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Original Research Article

## Human papilloma virus vaccination: knowledge, awareness and acceptability among medical and paramedical students

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### ABSTRACT

**Background:** Cervical cancer is the second leading cause of death in India. It is also one of the few malignancies where an infectious etiological agent, human papilloma virus (HPV), has been identified. With the advent of HPV vaccination, it is possible to reduce the morbidity and mortality associated with carcinoma cervix. But the biggest hurdle to achieve this is the lack of awareness about the availability and use of HPV vaccine. This study was conducted to know the knowledge and awareness of HPV infection and vaccination among medical and paramedical students. We also evaluated the acceptability and coverage of HPV vaccine among these students.

**Methods:** This study was conducted among a total of 520 female students of the Sri Dharmasthala Manjunatheshwara University with the help of a questionnaire. The study group included 207 MBBS students, 167 BDS students, 89 nursing students and 57 physiotherapy students.

**Results:** Most of the students were in the 18-20 years' age group. Nearly 40.57% of the students knew that HPV is sexually transmitted and 29.80% were aware that this infection can be prevented. Availability of HPV vaccine was known to 75% of the students and the main source of their information was through their college teachings. Nearly 43.75% of the students knew HPV vaccine protects against cervical cancer and 26.73% of the students were vaccinated. Overall knowledge and awareness were better among medical students.

**Conclusions:** A lot of work needs to be done so as to make the target population accept HPV vaccine. There is a great difference between awareness of availability of the vaccine and its use. This emphasizes the need for health care professionals to take special interest in promoting this vaccine in the general population.

**Keywords:** Acceptability, Awareness, Carcinoma cervix, Human papilloma virus, Human papilloma virus vaccination, Medical students, Paramedical students, Prevention

### INTRODUCTION

Malignancies are emerging as the second leading cause of death worldwide and globally deaths due to cancer has increased by 17.0% between 2005 and 2015.<sup>1</sup> Burden of cancer was 17.5 million cancer cases, 8.7 million deaths, and 208.3 million disability adjusted life years (DALYs) in the year 2015.<sup>2</sup> Up to 60 per cent of total cancer cases are preventable and nearly 15% of all cancers are due to infective origin.<sup>3</sup> Success in prevention of malignancies

would lead to reduction in morbidity and mortality related to the disease. Awareness regarding the availability of preventive measures remains the missing link in the widespread use of preventive modalities resulting in effective prevention.

India has the highest burden of carcinoma cervix. At an incidence of 22 per 100,000 women per year, it is higher compared to that of the rest of the world being 14 per 100,000.<sup>4</sup> Cervical cancer is the second leading cause of

cancer in India and is also the second common cause of death due to cancer among women in India.<sup>5</sup> Every year 1,34,420 new cases are detected and causes death among 72,825 women which is predicted to increase to 1,82,027 and 1,01,362 by 2020 respectively.<sup>6</sup> India accounts for 15.2% of the total cervical cancer deaths in the world.<sup>7</sup> The age standardized rate for DALY was 466 with 428 accounting for years of life lost and 37 years of life lived with disability.<sup>5</sup> Compared to any other malignancy carcinoma cervix is the leading cause of premature deaths among women in India.<sup>5</sup>

There is a population of 453.02 million of women aged 15 years and above who are at the risk of developing cervical cancer in India.<sup>5</sup> Indian women have a cumulative lifetime risk of 2.5% for developing cervical cancer and 1.4% cumulative lifetime risk of death due to cancer cervix.<sup>8</sup>

Carcinoma cervix is one of the few malignancies where an etiological agent has been identified and also vaccination against the same is available. High risk strain of human papilloma virus (hrHPV) has been identified as the etiological agent. Oncogenic HPV s cause nearly 100% of cervical cancer.<sup>9</sup> HPV is one of the most common causes of sexually transmitted diseases.<sup>10</sup> It has been estimated that more than 80% of the sexually active women acquire HPV infection by 50 years of age.<sup>11</sup> The highest prevalence of infection is seen in women soon after the onset of sexual activity. It is found that any given point 5% of women are found to be infected with HPV.<sup>5</sup>

Among all the serotypes of HPV, 18 serotypes have been identified as the high-risk ones. Of these HPV 16 and 18 are the ones commonly found in carcinoma cervix with HPV 16 being the commonest. Together they contribute to over 70% of all cervical cancers worldwide.<sup>12</sup> Studies from India also show the prevalence of HPV among 87.8-96.67% of women with cervical cancer and 9.9-36.8% among women with no cancer.<sup>13</sup> In India HPV 16 was found in 66.7%, HPV 18 in 19.4%, HPV 33 in 5.6% and HPV 35 in 5.6% of the cases. Other high-risk types HPV 45,52,58,59 and 73 was found in less 5% of the cases.<sup>14</sup>

