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Original Research Article

Knowledge and awareness of HPV virus and HPV vaccine among medical students

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ABSTRACT

Background: Cervical cancer remains one of the major public health problems in India. India accounts for nearly one third of global cancer deaths with cumulative risk of developing cancer cervix is 1.6% and cumulative death risk is 1%. Infection with human papilloma virus increases the risk of acquisition of cervical cancer. High risk HPV such as HPV 16 and 18 are commonly associated with invasive cervical cancer. Implementation of HPV vaccination is a primary prevention strategy.

Methods: A cross-sectional study was conducted at SSIMS and RC, Davangere, Karnataka., including the first year medical students (148 students recruited). A 32-point questionnaire was administered to assess the knowledge, attitude and awareness regarding HPV virus and vaccination. The data was entered in Microsoft Excel and analysed using EpiInfo software.

Results: Majority of the students were aware about the virus and the infection it causes. Only 50% of the students were aware of spectrum of malignancies HPV causes. 50% of the participants opined that HPV vaccination protects against cervical cancer. Students were more sceptical about the side effects caused by the vaccine. Only 35% of the students knew the right time to vaccinate. Almost all participants strongly felt the need to spread the information regarding HPV infection across the general public.

Conclusions: Knowledge about HPV virus such as its role in causing cancer, subtypes, pathogenic mechanism and HPV vaccination is crucial. Being future physicians and their responsibility towards community, medical students are expected to know the basics about HPV virus and vaccine.

Keywords: Cervical cancer, HPV vaccine, HPV virus

INTRODUCTION

Worldwide, cervical cancer is the fourth most common cancer in women.¹ An estimated 604 000 new cases are reported in 2020. Of the estimated 342,000 deaths from cervical cancer in 2020, about 90% of these occur in low- and middle-income countries.² Age standardized incidence of cervical cancer in India (WHO cervical cancer country profiles 2021) is 18 per 100 000 women (2020). 45,300 have died because of cervical cancer in 2019.² Mortality

rates are high in India as nearly 70% of the cases are diagnosed in advanced stage (stage 3 or 4).³

Almost all cervical cancer cases (99%) are linked to infection with high-risk human papillomaviruses (HPV), an extremely common virus transmitted through sexual contact.⁴ HPV infection is especially common in young women under 25 years. There are over 200 variants of HPV virus.⁵ There are about 12 oncogenic types of HPV which are categorized as high risk HPV namely, types 16, 18, 31, 33, 35, 39, 45, 52, 56, 58 and 59. HPV 16 and 18 are the most virulent types.⁵

Although most infections with HPV resolve spontaneously and cause no symptoms, persistent infection can cause cervical cancer in women. HPV is principally related to cervical cancer, although it is a causative agent in a range of anogenital malignancies in both the sexes.⁵ Women infected with one type of HPV can be co-infected with other type of HPV variant. Anal HPV infections are very common in men who have sex with men, and almost universal among those who are HIV-infected. HPV infection is also implicated in a range of cancers involving oropharynx, the vulva and vagina and of the penis.⁶

HPV infection with low-risk types causes anogenital warts in females and males (condylomata acuminata or venereal warts). Over 90% of these are associated with types 6 and 11.⁸

Effective primary (HPV vaccination) and secondary prevention approaches (screening for, and treating precancerous lesions) will prevent most of the cervical cancer cases. These vaccines are intended to be administered, if possible, before the onset of sexual activity, i.e., before first exposure to HPV infection. All 3 vaccines are prepared using recombinant DNA technology, from the purified L1 structural protein that self-assemble to form HPV type-specific empty shells, termed virus-like particles (VLPs). None of the vaccines contains live biological products or viral DNA, and are therefore non-infectious; they do not contain antibiotics or preservative agents.⁹

HPV vaccines are available in many countries throughout the world and three main types are marketed: bivalent, quadrivalent, and a nonavalent vaccine. All three vaccines are highly efficacious in preventing infection with virus types 16 and 18, which are together responsible for approximately 70% of cervical cancer cases globally. The quadrivalent vaccine is also effective in preventing anogenital warts caused by HPV types 6 and 11. The nonavalent provides additional protection against HPV types 31, 33, 45, 52 and 58.^{9,10}

The primary target group in HPV vaccination is young adolescent girls, aged 9-14 years. For all the three vaccines, the vaccination schedule depends on the age of the vaccine recipient.

