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Original Research Article

Knowledge, attitude and practice of HPV vaccination among female undergraduate medical students at a tertiary centre: a cross-sectional study

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ABSTRACT

Background: Human papillomavirus (HPV) is a high-risk virus with less awareness and less efforts taken to combat the infection. The present study was undertaken to assess the knowledge attitude and practice about HPV and related health problems and its associated vaccine, among female medical undergraduate students to gauge their awareness levels about HPV and HPV vaccine.
Methods: A cross-sectional study was carried out on 260 undergraduate (UG) female medical students from first to fourth year at an institution in Central India. A structured, pre-tested, validated questionnaire, focusing on knowledge, attitude and practice of HPV vaccine was administered to participants and the responses were gathered. The data analysis was done with Statistical Package for the Social Sciences (SPSS) Version 20 software (IBM SPSS Statistics Inc., Chicago, Illinois, USA).
Results: A total of 254 students in the age range of 18 to 24 years participated in the study. The study observed inadequacies in the knowledge about certain aspects of HPV. In the present study, nearly 10% of participants were immunised for HPV. The most commonly identified reason for the lack of vaccination was 'poor knowledge levels' about HPV vaccine.
Conclusions: The study noted an average level of knowledge about HPV and related health problems and poor knowledge levels about HPV vaccine among medical undergraduates. The study emphasises the need for educating medical students, health care professionals and the community, at large regarding HPV infection and the importance of HPV vaccination to prevent the associated sequelae.

Keywords: HPV vaccination, Knowledge, Undergraduate medical students

INTRODUCTION

Human papillomavirus (HPV) is a high-risk virus and has been identified as a significant cause for numerous diseases like genital warts, cervical cancer, and oropharyngeal cancer and it spreads through physical or sexual route.[1] Worldwide, cervical carcinoma is the fourth most common malignancy among females and accounts for 7.5% of all female cancer deaths.[1,2] In India, it contributes for 43.8% of all cancers among females and more than 80% of them are linked with HPV types 16 and 18.[1-3] These strains are also accountable for approximately 92% of anal cancers, 89% of oropharyngeal cancers and 63% of penile cancers among males.[1] Being part of effective preventive strategies for HPV induced health problems, HPV vaccine can prevent most cases of cervical cancer, if given before women are exposed to the virus. In addition, the vaccine is found to be efficient in preventing genital warts, anal cancers, and

mouth, throat, head and neck cancers in the men and women.[1-3]

Efforts are being implemented to scale up HPV vaccination for beneficiary women in India.[4] It is encouraging that the National Technical Advisory Group on Immunization (NTAGI) has recommended the inclusion of HPV vaccination into the National Immunization Program of India. It cannot be reiterated enough that widespread public screening is crucial for the control of HPV infection in the population. The World Health Organization (WHO) recommends screening protocols consisting of HPV testing for high-risk HPV types, Papanicolaou (Pap) smear test, visual inspection with acetic acid (VIA), and liquid-based cytology (LBC).[1] Healthcare specialists play an essential role in creating awareness regarding screening methods and vaccination, thereby assisting individuals and communities to overcome socio-cultural, religious and ethical stigmas related with them.[3] However, lack of updated knowledge among healthcare professionals poses a hurdle in creating awareness about accessing various HPV control services.[3] It is imperative to include information and create understanding regarding HPV in the early phases of training of medical students, to ensure the appropriate shaping of competency to deal with HPV related health services, as future healthcare workers.[5-7] However, a thorough literature search has indicated that limited studies emphasise on evaluating knowledge and perceptions, specifically among female medical students. This study was therefore undertaken, to assess knowledge, attitude and practice levels about HPV and HPV vaccine among female undergraduate students at one of the tertiary health care institutes in central India. The study also attempted to find out the proportion of beneficiary students who have been vaccinated against HPV.

METHODS

Study design and area

The cross-sectional study was carried out at one of tertiary health care institutes in Central India.

Ethics considerations

Ethical approval was obtained from the Institutional Ethics Committee of the respective institute (Letter no.EC/Pharmac/GMC/NGP/no.3752-Dt.2/7/22). An informed consent was obtained from the study participants. Necessary permissions were also received from the concerned authorities of the institute for implementation of the study.

Inclusion criteria

All female undergraduate MBBS medical students from 1st to 4th year (age ranging from 18 years to 24 years) from the respective institute were enrolled as study participants. Those participants who were willing to give informed consent were included in the study.

Exclusion criteria

The participants who were not willing to give informed consent and those who could not complete the questionnaire were not considered for the study.

