



Acceptability of human papillomavirus vaccination among medical students in Mangalore, India



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ABSTRACT

Background: The highly prevalent cervical cancer can be prevented through a vaccine. However, the uptake of the Human Papillomavirus vaccine in the general population continues to be low. Medical students, as healthcare providers in the future, would be influential in affecting the community's views and thereby the uptake of the Human Papillomavirus vaccine. Hence, there is a need to promote the right attitude for prompt implementation of this vaccine among medical students. None of the studies in India have so far documented the proportion of vaccinated population among medical students or an intervention strategy to eliminate the barriers to Human Papillomavirus vaccine.

Aims and objectives: To determine the proportion of vaccinated medical students and the barriers against HPV vaccination among non-vaccinated participants; and to test the efficacy of an information session on the barrier.

Methodology: Data on barriers against the Human Papillomavirus vaccination was collected through a questionnaire-based survey. The barriers were reassessed after an intervention in the form of training session using audio-visual aids.

Results: Out of the 263 participants, 46 (18%) had never heard of the vaccine against Human Papillomavirus and only 54 (21%) were vaccinated. Participants thought it was not essential to get vaccinated as they were not sexually active (28%). Lack of information about the vaccine (28%), its access (24%), and high cost (27%) were the other barriers. Following the information session, 59% of the previously non-vaccinated participants responded that they would get vaccinated while 34% were considering getting vaccinated. The most common reason for rejection of the vaccine post-intervention was high cost of the vaccine.

Conclusion: Vaccine uptake is very low among medical students and amenable barriers exist against the vaccine. Urgent intervention in the form of information session is recommended targeted at the medical students, to eliminate the barriers of Human Papillomavirus vaccination.

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1. Introduction

One of the most common sexually transmitted infections is Human Papillomavirus (HPV) infection, so much so that at least 80% of the sexually active population are said to be infected with HPV once in their lifetime [1]. Human papillomavirus of strains 16 and 18 have been associated with 73% of cervical cancers.

The burden of cervical cancer is huge and has been considered a serious public health concern. Cervical cancer is the fourth most common cancer in women worldwide [2], and second most com-

mon among Indian women. In addition, higher mortality of 56% among Indian women [3], makes it the most common cause of cancer death in India [4]. Several factors have been described in the literature to account for the discrepancy in morbidity and mortality observed in India and rest of the world. Unavailability of widespread pap-smear programs, unavailability of HPV vaccines and low awareness being a few. However, some efforts in the development of screening programs through the NPCDCS (National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke) have helped to reduce the incidence and mortality of cervical cancer.

The HPV vaccine was first approved for use in India and other parts of the world in 2006 [5]. Since then, its implementation has been predominantly in developed nations. This is ironic since high

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incidence and mortality is observed in underdeveloped and developing countries [6].

There exists a gap in literature pertaining to the barriers faced by parents and adolescent girls in the uptake of the HPV vaccination in developing countries [7]. Reasons of low uptake maybe numerous, including the high cost of the vaccine, low awareness, fear of adverse effects and its relation to sexual activity [8]. Results of studies conducted in low-income countries have documented a poor knowledge among the recipients of the vaccine. This mandates an intervention targeted at healthcare workers, to disseminate information to the general population [9].

Parental acceptance plays a major role in the uptake of optional vaccines of children and adolescents. Studies to explore factors influencing the acceptance have yielded various results. A physician recommending the vaccine, higher perceived seriousness of HPV infection, high efficacy of the vaccine, were all beneficial in increasing the acceptance of the vaccine [10,11]. These results are promising, as a healthcare provider plays a major role in governing these factors. Therefore effective interventions can be implemented by targeting the healthcare providers.

Another barrier in the uptake of the HPV vaccine is a misconception about the safety of the vaccine among the well-aware gynaecologists, pediatricians, and medical students. The results of PATH (a non-governmental organization) study of five-year demonstration of HPV vaccination among 23,000 vaccinated girls showed seven non-vaccine related deaths [12]. This has been wrongly attributed to the effects of the vaccine deterring its popularity among healthcare workers.