Vaccination against high risk HPV types play an important role in preventing carcinoma cervix as this is the only medical method available. HPV infection cannot be prevented by any other method except by abstinence and lifetime mutual monogamy.<sup>8</sup> Also HPV infections are asymptomatic. Genital HPV is ubiquitous with a lifetime risk for HPV infection being 50-80%.<sup>15</sup> Natural infections with HPV induces a weak immune response which may not be protective whereas vaccination results in a strong immune response.<sup>16</sup> Although the impact of vaccination on cancer cervix is awaited, countries which have introduced HPV immunization program have reported reduction in prevalence of vaccine type HPV infections.<sup>9</sup> Herd immunity and cross-protection are known to augment the impact of vaccine.

India has not yet introduced HPV vaccination in the national immunization program. Vaccination is voluntary and as such depends on the awareness regarding its availability and advantages. Widespread coverage is also hampered by the cost and bias regarding side effects of vaccination.

This study is undertaken to assess the knowledge of HPV infection and vaccination among medical and paramedical students. We have also assessed the acceptability of HPV vaccine among them.

## METHODS

A cross sectional observational study was conducted over a period of 2 months from April 2019 to May 2019. This study was conducted at the colleges affiliated to the Sri Dharmasthala Manjunatheshwara University Sattur Dharwad, Karnataka India. This study was conducted among a total of 207 MBBS students, 167 BDS students, 89 nursing students and 57 physiotherapy students. For the purpose of convenience students were grouped as Group A (MBBS), Group B (BDS), Group C (Nursing) and Group D (Physiotherapy). Inclusion criteria was female students studying medicine, dentistry, nursing and physiotherapy in all academic sessions. Males and post-graduate students were excluded. The study was done using a common questionnaire (Table 1).

**Table 1: Questionnaire.**

Age	Education
1.1	Is HPV infection sexually transmitted?
1.2	Can HPV infection be prevented?
1.3	How can the infection be prevented?
1.4	What is the risk associated with persistent HPV infection?
2.1	Do you know about HPV vaccine?
2.2	What is the source of your information?
2.3	Against which disease is the vaccine given?
2.4	What is the ideal time and age for this vaccination?
2.5	How many doses are to be given?
3.1	Have you been vaccinated?
3.2	If no why?
3..3	Do you want to get vaccinated and will you recommend this vaccine to your family and friends?

With this questionnaire information regarding demographic details of the students, their knowledge regarding HPV infection and vaccination were collected. Completed questionnaire was collected back from the students after the allotted time. Ethical approval was obtained from the institution's Human ethical committee. Difference in knowledge among medical and paramedical students was assessed.

**Statistical analysis**

Statistical analysis was done with percentages and compared with chi-square test. A P-value of < 0.05 was considered significant.

**RESULTS**



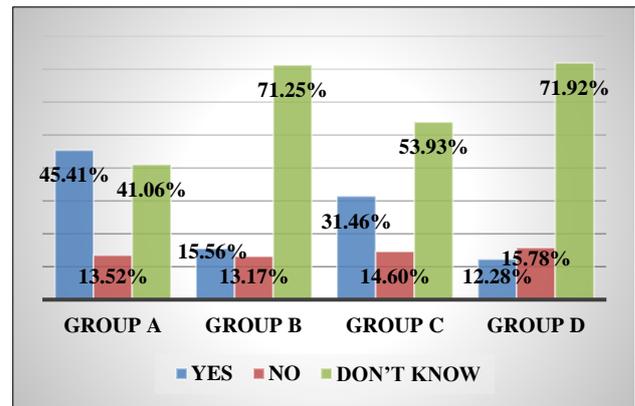
**Figure 1: Knowledge if HPV infection sexually transmitted.**

A total of 520 students were included in the study, which included 207 MBBS students, 167 BDS students, 89 nursing students and 57 physiotherapy students. Majority of the students 219 (42.11%) belonged to 18- 20 years' age group. There were 214 (41.15%) participants' in >20-22 years' age group and 87 (16.73%) were aged above 22 years.

**Knowledge about HPV infection**

*Is HPV infection sexually transmitted?*

Nearly half in Group A 109 (52.65%) knew that HPV infection is sexually transmitted. This was in contrast with the fact that in all other 3 groups this awareness was less than 50% (Figure 1). Most of the students 123 (73.65%) in Group B, 47 (52.80%) in Group C and 41 (71.92%) in group D did not know that HPV infections are sexually transmitted. The difference in this knowledge among medical and paramedical students was 109 (52.65%) and 102 (32.58%) respectively. The P-value was <0.00001 and was statistically significant. Overall awareness was 40.57%.