Study procedure

A pre-designed, pilot - tested validated questionnaire was developed in English language and used as a tool for the collection of data. The questionnaire was validated by circulating it to 5 experts in the field. The questionnaire was semi-structured and consisted of a total 20 open-ended and closed-ended questions on various aspects of HPV and associated vaccines. The questionnaire was circulated as a google form amongst the medical students. The questionnaire consisted of three parts namely sociodemographic characteristics of participants, knowledge, attitude and practice of vaccines. The participants were not needed to identify themselves by mentioning their names on the questionnaire and thus the confidentiality was ensured. However, a coding system was applied during the process of data analysis. The study was carried out from June, 2023 to August, 2024.

Sample size estimation

After having preliminary consultation with biostatistician, the required sample size for the present study was calculated considering three factors namely, 95% confidence level, the prevalence of vaccination against HPV i.e. 12.17%[8-10] (an average was taken from previous studies) from the past studies and the allowable level of margin of error 5%. The sample size was determined by using following formula,

$$n = \frac{4PQ}{L2}$$

Where, P=12.17%, Q=100-P=87.83%, L=5% as allowable level of margin of error, n=4×12.17×87.83/ 25=171

Therefore, the required sample size in the present study was 171. However, considering the interest of more medical students from the institute to participate actively in the study, a total sample size of 260 was considered for this study.

Statistical analysis

All descriptive statistics were presented in the form of Mean±SD (Standard Deviation) and Percentages. Categorical variables were presented as numbers and percentages. ‘Chi-square test’ and ‘t’ test was performed to compare the relationship among two or more categorical variables. Mean scores were analysed by

using One-Way ANOVA test while Spearman correlation coefficient was used to stratify the relationship between certain variables. The data analysis was done with Statistical Package for the Social Sciences (SPSS) Version 20 software (IBM SPSS Statistics Inc., Chicago, Illinois, USA). Two-tailed p value less than 0.05 was considered statistically significant.

RESULTS

General characteristics of participants

Out of a total 260 participants, 6 (2.30%) were excluded as they could not complete the questionnaire due to various reasons. Hence, the data analysis was done for 254 students. All participants were in the age range of 18 to 24 years. The mean age of participants was 20.56±1.245 (SD) (Table 1).

Table 1: Mean age and academic level of study participants (n=254).

Academic year	Number of participants (%)
First	69 (27.2)
Second	80 (31.5)
Third	67 (26.4)
Fourth	38 (15)
Total	254 (100)

Around only 5% of participants were aware about the places where HPV vaccination was provided whereas nearly 82% of participants were well versed with the costing of HPV vaccine. 'Internet' (56.7%) and 'doctors' (54.3%) were the most frequent sources of information for HPV vaccine as reported by the participants in the current study.

Knowledge of participants about HPV and HPV vaccine

Table 2 describes the knowledge of participants about HPV and HPV vaccine. The participants were well aware that HPV was responsible for causing sexually transmitted infections (92.5%) and that HPV led to cervical cancer (95.3%) and genital warts (90.6%). They were also aware that people could remain asymptomatic for a long time even after being infected with HPV (89.8%). However, the present study observed inadequacies in the knowledge about HPV types (56%), the oncogenic variants (41%), and the type causing genital warts (46%). A modest number of participants were aware about the routes and mechanism of HPV infection (60.2%) and that not all infections are symptomatic (83.5%). Regarding the HPV vaccine, the participants were well aware about the availability of a vaccine against HPV (91.7%), and that the number of doses required varied depending on the age (79%). There were gaps in knowledge regarding the appropriate age for HPV vaccination (20.47%), the exact variation in number of doses below and above the age of 15 (34.5%); as well as the age limit until which HPV vaccine can be administered (8%) (Table 2).

Table 2: Knowledge of participants regarding HPV and HPV vaccine (n=254).

Question	Number of participants (%)	
	With correct answer	With incorrect answer
Is HPV responsible for causing sexually transmitted infections?	235 (92.5)	19 (7.5)
Can HPV lead to cervical cancer?	242 (95.3)	12 (4.7)
Do you know that people can remain asymptomatic for a long time even after being infected with HPV?	228 (89.8)	26 (10.2)
Do you know that HPV can cause genital warts?	230 (90.6)	24 (9.4)
What are the types of HPV?	141 (56)	113 (44)
What are the high risk oncogenic HPV types?	104 (41)	149 (59)
Which type of HPV causes genital warts?	136 (46)	118 (54)
Are all HPV infections symptomatic?	212 (83.5)	42 (16.5)
Do you know the route and mechanism of HPV infection?	153 (60.2)	101 (39.8)
Is there a vaccine available to protect against HPV infection?	233 (91.7)	21 (8.3)
Can the vaccine prevent both genital warts and genital cancer?	158 (62.2)	96 (37.8)
What is the appropriate age for HPV vaccination?	52 (20.47)	202 (79.52)
Does the number of doses of HPV vaccine required depend on age?	200 (79)	54 (21)
Number of doses required below the age of 15?	99 (39)	155 (61)
Number of doses required above the age of 15?	76 (30)	178 (70)
Until what age HPV vaccine can be administered?	20 (8)	234 (92)

