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HPV Vaccine awareness and acceptance: Survey among medical students

Prachi D. Sondankar[1], Mayavati N. Nannaware[2], Khyati Kalra[3], Parvinder S. Chawla[4]

ABSTRACT

Introduction

Human Papillomavirus (HPV) vaccine is a crucial tool in preventing certain types of cancer and other diseases. CDC recommends vaccination for everyone through age 26 years if not adequately vaccinated when younger. Awareness and acceptance of this vaccine plays crucial role in prevention. Future doctors should be aware of the importance and benefits of the HPV vaccine. Higher vaccine acceptance among medical students can contribute to higher vaccination rates in public.

Objectives

1.To study the level of awareness of HPV vaccination among medical students. 2. To know the various barriers of HPV vaccine uptake.

Methods

It was descriptive cross-sectional study conducted at tertiary care teaching hospital. Study participants were medical students. Study duration was from October 2024 – March 2025. Universal sampling was used. Data was collected through google form questionnaire circulated in online Whats App platform and analyzed.

Results

Total responses received were 543. Mean age of the participants was 20.67 ± 1.71 years. Research findings showed that 97.24 %(C.I.- 95.48% to 98.45%) participants were having awareness regarding HPV vaccination. 95.58% (C.I.- 93.49% to 97.15%) were aware of vaccine role in prevention of cervical cancer but majority were not aware of its protective role in other diseases. Majority, 75.14%(C.I. – 71.28% to 78.72%) had not taken the vaccine. Barriers for HPV vaccine uptake were insufficient knowledge about the vaccine in 31.18%, concerns regarding safety of the vaccine in 12.03%, 11.58% said it was not available and 10.91% were not sure about the benefits.

Conclusion

Though awareness of HPV vaccination is present, a significant portion of medical students were not vaccinated against HPV. Lack of accurate knowledge, doubts about safety and benefits among medical students were the main barriers of the vaccine uptake. As India is planning to roll out this vaccine in National Immunization schedule, overcoming barriers in medical students who will be future medical professionals is of utmost importance.

Keywords: HPV vaccine, medical students, acceptance of HPV

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4*Corresponding author Parvinder S. Chawla, Department of Community Medicine, Smt. Kashibai Navale Medical College, Narhe, Pune, Maharashtra, India – Email: drparvinderchawla@gmail.com; 1.Prachi D. Sondankar, Department of Community Medicine, Smt. Kashibai Navale Medical College, Narhe, Pune, Maharashtra, India – Email: prachisondankar@gmail.com; 2. Mayavati N. Nannaware, Department of Community Medicine, Smt. Kashibai Navale Medical College, Narhe, Pune, Maharashtra, India – Email: mayanannaware80@gmail.com; 3. Khyati Kalra, Department of Community Medicine, Smt. Kashibai Navale Medical College, Narhe, Pune, Maharashtra, India – Email: khyatikalra4@gmail.com;

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INTRODUCTION

Human papillomavirus (HPV) is a common sexually transmitted infection which can affect the skin, genital area and throat. Almost all sexually active people will be infected at some point in their lives, usually without symptoms. Persistent infection with high-risk HPV can cause abnormal cells to develop, which go on to become cancer.[1] Cervical cancer is the fourth most common type of cancer in women, and more than 95% of cervical cancer is caused by sexually transmitted HPV. Reducing the incidence of cervical cancer by increasing access to effective vaccines is a highly significant step in alleviating unnecessary illness and death.[2] It is necessary to prevent the disease by vaccinating the adolescents at early age. CDC also recommends vaccination for everyone from 9 to 26 years if not adequately vaccinated when younger. Two doses of HPV vaccine are recommended for most persons starting the series before their 15th birthday. Three doses of HPV vaccine are recommended for teens and young adults who start the series at ages 15 through 26 years, and for immune-compromised persons.[3] Introduction of the vaccine in low-income and middle-income countries, where 90% of deaths occur, remains slower. There is a long way to go to meet the 2030 elimination target of 90% in India as presently less than 1% of our girls are vaccinated and less than 2% of Indian women have ever been screened according to NFHS-5.[4]Aiming for Viksit Bharat by 2047 and with a sharp focus and providing momentum to Nari Shakti, Union Minister for Finance & Corporate Affairs, Smt. Nirmala Sitharaman proposed vaccination to prevent Cervical Cancer and amalgamation of various schemes for maternal and child care, as she presented the Interim Budget 2024-25 in Parliament recently.[5]A study in India among medical students shows awareness regarding the availability of vaccine against cervical cancer was 75.6%. Overall acceptance or willingness of HPV vaccine among the population studied was 67.8 %.[6] Another study among Indian physicians suggest that while physicians are generally aware about the burden of cervical cancer and its prevention by HPV vaccination, they face several barriers to recommending the HPV vaccine routinely and strongly.[7] It is rightly said that mere availability of an effective vaccine is not synonymous with an effective vaccination program.[6]