Educational interventions directed at healthcare professionals regarding their personal barriers in vaccine uptake help in increasing the overall uptake of the vaccine in the broader community [13]. Medical students as healthcare providers in the future will be influential in communicating the nature, efficacy, and importance of the HPV vaccine. Need for the right attitude and prompt implementation of this comparatively new vaccine cannot be overemphasized. Only a few studies have been conducted in India to assess the views of the medical/dental students' barrier to the uptake of the HPV vaccine [14–17]. Moreover, none of the studies in India so far have documented an intervention to eliminate the barriers or documented the proportion of vaccinated medical students. It is for this reason, the present study was undertaken to assess the numbers of vaccinees among medical students, assess barriers of female medical students in the uptake of the vaccine and to assess the efficacy of an intervention by a training session. Results obtained from this study may also provide information on formulating an effective yet convenient intervention strategy for medical students/healthcare providers.

2. Aims and objectives

1. To determine the proportion of vaccinated population in medical students.
2. To analyze the factors influencing the attitude about HPV vaccination.
3. To check the effectiveness of an information session in the uptake of the HPV vaccine in medical students.

3. Materials and methodology

3.1. Type, site, and participants

An interventional study was conducted among the female students (age above 18 years) of the undergraduate medical program. The study was conducted in lecture halls of Kasturba Medical College, Mangalore. Informed written consent was obtained from each

participant after explaining to them the purpose and nature of the study. All the eligible participants were included in the study and hence no sampling was done.

3.2. Data collection methods

Approval for the study was obtained from the Institutional Ethics Committee. Information regarding personal barriers against the HPV vaccination was obtained anonymously through a printed questionnaire (Fig. 1). The data collection was done by the representatives of the respective classes with the intention that students' responses would not be altered in view of the authority of the authors.

3.3. Questionnaire

The questionnaire was developed based on a reference study [18]. It was further validated by a gynaecologist and pediatrician. The survey included the following questions-

1. Have you heard about the vaccine?
2. Have you been vaccinated against HPV?
 - a. if yes, how have you heard about the vaccine? and
 - b. if no, why have you not taken the vaccination?

Checkboxes for options and an alternate "other" column was provided. (Please refer to Appendix A)

3.4. Intervention

The survey was followed soon after by an information session lasting for five minutes. It was conducted by the student representatives of the respective classrooms who were trained by the

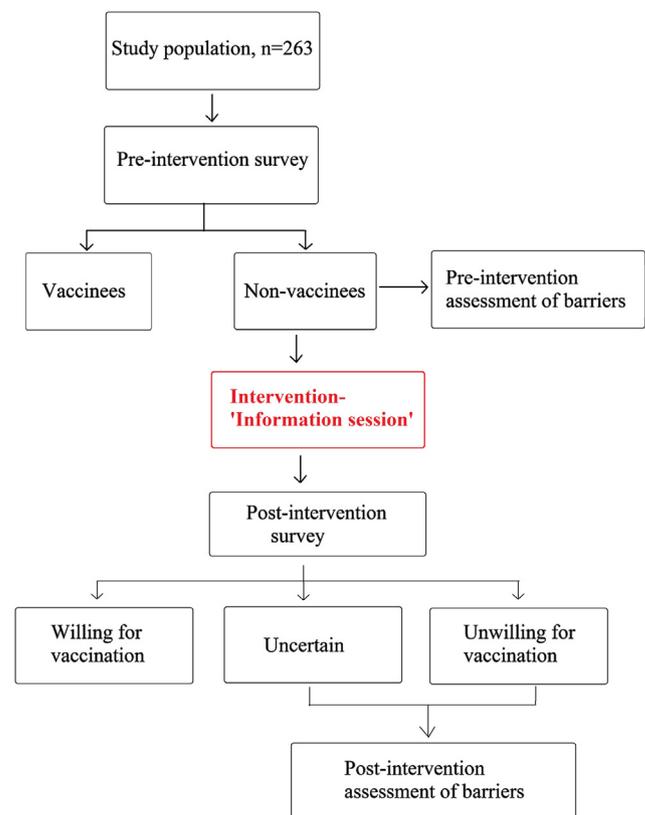
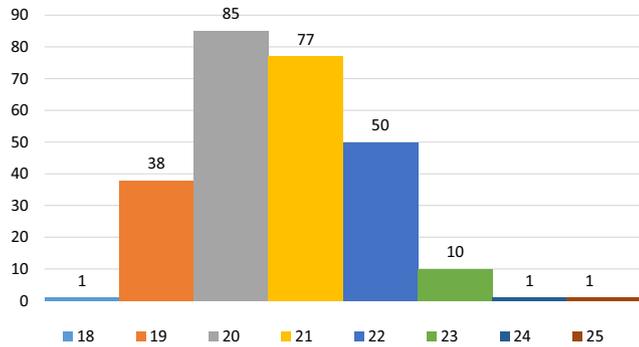


Fig. 1. Flowchart of the study design.