**Figure 2: Awareness if HPV infection can be prevented.**

**Table 2: Methods available for prevention of HPV infection among students who knew HPV infection can be prevented.**

Methods	Group A (94)	Group B (26)	Group C (28)	Group D (7)
Vaccination	39 (41.48%)	13 (50%)	15 (53.57%)	4 (57.14%)
Condoms	13 (13.82%)	7 (26.92%)	9 (32.14%)	3 (42.85%)
Avoid multiple sexual partners	24 (25.53%)	6 (23.07%)	3 (10.71%)	0
Delayed onset of sexual activity	18 (19.14%)	0	1 (3.57%)	0

*Can HPV infection be prevented?*

In Group A 94 (45.41%) students replied that HPV infection can be prevented, whereas 26 (15.56%) in Group B, 28 (31.46%) in Group C and 7 (12.28%) in Group D were aware that HPV infections can be prevented (Figure 2). Again, here P-value for difference in knowledge among medical and paramedical students was calculated and the P-value was < 0.00001 which was statistically significant.

*How can the infection be prevented?*

Only 71 (13.65%) of all the students knew that HPV infection can be prevented with vaccination (Table 2).

Students in Group A were better aware about this than students in other 3 groups. Among all the students in each group vaccination as the mode of prevention was known to 39 (18.84%) in Group A, 13 (7.78%) in Group B, 15 (16.85%) in Group C and 4 (7.01%) in Group D.

*What is the risk associated with persistent HPV infection?*

Persistent HPV infection would lead to carcinoma cervix was replied by 86 (41.54%) Group A students, 28 (16.76%) students of Group B, 33 (37.07%) in Group C and 12 (21.05%) in Group D. More than 50% of students in all the 4 groups did not know that persistence of HPV infection resulted in carcinoma cervix. There were 86

(41.54%) medical and 73 (23.32%) paramedical students who were aware that persistent infection would lead to cancer cervix. The P-value here was < 0.00001 which was statistically significant.

Overall knowledge about HPV infection was better among students in Group A followed by Group C.

**Knowledge about HPV vaccination**

*Do you know about HPV vaccine?*

Majority of students in Group A 176 (85.02%) and 69 (77.52%) in Group C were aware of the availability of HPV vaccine. This awareness was slightly lower in Group B 64 (38.32%) and 32 (56.14%) in Group D. The P-value was calculated to be <0.00001 which was statistically significant. Overall awareness about the availability of vaccine was 65.57% (Figure 3).

Group B was lagging in their information about the availability of HPV vaccine. The knowledge in this area among the other 3 groups was above 50%.



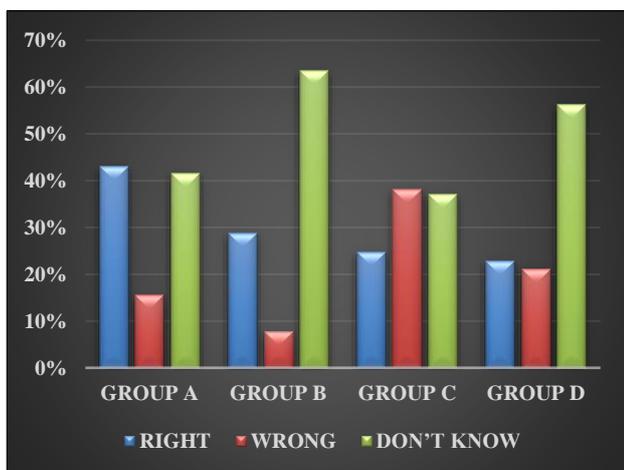
**Figure 3: Awareness about the availability of HPV vaccine.**

**Table 3: Source of Information among students who knew about HPV vaccine.**

Source of information	Group A (176)	Group B (64)	Group C (69)	Group D (32)
Professional college books and teachers	146 (82.95%)	42 (65.62%)	58 (84.05%)	16 (50%)
Internet	18 (10.22%)	21 (32.81%)	11 (15.94%)	14 (43.75%)
Newspaper and television	3 (1.7%)	1 (1.5%)	0	1 (3.12%)
Parents	7 (3.9%)	0	0	0
Friends	2 (1.13%)	0	0	1 (3.12%)