As India is planning to roll out HPV vaccine in National Immunization schedule, it is of utmost importance to sensitize all the stakeholders in the process. So, there is a strong need for the medical students who will be future doctors to be aware about HPV vaccination and to have maximum acceptance of vaccination amongst them. There are few studies related to HPV awareness among medical students in India but very few in Western Maharashtra region. Thus, the study was planned to find the awareness and acceptance of HPV vaccination among medical students in Western Maharashtra region and to know the various reasons of not availing the vaccine.

Methods and Materials:

The study is descriptive cross-sectional study conducted at tertiary care teaching hospital in Western Maharashtra region. Medical students i.e. undergraduate (UG) students and interns studying in a medical college were taken as study participants. Ethics approval was taken from Institutional Ethical Committee prior to start of the study. (Ref. SKNMC/Ethics/App/2024/297). Assuming 67.8% acceptance of HPV vaccine[6], with alpha error of 5%, a sample size of 336 was calculated using formula $n=Z^2\ p(1-p)/\ l^2$. Universal sampling was used to collect the data. Study duration was from October 2024 – March 2025. **Inclusion Criteria:** Medical students i.e. MBBS undergraduate students and interns studying in a medical college who were willing to participate in the study and have given written E-consent. **Exclusion Criteria:** Study participants who were eligible but were not willing to participate or did not give consent.