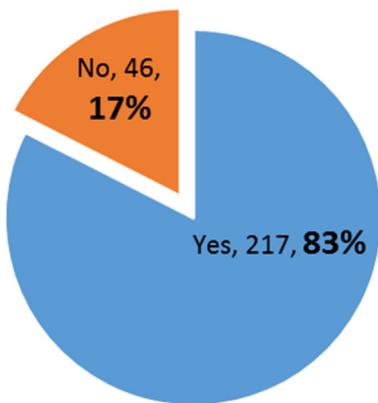
authors and provided with identical audio-visual presentations. The information in the presentation included:

1. HPV vaccine has been approved by the Indian government for use in women of 9–26 years of age.
2. Two strains of HPV -16,18 which are associated with 73% of cervical cancer cases and the two strains are included in both the available vaccines- Cervarix (GlaxoSmithKline) and Gardasil (Merck Inc). Dosage is three doses at zero, one and six months.
3. Efficacy is nearly 100% in women who are not infected with HPV and lesser in those previously infected.
4. Both the vaccines have been licensed by the FDA (Food and Drug Administration) and approved by the CDC (Centers for Disease Control and Prevention) and labeled as safe and effective.
5. Cost of Gardasil vaccine would be approximately 2975 rupees, and that of Cervarix is approximately 2190 rupees.
6. The vaccine is available in most pharmacies on prescription from a gynaecologist/paediatrician. Vaccine administration will be done by the prescribing physician. The entire process would be completed in about half an hour. Subsequent vaccines at one and six months can be procured and administered in a similar manner. In a teaching institution the whole process could be expedited due to the easy accessibility of the gynaecologist/paediatrician.

A post-information survey was conducted among the non-vaccinee study population regarding their acceptability and possible barriers of the vaccine. (Fig. 1) It included “Are you willing to take the vaccine? If no, why?” (Appendix A)



Graph 1. Age of the participants (in years). n = 263.



Graph 2. Knowledge about presence of vaccine, n = 263.

3.5. Data analysis

Descriptive statistics was analyzed using SPSS version 16.0. Statistical significance of correlation was tested using Spearman’s Rho correlation.

4. Results

4.1. Demographics

In our study, 80% of the study participants were in the age group 20–22 years with a mean of 20.66 (SD 1.12) years. Nearly equal number of responses from the batches of each year were observed (Graph 1).

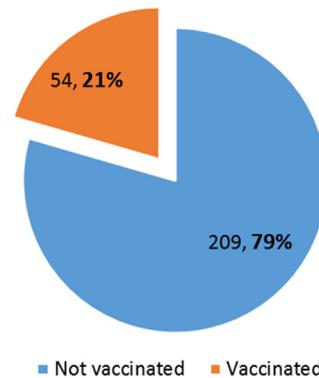
4.2. Knowledge about the HPV vaccine

Out of the 263 participants, 46 (18%) had never heard of the vaccine for HPV (Graph 2). An attempt was made to determine if

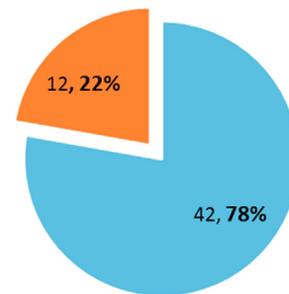
Table 1
Distribution of knowledge of HPV vaccine by age.

Age in years	Aware of the vaccine	Not aware of the vaccine	Total
18	1	0	1
19	28	10	38
20	73	13	86
21	63	14	77
22	46	3	49
23	5	5	10
24	0	1	1
25	1	0	1
Total	217	46	263

R-value = -0.037 and p = 0.54.



Graph 3. Proportion of vaccinated population among participants, n = 263.



Graph 4. Source of information among the vaccinated participated, n = 54.

age (and thus more years of medical training) has any correlation with knowledge of HPV vaccine. The correlation between age and knowledge about the presence of the HPV vaccine was found to be statistically insignificant, with the R-value of -0.037 and a p of 0.54 (Table 1).