Females <15 years at the time of the first dose

A 2-dose schedule (0, 6 months) is recommended. If the interval between doses is shorter than 5 months, then a third dose should be given at least 6 months after the first dose.

Females ≥15 years at the time of the first dose

A 3-dose schedule (0, 2, 6 months) is recommended (a 3-dose schedule remains necessary for those known to be immunocompromised and/or HIV-infected).⁹

Currently HPV vaccination is not a part of national immunization programme.⁹

METHODS

The present cross-sectional descriptive study was conducted in S. S. Institute of Medical Sciences and Research Centre, Davangere, Karnataka, India in the month of April 2022. This study was approved by Institutional ethical committee.

The participants were first year medical students. A total of 148 students participated in the study. Students were assured about their anonymity and confidentiality. A verbal consent was taken from all the participants prior to data collection.

Inclusion criteria

Inclusion criteria was all the students willing to participate in the study and those students present on the day of the study.

Exclusion criteria

Exclusion criteria was those students not willing to participate in the study and those who were absent on the day of study.

The student participants were given a 32 point questionnaire regarding HPV virus, HPV infection and vaccine. The questionnaire was adopted from a cross-sectional study conducted in Kingdom of Bahrain and permission was obtained to use the questionnaire from the corresponding author.¹⁶ All the questions were asked in English. The questionnaire used for the study included the demographic data, tested the knowledge of HPV virus, HPV infection, various malignancies it causes and also about the HPV vaccine and its efficacy. The questionnaire also tests the attitudes and beliefs the students have towards HPV virus and its vaccine. The information regarding the questions can be found in results section. All the data were entered in Microsoft excel sheet and the descriptive statistics were analysed using Epi-info software.

RESULTS

A total of 148 students were recruited for the study after applying inclusion and exclusion criteria.

Demographics characteristics:

Of the 148 medical students aged between 18-22 years, the mean age was 19.5±1.2 years. There were 79 (53.4%) boys and 69 (46.6%) girls who participated in the study. Majority of them (146 participants) were unmarried and only 2 of them were married. 138 (93.24%) participants were Hindu, 9 (6.08%) were Muslim by religion and 1 participant did not specify the religion (Table 1).

Table 1: Demographics.

Gender	n	%
Male	79	53.4
Female	69	46.6
Age (years)		
18	28	18.91
19	64	43.24
20	41	27.7
21	14	9.46
22	1	0.67
Marital status		
Unmarried	146	98.64
Married	2	1.35
Religion		
Hindu	138	93.24
Muslim	9	6.08
Not specified	1	0.67

Knowledge about HPV infection

Out of 148 students, 142 (95.95%) students had heard about HPV virus and infection and 6 (4.05%) students had not heard of HPV infection. Analysing the source of awareness about HPV virus, 61 (41.2%) students had

heard about it in school, 38 (25.7%) students heard in their college time, 35 (23.5%) had read about HPV virus in the books, 5 (3.4%) had information from the media 1 (0.7%) student had heard it from a friend and 2 (1.35%) had heard about the virus from a hospital (Table 2).

115 (77.7%) students identified HPV as an STI. 69 (46.62%) students felt that HPV infection is common in India. 113 (76.4%) students are of opinion that inappropriate sexual practices can lead to acquisition of HPV infection. 105 (71%) students believed that both men and women can get infected by the virus. 40 (27%) students believe that most people infected with HPV are asymptomatic whereas 40 (27%) of them disagreed with it (Table 2).

35 (23.6%) students believe that there is no treatment for HPV infection. 45 (30%) students are of the opinion that smoking increases the risk of persistence of HPV virus. 92 (62%) students believe that HPV infection causes genital warts. 87 (59%) students believe that in women, if the virus persists, it causes an abnormal cervical smear and cancer. 76 (51.35%) students believe that HPV can cause other genital malignancies. 68 (46%) students are of the opinion that prevention against HPV will prevent cervical cancer (Table 2).

Table 2: Knowledge about HPV infection, risk factors and prevention.