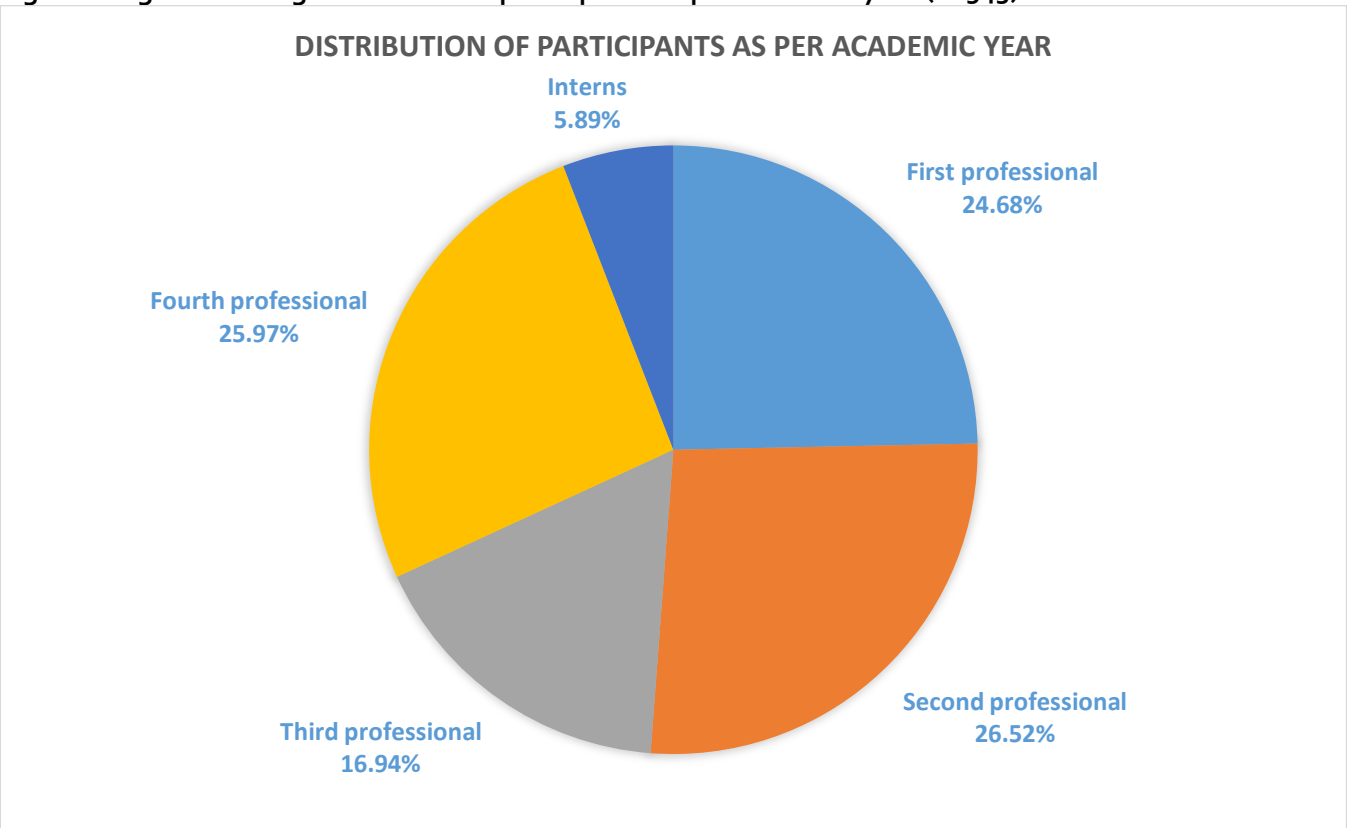
A questionnaire was prepared to know their awareness regarding HPV vaccination, vaccine uptake data as per recommended vaccination schedule [3], barriers for not taking the vaccine and their perspectives regarding HPV vaccination. This questionnaire was pre-tested and validated by experts of the subject. Then, questionnaire was transformed into a google form and link for the same was circulated in student's whatsapp group. Written E consent was taken and data was collected online

for 1-month period. Minimum sample size as estimated was 336, however all the responses received (543) during 1-month period were included in the study. All students were encouraged to participate in the study. Confidentiality and anonymity were maintained throughout the study. Data was collected and entered in MS- Excel spread sheet after coding. It was further processed and analyzed using EPI-INFO TM Version 7.2.5 Software. Mean, percentage, proportion and standard deviation were calculated based on type of data. Chi-square test of significance was used. A p value of < 0.05 at 95% Confidence Interval was considered as significant.

Results:

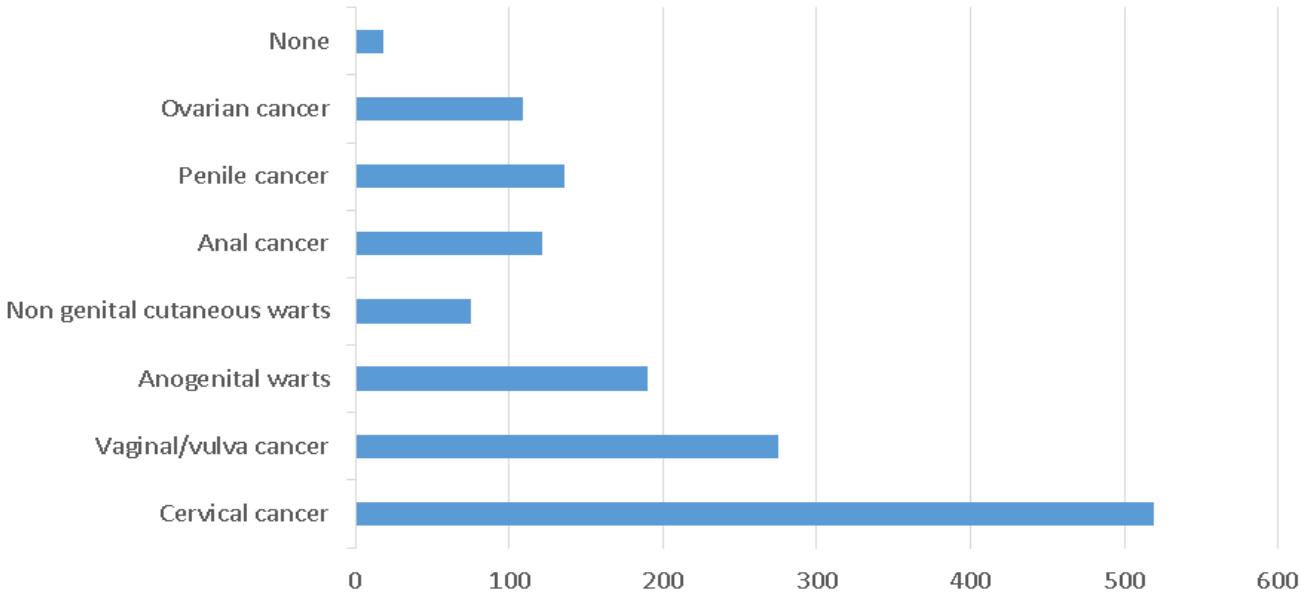
Total participants were 543. Participants were MBBS under Graduate students of all professional years and interns. Figure 1 depicts their distribution among all academic years. 51.75% (281) were female participants and 48.25% (262) were males. Mean age of the participants was 20.67 ± 1.71 years.

Figure 1: Figure showing distribution of participants as per academic year (n=543)



Research findings showed that 97.24% (528) (C.I.-95.48% to 98.45%) participants were aware regarding HPV vaccination while others were not aware. When a question was asked regarding whether HPV vaccine has a role in prevention of cervical cancer, 90.98% (494) (C.I.-88.25% to 93.25%) gave correct reply as yes while others were not sure about it. Figure 2 shows responses to question regarding which diseases can be prevented by HPV vaccine. Maximum respondents i.e. 95.58% (C.I.-93.49% to 97.15%) were aware of vaccine role in prevention of cervical cancer but majority were not aware of its protective role in other diseases like vaginal cancer, anogenital warts, non-genital cutaneous warts, anal cancer, penile cancer and ovarian cancer.

Figure 2: Distribution of responses regarding diseases of HPV vaccine protection (n=543, Multiple responses)



	Cervical cancer	Vaginal/vulva cancer	Anogenital warts	Non genital cutaneous warts	Anal cancer	Penile cancer	Ovarian cancer	None
Numbers	519	275	190	75	121	136	109	18

Only 27.81% (151) participants could answer correct age for the HPV vaccination i.e. 9 to 26 years of age [3] while maximum of them i.e. 72.19% were unaware about it. 71.09% (386) respondents correctly answered that HPV vaccine is recommended for both males and females. 22.28% (121) answered that it is recommended only for females while 1.1% (6) responded that it is recommended only for males. 4.42% (24) were unaware about the vaccine requirement in males and females and 1.1% (6) considered it for high risk individual's only i.e immunocompromised individuals, multiple sexual partners and commercial sex partners. Regarding HPV vaccination status of study participants which is depicted in Figure 3, majority 75.14% (408) (C.I. – 71.28% to 78.72%) have not taken even one dose of vaccine. 17.31% (94) students have taken complete vaccination schedule while 7.55% (41) have taken incomplete vaccination. Out of completely vaccinated students, 57.45% (54) were females and 42.55% (40) were males.