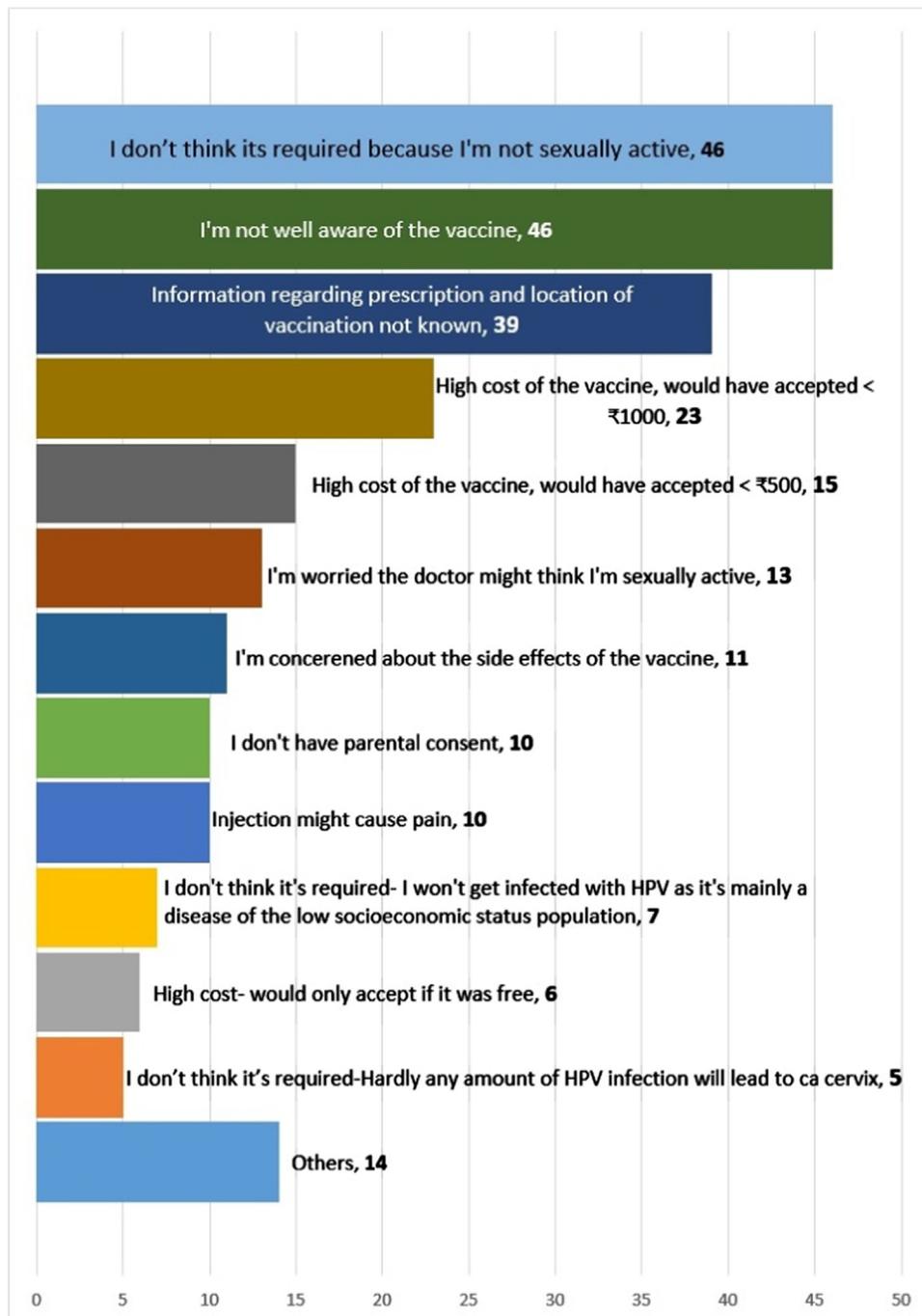
4.3. Vaccine recipient proportion of participants

25% of the participants who had heard about the vaccine had received the immunization. That leaves 79% of the total partici-

pants not vaccinated against HPV. The correlation between age and vaccination also was found to be statistically insignificant, with the R-value of 0.01 and p of 0.82 (Graph 3).