Attitudes of participants towards HPV vaccine

Table 3 delineates the attitude of participants towards HPV vaccine. 35.5% were apprehensive about the safety and efficacy of the HPV vaccine. However, only a minor percentage of participants (7.9%), rejected the vaccine due to fear of side-effects. Only 12.6% participants had any family members who had been vaccinated against

HPV and the majority (99.2%) of the participants expressed the need to get vaccinated for HPV (Table 3).

Table 3: Attitudes of participants regarding vaccination against HPV (n=254).

Question	Responses, N (%)		
	Yes	No	May be
Do you feel the need to get vaccinated against HPV?	229 (90.2)	25 (9.8)	NA
Do you reject the vaccine due to fear of side effects?	20 (7.9)	169 (66.5)	65 (25.6)
Do you have any family members who have been vaccinated against HPV?	32 (12.6)	222 (87.4)	NA
Do you believe that the HPV vaccine is safe and effective?	164 (64.6)	7 (2.8)	83 (32.7)

NA= Not Applicable, HPV=Human Papillomavirus

Practice of HPV vaccine and underlying reasons

In the present study, only 9.1% of participants were immunized for HPV (in the age group of 18-24 years) (Table 4). The reasons for such poor coverage of vaccination were cited as 'lack of knowledge about HPV vaccines' (80.3%) by maximum participants. Other reasons cited were, that the vaccine was unnecessary (15.9%), a lack of trust (7.2%), unsuitability of vaccine (6.3%), and its high cost (5.8%) (Table 4).

Association between vaccination status and mean knowledge scores

The study also attempted to reveal the relationship between academic levels, vaccination status and mean scores of knowledges among the participants (Table 5). There was a statistically significant association between level of academics and knowledge of students ($p<0.05$).

Table 4: Acceptance of HPV vaccination and associated concerns among participants (n=254).

Number of participants (%)	
Vaccinated against HPV	Not vaccinated against HPV
23 (9.1%)	231 (90.9%)
Reasons for not getting vaccinated	Number of participants (%)
High cost	12 (5.8%)
Unnecessary	33 (15.9%)
Unsuitable	13 (6.3%)
Lack of knowledge	167 (80.3%)
Lack of trust	15 (7.2%)

Table 5: Analysis of vaccination status and mean score of knowledge among participants of different academic years (n=254).

	First year (n= 69)	Second year (n=80)	Third year (n=67)	Fourth year (n=38)	P value
Mean score (Mean±SD)	9.22±1.98	9.41±2.73	10.66±2.21	10.87±2.59	0.0001

*SD=Standard Deviation, $p<0.05$ was considered as statistically significant

DISCUSSION

India contributes majorly to the global burden of HPV and related infections like cervical carcinoma and oropharyngeal cancer. Therefore, it is indispensable to identify the current knowledge, attitude and practice of healthcare professionals including medical students about HPV and its prevention strategies to translate it into actionable policymaking that will contribute towards the welfare of the population in the future. Considering this, the current study was carried out primarily to evaluate knowledge, attitude and practices among medical undergraduate students about HPV. According to the CDC, HPV vaccine is recommended for routine vaccination at age 11 or 12 years. (Vaccination can be started at age 9). ACIP (Advisory Committee on Immunization Practices (ACIP)) also recommends vaccination for everyone through age 26 years if not adequately vaccinated when younger. HPV vaccination is given as a series of either two or three doses, depending on age at initial vaccination. Vaccination is not recommended for everyone older than age 26 years. Two doses of HPV vaccine are recommended for most persons starting the series before the age of 15. The second dose of HPV vaccine should be given 6 to 12 months after the first dose. Three doses of HPV vaccine are recommended for teens and young adults who start the series at ages 15 through 26 years, and for immunocompromised persons.