Figure 3: Figure showing HPV vaccination status among participants (%) (n=543)

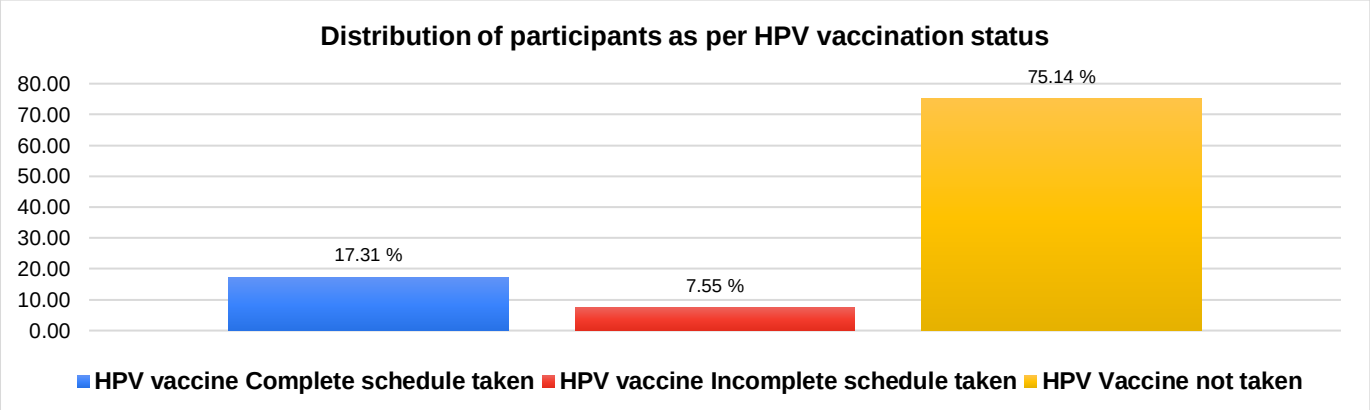
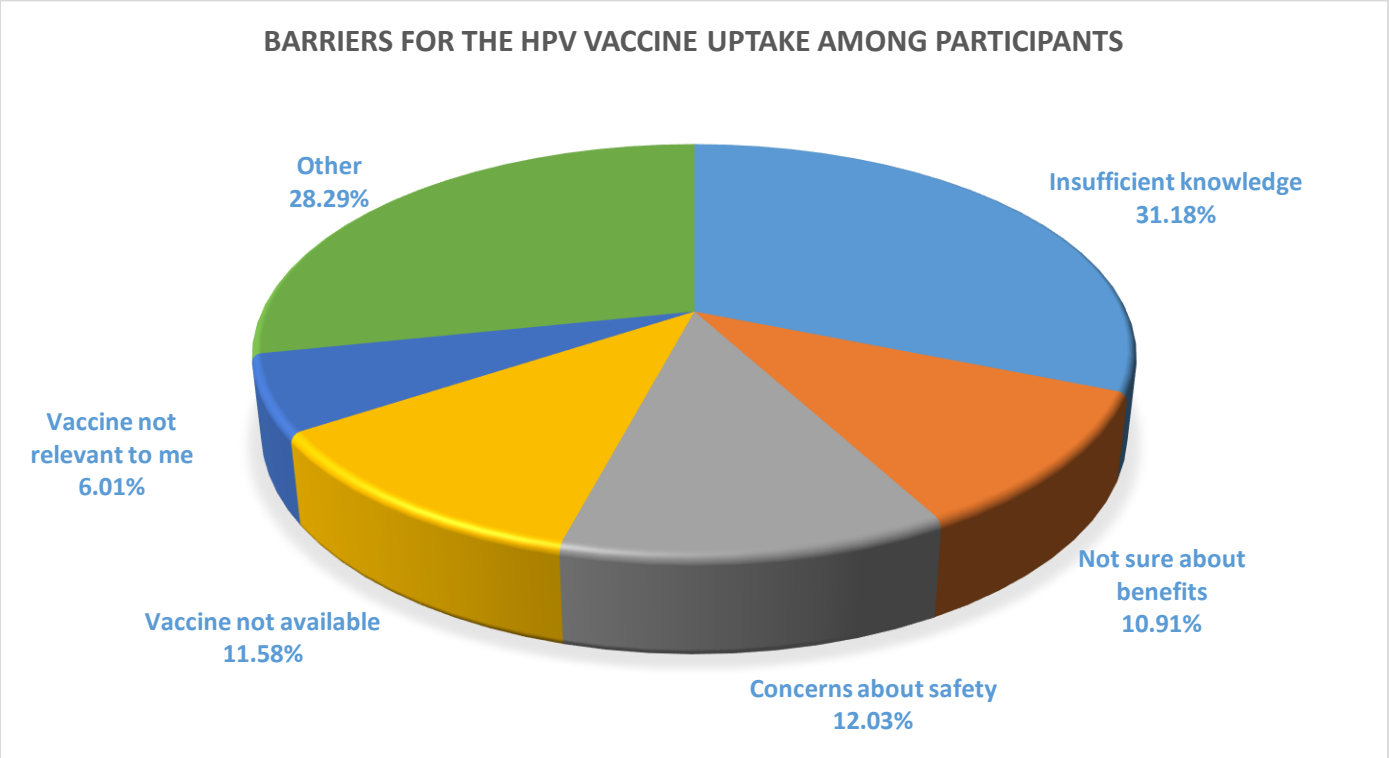