4.4. Source of information to the vaccine recipients

Majority of the vaccinated participants' source of information was their family/friends (78%), while the rest got the information through theory class/clinical posting/textbooks (22%). There was



Graph 5. Barriers in the vaccination of HPV (n = 163).

no statistically significant association between the source information and age with R-value of 0.12 and p of 0.40 (Graph 4).

4.5. Barriers to HPV vaccination

Among the non-vaccinated participants, the most common reason for rejection of the HPV vaccination was that they were not well informed of the vaccines (28%) and among those who were aware, the participants thought it was not required as they were not sexually active (28%). This was followed by a lack of knowledge as to where to get the vaccine and who should be approached (24%). Many participants also found that the vaccine was expensive (23%). They would have accepted the vaccine if the cost was less than 1000 rupees (14%) and cost less than 500 rupees (9%). The other common concern was that related to hesitancy to ask the gynaecologist for a vaccine that has attached sexual stigmata (8%). While some were worried about the side effects of the vaccine (7%), some did not have parental consent (or were reluctant in obtaining consent)–(7%) and some were confident that very few HPV infections will lead to cancer of the cervix. A few thought it was not efficacious (Graph 5).

4.6. Post-intervention acceptance

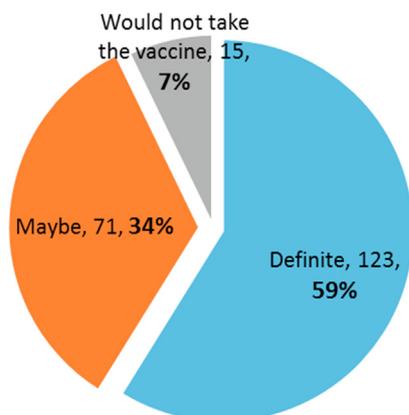
Following the intervention, 59% of the previously unvaccinated participants responded that they would definitely get vaccinated against HPV, while 34% of the participants were not sure, and 7% were still not willing to get vaccinated against HPV (Graph 6).

4.7. Barriers to HPV vaccination post-intervention

Among those who were not sure and denied the vaccine post-intervention, the predominant barrier was of the cost, some participants (30%) accepting only if the cost was below 1000 rupees/dose and some (26%) below 500 rupees/dose. Post-intervention, the cost barrier in 56% of the study population contrasts the 23% in pre-intervention assessment. Other barriers included participants were worried about the safety of the vaccine (10%) and the perception that HPV leads to cancer in only the low socioeconomic population (10%) (Graph 7).

5. Discussion

Attitude and barriers against any vaccine among healthcare providers should be assessed critically. They have multi-fold effect on the uptake of the vaccine as they are the key disseminators of vaccine-related information to the general population. It especially



Graph 6. Post intervention acceptance of vaccine, n = 209.

has a vital impact when the vaccine in question is optional. We report the barriers of HPV vaccination in medical students and an effective way to tackle the barriers.

None of the studies on HPV have documented the proportion of vaccinated participants among medical students. In our study, a meagre 21% of the participants were vaccinated against HPV. This is a matter of concern, as it is recommended for all females aged 9–26 years. Higher vaccination coverage cannot be expected from the general population, as observed with a study by Bruni et al. [19] where 1.1% of the total female population was immunized in low-income countries. An increase in this proportion will exponentially raise the uptake of the vaccine in the general population through patient education and counselling from the medical students. This reiterates the need for an intervention aiming at an increase in uptake of the vaccine.