Questions	True N (%)	False N (%)	Don't know N (%)
HPV is STI	115 (77.7)	16 (10.81)	17 (11.48)
HPV is common in India	69 (46.62)	13 (8.78)	66 (44.59)
Both men and women infected	105 (70.94)	10 (6.76)	33 (22.3)
Inappropriate sexual relations increase risk of HPV infection	113 (76.35)	10 (6.76)	25 (16.89)
HPV is mostly asymptomatic	40 (27.03)	41 (27.71)	47 (31.75)
There is no treatment for HPV infection	35(23.64)	58 (39.2)	55 (37.16)
Smoking increases the risk of persistence of HPV and make them cancerous	45 (30.4)	32 (21.62)	71 (47.97)
HPV causes genital warts	92 (62.16)	11 (7.43)	45 (30.4)
In women persistent HPV causes abnormal cervical smear and cancer	87 (58.78)	2 (1.35)	59 (39.86)
HPV causes other genital cancers (penis, anus)	76 (51.35)	10 (6.76)	62 (41.81)
Prevention against HPV prevents cervical cancer	68 (45.94)	22 (14.86)	58 (39.21)

Table 3: Attitude and beliefs towards HPV vaccine.

Question	Yes N (%)	No N (%)	Don't know N (%)
Will you believe that vaccine is safe?	120 (81.1)	7 (4.73)	21 (14.18)
Do you want reassurance that vaccine protects against HPV infection?	96 (64.86)	25 (16.9)	27 (18.24)
Are you worried about short term side effects?	60 (40.54)	52 (35.13)	36 (24.32)
Are you worried about long term side effects?	94 (63.5)	16 (10.8)	38 (25.61)

Attitudes and beliefs about HPV vaccination

Table 3 depicts the attitudes and beliefs of medical students towards HPV vaccine. Majority of them, around

120 (81%) students believe that HPV vaccine is safe, but 96 (65%) students want to be reassured that vaccine will protect against HPV infection.

The greatest concern about HPV vaccination among medical students was regarding the side effects. About 60 (40%) students were worried about the short-term side effects and 94 (63.5%) students were worried about the long-term side effects. Their concern regarding side effects was more than the vaccine efficacy and cost (Table 4).

Table 4: Vaccination concern.

What is your greatest concern about HPV vaccine?	N (%)
Vaccine side effects	71 (47.97)
Vaccine efficacy	58 (39.2)
Vaccine cost	11 (7.43)
Others	8 (5.4)

Attitudes and beliefs regarding vaccination policy

Majority (121 students; 81.75%) believed that both genders should be vaccinated. However, the opinion regarding the timing of vaccination was divided. 55 (37%) students feel that vaccine should be administered in school age, 42 (29%) believe in vaccination before marriage and 18 (12%) students feel that vaccination can be done at any age. 30 (20.3%) students do not have fixed opinion about timing of vaccination (Table 5).

Table 5: Attitude and beliefs regarding vaccination policy.

Groups to be vaccinated	N (%)
Males only	4 (2.7)
Females only	15 (10.14)
Both sex	121 (81.75)
Don't know	8 (5.41)
Timing of vaccination	
Pre -school	3 (2.03)
School age	55 (37.16)
Before marriage	42 (28.38)
Any age	18 (12.16)
Don't know	30 (20.27)
Decision regarding HPV vaccination	
Person himself/herself	79 (53.4)
Joint decision of parents and young person	56 (37.8)
Only the parents	3 (2.03)
Don't know	10 (6.76)

Regarding decision about vaccination, 79 (53.4%) students felt that the person himself/herself can decide about vaccination. 56 (37.8%) students felt that it should be a joint decision by parents and young persons (Table 5).

Almost all the participants (146 students, 98.7%) felt the strong need for information regarding HPV infection to be spread across general population. Around 125 (82%) students agreed on providing information to adolescents about HPV infection, health sequelae and its prevention

methods including vaccination as a part of reproductive health education program. 121 (82%) participants showed willingness to take vaccine if recommended (Table 5).

DISCUSSION

This study assessed the level of knowledge about HPV infection, attitudes and beliefs about the HPV vaccine and vaccination policy among the first-year medical students of SS Institute of Medical Sciences, Davangere, Karnataka, India. Overall, the awareness about HPV virus and vaccine is fairly good among medical students.

