagues and relatives	138 (96.5); 80 (84.2)	0; 5 (5.2)	5 (3.4); 10 (10.5)
I would recommend it to my future clients	138 (96.5); 80 (84.2)	0; 5 (5.2)	5 (3.4); 10 (10.5)

In a similar study done at a different center, in which one of the authors of this study was a co-author, good knowledge was seen in 18% students. Most of the participants were in 1st and 2nd professionals, and they were aware of only two types of vaccines. Age wise dosage schedule of two or three doses was also not known to them.^[14] In the present study, the students were aware and updated about the nonavalent vaccine also. The positive point in our study was that we recruited the students from all the semesters so that we can have an idea about the baseline awareness of the students who have not yet been exposed to the clinical postings and this would be an indirect reflection of the awareness of general population. Undoubtedly, the senior students were found to have better knowledge as compared to the juniors. This highlights the impact of medical education in promoting awareness.

The guidelines and protocols keep evolving so one has to be updated thoroughly. Moreover, the lectures specifically oriented towards HPV infection and vaccination must be introduced in a more integrated manner so as to improve the level of awareness.

Despite the approval of Gardasil 9 vaccine by FDA in 2014 and recommendations by WHO to introduce HPV vaccination in the national program, it has not been implemented in the national immunization program.^[17] We understand that we are a developing country but considering the disease burden of cervical cancer, the cost of vaccine outweighs the expenditure on treatment of malignancy. Therefore, we believe that cost should not be an obstacle in implementation of this vaccine in the national immunization program. The acceptance of this vaccine is poor in our country.^[19] However, since 2016, Punjab and Sikkim have re-introduced the HPV vaccine in their immunization programs. Even the Delhi Government made efforts to re-introduce this vaccine as a single dose answer to protect women.^[20,21]

Gradually its awareness in general population and more specifically among medicos is rising but unfortunately only a

few are getting themselves vaccinated. Out of the 143 female students in the present study, only 15 participants had received the HPV vaccination. In another study from Rajasthan, from a different medical college, 6.25% students were vaccinated.^[14] Similar vaccination acceptance rate of 6% and 10% was observed in two different medical colleges of India and slightly higher rate of 21.1% in a Brazilian study.^[22,23] The willingness to accept vaccine was 66.8% in a study by Mehta *et al.* and 64% by Kamini *et al.* versus 88% in our study.^[11,13] A positive development is highlighted during this study that 96.5% respondents agreed to recommend the vaccine to others.

Medical students, who are potential recipients of the HPV vaccine themselves, can play a unique role in promoting HPV vaccination in the future. Our institute is a tertiary referral center and a research institute. Despite having integrated lectures and competency based medical education, the mean knowledge score of our students came out to be 15.9 which stands under average category. Hence, we recommend that more and more innovative methods and better integration of topics about HPV and its vaccine should be introduced in the curriculum. The objective behind this article is to bring awareness about cervical cancer and its preventive measures among the general public through the health care professionals and eventually reduce the burden of cervical cancer in the country. Only highly motivated and knowledgeable health care workers and family physicians can carry out this task efficiently by promoting awareness about the HPV vaccination among adolescent girls. Even if 60-70% girls get vaccinated, this will develop a herd immunity and ultimately decrease the burden of disease in the community.

Conclusion

In the light of the study findings, we conclude that the medical students clearly lacked appropriate and up to date knowledge about HPV and the available vaccination. However, their attitude towards this task was a positive one. We therefore recommend that they must have an orientation lecture in their first year

regarding HPV vaccination. Just like the Hepatitis B vaccine, HPV vaccine can also be made compulsory on admission and can be provided free of cost. If the students are themselves vaccinated, they are more likely to promote its awareness in general public and help them to clear their misconceptions.

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Conflicts of interest

There are no conflicts of interest.

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