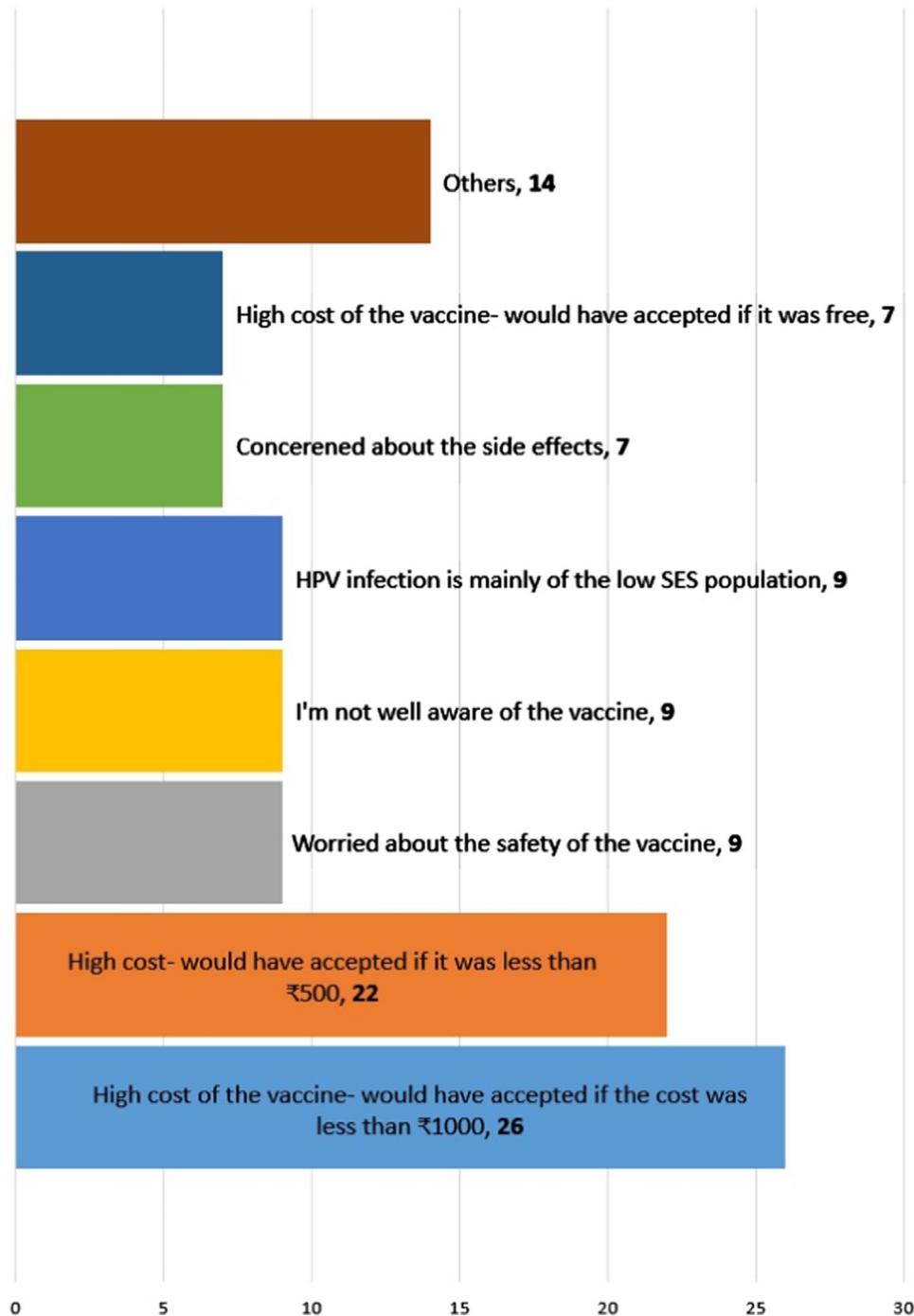
Many studies have addressed the pharmacological and clinical knowledge of HPV vaccine among medical students. Our study limits the information to knowledge about its presence. In the study by Pandey et al. [14], 15.2% of the participants were not aware of the vaccines, similar to the results by Mehta et al. [15], which reported 18%. A study by Muhammad et al. [17], conducted in South Africa reported 42.3% of the medical students being unaware of the presence of the HPV vaccine. In our study, 17% of the study population were unaware of the vaccine, concordant with other studies.

Source of information regarding the vaccine among recipients in a medical school indicates if medical training has an impact on knowledge and attitude towards HPV vaccine uptake. Since our study did not include a control group for this parameter, we consider a higher age as a marker for additional medical training. We found no correlation between the knowledge of HPV vaccine with age. Furthermore, most of the participants (78%) were familiarized about the vaccine through a family member/friend. In contrast, the study by Pandey et al. [14], reports show that 42.9% of the participants were informed through theory classes/clinical postings or textbooks.

Major barriers against HPV vaccination in medical students is the perception that they would not be victims of cervical cancer—either because they are not sexually active/HPV only infects the low socioeconomic population with poor hygiene/chances of HPV infection turning to cervical cancer is low. Being uninformed was the second most common concern, third being the high cost. This is concordant with results obtained by Pandey et al. [14], and Mehta et al. [15]. It is striking that the two most common barriers are amenable to change, justifying the positive results obtained post-intervention.