Majority of the students (77%) know that HPV is a sexually transmitted infection and both men and women are affected by the virus. Study by Mehta et al stated that their participants agreed that HPV spreads both by sexual and non-sexual route.¹¹ Only 50-60% of the students in our study are aware of the fact that HPV virus causes genital warts and also other genital cancers apart from cervical cancer. The study by Mehta et al found that 44% of their students answered that HPV causes vulval, penile, oral and vaginal cancers while 12% of them gave some weird answers like HPV can cause hepatocellular carcinoma, seminoma and leiomyoma of the uterus.¹¹ HPV nearly accounts for 88% of anal, 78% of vaginal, 51% penile, 15-48% of vulval carcinoma. It is also known that HPV is a relevant factor in head and neck cancers. HPV type 6 and 11 accounts for 90% of anogenital warts.

Results of some worldwide systematic reviews reveal that knowledge about HPV virus and vaccination was low to moderate amongst the adolescent boys compared to their girl counter-parts. Probable reason could be the fact that HPV is most commonly associated with cervical cancer and hence assumed to cause pathology only in females. A study was conducted by Challa et al assessing the awareness and attitude regarding HPV virus and its vaccine in medical students of Tirupathi, India, revealed that most of the participants are well aware of the viral etiology and preventive nature of cervical cancer.¹² A similar finding was noted in study conducted by Pandey et al and Mehta et al.^{11,13} Considering the fact that medical students are exposed in the curriculum about HPV virus and vaccine, the knowledge appears to be good.

Our study reflects the role medical teaching has an influence in understanding the etio-pathology of HPV virus and the preventive role of the vaccine. Yet the knowledge regarding the various other pathologies associated with HPV virus needs to be improved. It shows the importance and necessity of medical teaching to improve awareness regarding HPV virus and also the vaccine. Various teaching methods like integrated teaching, small group discussions and seminars should be held in the college to clarify the doubts regarding HPV virus and vaccination.

HPV vaccination along with screening procedures is considered as effective in prevention of cervical cancer,

thus reducing the burden of the disease and mortality associated with it.

In our study around 65% of the students wanted reassurance that vaccine protects against HPV infection. Since HPV vaccine is not included in the national immunisation policy of India, more awareness needs to be created regarding the vaccine and the confusion regarding the efficacy and side-effects needs to be cleared by spreading knowledge about the HPV vaccine.

Although concerned about the side-effects and the efficacy of HPV vaccine in our study, majority (82%) of the students were willing to receive the vaccine. The vast majority of the study population were against only females getting vaccinated. They believed that both male and female population needs to be vaccinated. 37% of the participants agreed with the prevailing WHO recommendation and chose school age as the appropriate age group to receive the vaccination. The other chunk, around 28% of the participants felt that vaccination needs to be done before marriage. The reason for choosing before marriage as the right time for vaccination may be the cultural and the religious beliefs which prefer the sexual activity to begin after the marriage.

In India, where the burden of HPV infection is high and hence the burden of carcinoma cervix and related mortality is also high. Inclusion of HPV in National Immunisation Programme may help in reducing the burden of carcinoma cervix in our society. However, Indian Academy of Pediatrics Committee of Immunisation (IAPCOI) recommends vaccination to all girls who can afford the same (category 2 of IAP categorisation of vaccine).¹⁴

Bhatla et al in his study points the major obstacles for implementation of HPV vaccination programme in India.¹⁵ The main obstacles as per the study were cost, acceptability, lack of public awareness and infrastructure, concerns regarding the side effects and also certain social and religious barriers.

Knowledge among the medical students and health care professionals is important as it influences their intention to recommend the vaccine and in turn affects the vaccination uptake in the community. Knowledge regarding the etiology of carcinoma cervix and its link to HPV enhances uptake of HPV vaccine. Government sponsored and school-based programs are recommended as initiative to improve HPV related knowledge and HPV vaccine acceptability.

CONCLUSION

In conclusion, bridging the knowledge gaps regarding HPV infection, its link in etiopathogenesis of carcinoma cervix and vaccination by designing HPV education program with outreach to general public as well as integrated into national programmes, improves the uptake of HPV vaccine. Inclusion of HPV vaccine in national

immunisation program helps alleviate public concern regarding vaccination. The cost of the vaccine to be reduced in line with public expectation and national interest.

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