The recommended three-dose schedule is 0, 1-2 and 6 months.[16]

In our study, we assessed the knowledge regarding the HPV vaccine - results indicated that majority participants (95.3%) in our study were aware of the causal relationship between HPV and cervical cancer. These findings were similar to the study carried out by Sadiqunissa et al where authors observed that the

majority of the students knew about the causal relationship between HPV and cervical cancer (80%).[3]

Participants also had good knowledge regarding the asymptomatic nature of HPV infection, causal relationship between HPV and genital warts, as well as the route and mechanism of HPV infection. However, in the present study, certain shortfalls in the knowledge about certain aspects of HPV were revealed such as the HPV types, and the types causing cervical cancer and genital warts. Participants showed a lack of knowledge about the vaccine being efficacious against genital warts. Majority of the students were aware that a vaccine was available against HPV (91.7%). These findings were similar to the study carried out by Sadiqunissa et al where authors observed that the majority of the students were aware of the availability of HPV vaccines (72%).[3] Although the participants were aware about the variability of the number of doses depending on age, they had alarmingly poor knowledge regarding the appropriate age for HPV vaccination, number of doses above and below the age of 15 and the age until HPV vaccine can be administered.

Regarding the attitude towards vaccination, in the present study the 'cost of vaccine' was not a major concern for the participants, whereas in a study conducted by Mehta et al, it was found that students felt that the vaccine can induce a false sense of security and can be expensive to use.[5] We found that 35.5% of the participants in our study were apprehensive about the safety and efficacy of the HPV vaccine and a minor percentage (7.9%) rejected the vaccine, due to a fear of side-effects - our findings were in line with the study by Sadiqunissa et al, wherein 65% study participants believed that the vaccine was safe and effective.[3]

Despite the fact that the majority of the participants (90.2%) felt the need to get vaccinated against HPV, very few of the participants (9.1%) were actually vaccinated against the same, and also very few had family members vaccinated against HPV (12.6%). The study conducted by Durusoy et al.[17] in Western Turkey stated that the knowledge among the students was remarkably inadequate and only 11.6% of students were willing to be vaccinated which was contrasting to the present study where more than 90% of participants expressed the need to get vaccinated against HPV.

A key aspect of the HPV infection going unnoticed is its asymptomatic nature, leading to 90% of cases going off without any treatment.[11] It is imperative to note that the prevention of cancer by vaccination is one of the significant revolutions in the field of medicine. The emergence of the HPV vaccine signifies an enormous advancement in the battle against cervical cancer. On the other side, the aggressive marketing of the vaccine by pharmaceutical corporations have made the public aware of its link with cervical cancer. However, the quotient of awareness is still unsatisfactory and has left several misconceptions in the minds of common people. The present study findings corroborated with this fact, as only 9.1% participants were immunised for HPV, with majority participants (80.3%) citing a lack of knowledge as the reason for not availing the vaccine.

Our study showed that knowledge regarding HPV improved significantly with successive academic years of medical education, indicating perhaps, the importance of educational measures in improving knowledge in communities.

We found that 'Internet' (56.7%) and 'doctors' (54.3%) were the most frequent sources of information for knowledge regarding the HPV vaccine. However, it must be iterated that to educate and vaccinate more women from lower socioeconomic backgrounds and rural India, community healthcare workers must be mobilised.

The insufficient knowledge among medical students about HPV and associated health problems represent only tip of the iceberg.[5,15,17] The myths and misconceptions existing among the lay people might be even more and it can have unfavourable implications on the health of the general population.[5,19,20] It is certain that global acceptance of HPV vaccine is likely to lend massive benefits to healthcare outcomes, by declining morbidity and mortality related to cervical cancer. These concerns can be effectively addressed by robust health education programs and health campaigns that focus predominantly on the adolescent population, a cohort that is meant to be -beneficiaries of the vaccine in present and future, as well as the harbingers of information on the context in forthcoming times-disseminating the same in the community, where considerable knowledge gaps exist.

Additionally, it may be suggested that pharmaceutical companies can undertake active Corporate Social Responsibility (CSR) measures as part of their business ethos, and become vibrantly involved in generating awareness and educating the community on the different aspects of HPV, cervical cancer and its prevention.

Medical students should actively participate in interactive sessions including conferences and workshops and other forums/platforms where queries about HPV and its relation with cervical cancer can be emphasized and clarified.

CONCLUSION

Although the knowledge regarding HPV vaccine was good in some aspects like the awareness of vaccine availability, its ability to prevent both genital warts and genital cancer and the fact that the number of doses of HPV vaccine depended on age; there was a striking gap in knowledge on certain aspects like the appropriate age for HPV vaccination, number of doses required below and above age of 15 and the age limit up to which HPV vaccine can be administered. Despite the fact that the

participants had average levels of knowledge and were aware about the availability of the vaccine, the practice of HPV vaccination was alarmingly low. This reflects a need for educating medical students, health care professionals across specialties and subsequently, the community at large, in order to reduce the burden of HPV induced infection and its associated sequelae across the world.