Figure 4 shows the reasons of not vaccinating with HPV vaccine. Out of the total 449 unvaccinated or partially vaccinated individuals, 31.18% (140) were having insufficient knowledge about the vaccine, 12.03% (54) had concerns regarding safety of the vaccine, 11.58% (52) considered it as unavailable and 10.91% (49) were not sure about the benefits. Around 6% responded that the vaccine is not relevant to them. 28.29% (127) gave other reasons such as cost, unaware about own vaccination status, didn't get a chance.

Figure 4: Figure showing barriers for the HPV vaccine uptake (n=449)



Abbreviations and symbols:
HPV: Human Papilloma Virus
CDC: Center for Disease Control

Majority of the participants i.e.90.42% (406) showed willingness to take the vaccine if made available but among 449 unvaccinated or partially vaccinated individuals, 9.58% (43) were not willing to get vaccinated. Table 1 indicates that there is no significant association between age of participants and their HPV vaccination status. Similarly, no significant association was found between gender of the participants and their HPV vaccination status. Academic years of the respondents was also found to be not significantly associated with their HPV vaccination status.

Table 1: Table showing association between demographic factors with HPV vaccination status (n=543)

	Complete course of HPV taken	Incomplete course of HPV taken	Not taken	Total	Statistical Test Results Chi square test
Age					$X^2 = 7.23$, df=4
≤19 years	33 (22.45%)	7 (4.76%)	107 (72.79%)	147 (100%)	p value 0.12
20-22 years	53 (16.61%)	26 (8.15%)	240 (75.24%)	319 (100%)	
≥23 years	8 (10.39%)	8 (10.39%)	61 (79.22%)	77 (100%)	

Gender					$X^2 = 4.46$, df=2
Female	54 (19.22%)	26 (9.25%)	201 (71.53%)	281 (100%)	p value 0.11
Male	40 (15.27%)	15 (5.73%)	207 (79.01%)	262 (100%)	
Academic year					$X^2 = 9.44$, df=6
First Professional	24 (17.91%)	4 (2.99%)	106 (79.10%)	134 (100%)	p value 0.15
Second Professional	30 (20.83%)	13 (9.03%)	101 (70.14%)	144 (100%)	
Third Professional	12 (13.04%)	6 (6.52%)	74 (80.44%)	92(100%)	
Fourth Professional*	25 (17.73%)	11 (7.80%)	105 (74.47%)	141 (100%)	
Interns*	3 (9.38%)	7 (21.87%)	22 (68.75%)	32 (100%)	
Total	94 (17.31%)	41 (7.55%)	408 (75.14%)	543 (100%)	

Discussion:

Participants profile and awareness regarding HPV vaccination

97.24% participants out of 543 were aware about vaccination and 90.98% knew the role of vaccine in prevention of cervical cancer. This can be due to information bias as medical students have more access to medical information.