After the initial survey, a convenient intervention in the form of ‘information session’ was done. Lasting for about five minutes, it informed about the safety of the vaccine and information on how to get vaccinated, apart from a minimal theory information. This intervention is considerably more convenient as compared to individual counselling. In a study by Ramavath et al. [20], health talk followed by group discussion lasting for twenty minutes was done to assess the knowledge later on. An hour of lecture combined with a thirty-minute video was found to be useful by Hwang et al. [21], and a study by Cooper et al. [22] showed active participation by the audience improved the efficacy of the intervention. This might very well be required in the general population with lower knowledge and awareness about HPV, but might prove unnecessary in medical student population.

Following the intervention, a promising 59% of the non-vaccinated participants were willing to get vaccinated and a further 34% were yet to decide on the vaccination. This implies that an information session is an effective yet convenient way to tackle barriers. While this might be true in case of well-aware medical students, added measures may be necessary to mandate the HPV



Graph 7. Post intervention barriers to the HPV vaccine, n = 86.

vaccine in the national immunization schedule to improve uptake, as suggested by Gallagher et al. [23].

The HPV vaccine is not listed under the National Immunization Schedule (NIS), Ministry of Health and Family Welfare, Government of India. However, the vaccine is recommended for routine use in the schedule of Indian Academy of Paediatrics (IAP) 2014. The nation-wide inclusion of HPV vaccination in National Immunization Schedule lies on the judgment of a petition in India's apex court probing about its safety in the general population. With the support of WHO, HPV vaccination was first included in the Immunization program in November 2016 limited to two districts of Punjab. Sub-

sequently, 10,000 twelve-year-old girls in the government schools were vaccinated. This offers optimism for the universal coverage of the vaccine.

As predicted and concordant to most studies, [20] the most common cause of rejection of vaccine post-intervention is that of the cost and the participants would only accept if the cost of the vaccine was between 500 and 1000 rupees per dose. Since a majority of the participants would get vaccinated after the intervention, to focus on an effective intervention would prove favourable in increasing the uptake of vaccine among medical students despite its cost. It would not only eliminate the barriers and uptake among

medical students but also help in dissemination of information to their patients in the future.

6. Conclusion

In conclusion, several amenable barriers exist against HPV vaccination among medical undergraduates despite having good knowledge. This needs to be acted upon to increase uptake of the vaccine in the larger community. Till such time that HPV vaccination is included in the national immunization schedule, information session targeted at medical students would be beneficial.

Conflict of interest

The authors declared that there is no conflict of interest.

Acknowledgments

We thank all the students who took part in this study. The college administration of Kasturba Medical College, Mangalore deserves a special thanks for their support.

Appendix A

Questionnaire

Age:

Have you heard of the HPV vaccine?

- Yes
- No

Have you taken vaccination against the HPV?

- Yes
- No

If yes, how did you get to know about the vaccine?

- Through the professors in theory classes/clinical postings or textbooks
- Through a friend/family

If no, why? (Please tick one or more of the options below):

- I don't think it's required, because.
 - There's very less prevalence of the HPV infection, even if I'm infected, it hardly progresses to cervical cancer.
 - Cervical cancer is a disease mainly of the low socio-economic status so I won't get the infection.
- I am not well aware of the vaccine
- I am concerned about side effects of the vaccine.
- High cost of the vaccine- would have accepted if the cost was less than _____
- Injection may cause pain
- Not enough information available about the vaccine – where to get prescription, where to get the vaccine.
- Worried about safety of the vaccine
- I'm worried that the doctor might think I'm sexually active if I ask for the vaccine

Post intervention

Would you take the HPV vaccine?

- Yes- would get vaccinated soon
- No/ unsure, because- (Tick one or more options)
 - I don't think it's required, because-
 - There's very less prevalence of the HPV infection, even if I'm infected, it hardly progresses to cervical cancer.
 - Cervical cancer is a disease mainly of the low socio-economic status so I won't get the infection.
 - I am not well aware of the vaccine.
 - I am concerned about side effects of the vaccine.
 - High cost of the vaccine- would have accepted if the cost was less than _____
 - Injection may cause pain.
 - Not enough information available about the vaccine – where to get prescription, where to get the vaccine.
 - Worried about safety of the vaccine.
 - I'm worried that the doctor might think I'm sexually active if I ask for the vaccine.

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