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REFERENCES

1. World Health Organization. Human papillomavirus (HPV) and cervical cancer. Available at: https://www.who.int/news-room/fact-sheets/detail/human-papillomavirus-(hpv)-and-cervical-cancer. Accessed on September 9th, 2022.
2. Elrefaey S, Massaro MA. HPV in Oropharyngeal cancer: The basics to know in clinical practice. Acta Otorhinolaryngol Ital. 2014;34(5): 299-309.
3. Sadiqunissa RM. Awareness and knowledge of human papilloma virus (HPV) vaccine in prevention of cervical cancer among medical students. Int J Reprod Contracept Obstet Gynecol. 2018;7:5026-30.
4. Sankaranarayanan R, Bhatla N. Current global status & impact of human papillomavirus vaccination: Implications for India. Ind J Med Res. 2016;144(2):169-80.
5. Mehta S, Rajaram S. Awareness about human papilloma virus and its vaccine among medical students. Ind J Community Med. 2013;38(2): 92-4.
6. Challa N, Madras V. Awareness and attitude regarding human papilloma virus and its vaccine among medical students in a medical school in India. Int J Res Med Sci. 2014;2:1607-11.
7. Pandey D, Vanya V. Awareness and attitude towards human papillomavirus (HPV) vaccine among medical students in a premier medical school in India. PLOS ONE. 2012;7(7):1-9.
8. Farsi NJ, Baharoon AH, Jiffri AE, Marzouki HZ, Merdad MA, Merdad LA. Human papillomavirus knowledge and vaccine acceptability among male medical students in Saudi Arabia. Hum Vaccin Immunother. 2021;17(7):1968-74.
9. Swarnapriya K, Kavitha D, Reddy GM. Knowledge, attitude and practices regarding HPV vaccination among medical and para medical in students, India a cross sectional study. Asian Pac J Cancer Prev. 2015;16(18):8473-77.
10. Padmanabha N, Kini JR, Alwani AA, Sardesai A. Acceptability of human papillomavirus vaccination among medical students in Mangalore, India. Vaccine. 2019;37(9):1174-81.
11. Haley CT, Mui UN, Vangipuram R, Rady PL, Tyring SK. Human oncoviruses: Mucocutaneous manifestations, pathogenesis, therapeutics, and prevention: Papillomaviruses and Merkel cell polyomavirus. J Am Acad Dermatol. 2019;81(1):1-21.
12. Krzowska-Firych J, Lucas G, Lucas C, Lucas N, Pietrzyk L. An overview of Human Papillomavirus (HPV) as an etiological factor of the anal cancer. J Infect Public Health. 2019;12(1):1-6.
13. Von Knebel Doeberitz, Prigge ES. Role of DNA methylation in HPV associated lesions. Papillomavirus Res 2019;7(1):180-3.
14. Plummer M, de Martel C, Vignat J, Ferlay J, Bray F, Franceschi S. Global burden of cancers attributable to infections in 2012: a synthetic analysis. Lancet Glob Health. 2016;4(9):609-16.
15. Soheili M, Keyvani H, Soheili M, Nasseri S. Human papilloma virus: A review study of epidemiology, carcinogenesis, diagnostic methods, and treatment of all HPV-related cancers. Med J Islam Repub Iran. 2021;22(5):35:65.
16. Meites E, Kempe A, Markowitz LE. Use of a 2-Dose Schedule for Human Papillomavirus Vaccination Updated Recommendations of the Advisory Committee on Immunization Practices. MMWR Morb Mortal Wkly Rep. 2016;65:1405-8.
17. Durusoy R, Yamazhan M, Taşbakan MI, Ergin I, Aysin M, Pullukcu H et al. HPV vaccine awareness and willingness of first-year students entering university in western Turkey. Asian Pac J Cancer Prev. 2010;11(5):1695-701.
18. Kepka D, Rutkoski H, Pappas L. US oral health students' willingness to train and administer the HPV vaccine in dental practices. Prev Med Rep. 2019;15(2):1-9.
19. Sallam M, Al-Fraihat E. Dental students' awareness and attitudes toward HPV-related oral cancer: A cross sectional study at the University of Jordan. BMC Oral Health. 2019;19(1):171-73.
20. Lowy DR, Schiller JT. Reducing HPV-associated cancer globally. Cancer Prev Res 2012; 5(1): 18–23.
21. Parkin DM, Bray F. Estimating the world cancer burden: Globocan 2000. Int J Cancer. 2001;94(2):153-6.

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