Various studies reveal similar findings though percentages varied. A survey [8] conducted in India consisted of 150 medical students aged between 18-25 years with a mean age of 21.5 ± 1.2 years. Majority students knew that HPV vaccination prevents cervical cancer. A survey conducted in Jodhpur among undergraduate medical students, a total of 238 respondents participated in the study and 41% students had good knowledge about HPV infection and HPV vaccination. [9] Out of 988 medical, dental and nursing students surveyed in South India, majority had heard about cervical cancer and 59.7% had heard of HPV vaccine prior to the survey. [10] A similar study in Mangalore India found out, that out of the 263 participants, majority have heard of the vaccine against Human Papillomavirus. [11] Another study also found nearly 2/3rd of the medical students were aware of the presence of a HPV vaccine. [12] A study done on 550 medical students in which 359 were females and 191 were males also showed that 99.3% of all the students were aware of HPV [13]. Similar participant profile and level of awareness were seen in multiple studies from various regions of India [14-21] and abroad. [22-24]

Details about HPV vaccination

This study reveals that maximum respondents i.e. 95.58% were aware of vaccine role in prevention of cervical cancer but majority were not aware of its protective role in other diseases like vaginal cancer, anogenital warts, non-genital cutaneous warts, anal cancer, penile cancer and ovarian cancer. Only 27.81% participants could answer correct age for the HPV vaccination while maximum of them i.e. 72.19% were unaware about it. 71.09% respondents correctly answered that HPV vaccine is recommended for both males and females while rest were not able to give correct answer. Possible explanation can be lack of/ limited specific information about the vaccine and lack of importance among students. Study done by Mehta S et al [8] revealed that 34% medical students thought that HPV vaccine could protect against other cancers also and 17.3% expressed that HPV vaccine could protect against other sexually transmitted diseases. Also 50% knew the correct age for initiation of vaccination but the vaccination schedule was not known to 90% of them and only 40% students answered that the vaccine was approved for men. Authors also stated that "first time in the history of medicine a cancer can be prevented by vaccination and it's a huge advancement in the fight against cervical cancer" but the awareness is still very low and has left many

myths and misconceptions in the minds of the consumer.[8] In other study, only 41% students had good knowledge about HPV vaccination. More than 80% knew that HPV is responsible for cervical cancer and ano-genital warts but their awareness was not of the same, when it came to associating HPV with penile and oropharyngeal cancer.[9] Another author stated that although the overall awareness of the HPV-related disease and prevention is good, but considerable knowledge gaps exist in many areas suggesting that more education about HPV disease and benefits of vaccination should be included in the undergraduate medical school curriculum.[10] Another Indian study showed, out of 957 participants, only 44.9% displayed good knowledge.[25] In Karnataka study, 50.4 % of the students had good knowledge of HPV virus and HPV vaccine.[26] Similar resembling findings were seen in different Indian studies [12-17, 19- 21, 27-29] and abroad studies. [23, 30-32]

Status of vaccination among participants

The study results demonstrate that only 17.31% students have taken complete vaccination schedule in which 57.45% were females and 42.55% were males. There was no significant association found between age & gender of the participants with their HPV vaccination status. Similarly, academic years of the respondents also found to be not significantly associated with their HPV vaccination status. Though our study revealed high level of awareness among participants, it may not guarantee high level of vaccine uptake. Lack of clear information and misconceptions can be the possible causes of majority being unvaccinated. Different studies have given insight regarding low HPV vaccination uptake among medical students. In a study, only 10% of female students were vaccinated.[9] Mangalore study also mentioned very low vaccine uptake (21%) among medical students.[11] None of the study participants had ever taken the HPV vaccine as per findings of Kamini S et al study.[12] In another study in South India, only 6.8% had received HPV vaccination.[25] In Karnataka study [26], majority of the students had good knowledge but only 5.6 % of female students were vaccinated against HPV similar to our study indicating good awareness or knowledge cannot assure a good vaccine uptake. Similar findings were seen in Turkey study where maximum of the participants were aware of HPV, however, only 3.5% were vaccinated against HPV.[24] Very low uptake was seen in other studies as well. [15,19,32,33]Similar to this study, a study found that there is no significant difference between male and female students regarding the acceptance of vaccination.[13] While contrary to this study, a Bangalore study found more uptake among female students which was statistically significant.[17] This can be due to regional differences or inclusion of only 2nd and 3rd year medical students in the Bangalore study which may have given rise to different findings or there can be some unstudied factors which needs in-depth exploration.

Barriers for HPV vaccine uptake and willingness to take the HPV vaccine

In the this study, barriers for HPV vaccine uptake were insufficient knowledge about the vaccine , concerns regarding safety , non-availability , uncertainty about the benefits etc Majority of the participants showed willingness to take the vaccine. Different Studies have noted down various reasons for not availing the HPV vaccine. According to a study by Pandey D et al, high cost (21.2%), fear of complications (17.6%) and worry about efficacy (16.7%) are the important obstacles for implementing HPV vaccination program and more than half (56.7%) agreed that most important problem is inadequate information. [6] Another study reasoned unessential to get vaccinated as they were not sexually active (28%) while lack of information, its access, and high cost were the other barriers. Author also highlighted about very low vaccine uptake among medical students and recommended urgent intervention in the form of information session specifically for medical students, to eliminate the barriers of HPV vaccination. [11] A study by Kamini S et al also mentioned that the most important factor that deterred the participants from receiving or advising HPV vaccination was lack of enough knowledge, followed by high cost and finally fear of complications. [12] Yet another study found that majority of the students did not consider the need for routine vaccination of young Indian population as the sexual exposure occurs at late stage of the life and the age of vaccination should be > 25 years, but 31.1 % students felt that there is a need for routine vaccination to young population due to rapid urbanization and changes in culture. [15]

Concerns regarding the efficacy, safety and cost of the vaccine were responsible for this as per another study and author highlighted that targeted health education interventions may have a positive impact not only on the acceptance of vaccination among the medical students, but also on their intention to recommend the vaccine, to others in the future.[25] Similar reasons were cited by other studies.[13, 14, 20, 21, 29, 34] Reducing cost of the vaccine, promoting vaccine safety, increase vaccine accessibility and use of social media to promote awareness of this gender neutral vaccine may reduce the barriers and enhance the vaccine uptake. Willingness to take the HPV vaccine was seen in majority of medical students in this study as well as many other studies. A study mentioned that 88% of the students were willing to accept the vaccination [9] and another study wrote that 65.2% intended to receive the vaccine. [10] Overall, majority were willing to get vaccinated if the barriers are removed. ([12, 17, 20, 25] India has an impressive track record in its childhood immunization program, and inclusion of school girls and boys into the national immunization schedule will undoubtedly boost the fight against cervical cancer. A strong political will and an effective public awareness campaign with positive messaging are necessary for the successful vaccination coverage and to gain momentum against cervical cancer.[35]

Conclusion

Medical students have good knowledge about HPV vaccine and its link to cervical cancer, but significant gaps remain regarding the vaccine's details and vaccination uptake was poor. The study highlights the need for more enhanced knowledge and uptake among medical students, emphasizing their role in promoting HPV vaccination and reduction of HPV related diseases.

Recommendations

Medical curriculum should emphasize on HPV vaccine awareness addressing knowledge gaps, identifying barriers and misconceptions. Barriers need to be addressed through targeted interventions, such as expert-led seminars, peer education, and possibly subsidized vaccination programs for medical students. Medical students, as future healthcare providers can promote HPV vaccination more effectively if the knowledge and uptake among medical students is improved.

Strength

Medical students, with their specialized knowledge, play a vital role in promoting HPV vaccination within their communities. Study findings obtained may be useful at the policy level to implement awareness programs about this important public health issue.

Limitations

Study findings may not apply to medical students from different region or countries. Being a self-administered questionnaire the respondents may provide answers they believe to be the most suitable and desirable by the researchers which may affect the findings leading to social desirability or self-reporting bias. Also there can be information bias incurred in the study as participants are medical students. Being a cross sectional design, causality between factors couldn't be established and data will reflect only snapshot in time.

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