**Table 4: Against which disease is HPV vaccination given.**

Disease	Group A (207)	Group B (167)	Group C (89)	Group D (57)
Carcinoma cervix	87 (42.02%)	24 (14.37%)	28 (31.46%)	22 (38.59%)
HPV infection	25 (12.07%)	19 (11.37%)	16 (17.97%)	3 (5.26%)
Sexually transmitted diseases	59 (28.50%)	4 (2.3%)	19 (21.34%)	5 (8.77%)
Genital warts	0	14 (8.38%)	0	0
Don't know	36 (17.39%)	106 (633.47%)	26 (29.21%)	27 (47.36%)



**Figure 4: Knowledge about the ideal age for vaccination.**

*What is the source of your information?*

Majority of the students 146(82.95%) in Group A, 42(65.62%) in Group B, 58(84.05%) in Group C and 16(50%) in Group D came know of this vaccine after learning about it in the college and also from their teachers and clinicians. Internet, newspapers, television, parents and friends were other sources of information (Table 3).

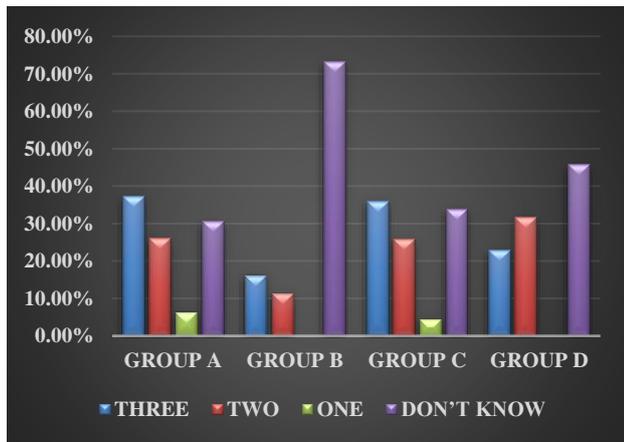
*Against which disease is this vaccine is given?*

There were 112 (54.10%) students in Group A who replied that the vaccine is given against carcinoma cervix and HPV infections. In Group B 43 (25.74%) students, 44 (49.94%) in Group C and 25 (43.85%) in Group D were aware that the vaccine was given against carcinoma cervix and HPV infections. Again, here Group B seems

to be the least informed group. The P-value for difference among medical and paramedical students was 0.001342 which was statistically significant (Table 3).

*What is the ideal time and age at which this vaccine is to be given?*

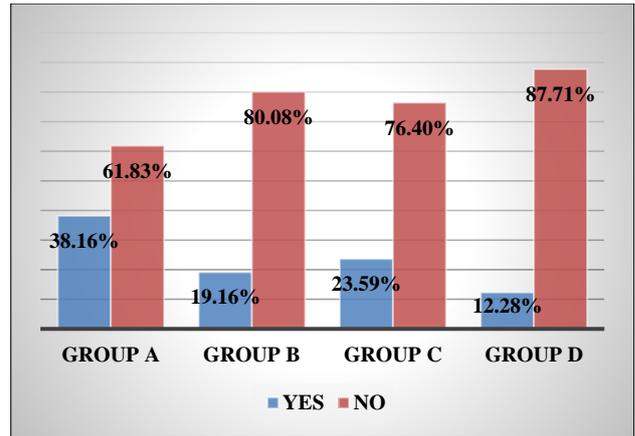
Again, students of Group A were better informed regarding this with 89 (42.99%) of them answering correctly whereas 48 (28.74%) in Group B, 22 (24.71%) in Group C and 13 (22.80%) in Group D knew the ideal time for the vaccination correctly. Among the students in all the groups who answered correctly only some knew that it has to be given before the onset of sexual activity (Figure 4).



**Figure 5: Number of doses of the vaccine required.**

*How many doses of this vaccine needs to be given?*

In Group A 77 (37.19%) followed by 32 (35.95%) in Group C knew 3 doses of vaccine is to be given. Only 27 (16.16%) in Group B and 13 (22.80%) in Group D were aware of the correct dose of the vaccine. All the remaining students didn't know right dose of the vaccine. Awareness was much better in Group A followed by Group C. Group B was least informed among the 4 groups (Figure 5).



**Figure 6: Percentage of students who were vaccinated.**

**Attitude and acceptability**

*Have you been vaccinated?*

Overall 139 (26.73%) of the students were vaccinated, the coverage being just above 25%. In Group A 79 (38.16%) students were vaccinated, followed by Group C 21 (23.59%), Group B 32 (19.16%) and Group D 7 (12.28%). There were 79 (38.16 %) medical and 60 (19.16%) paramedical students who were vaccinated and P-value was <0.00001 which was statistically significant (Figure 6).

*If not why?*

Lack of awareness about the vaccine was the most important reason for not being vaccinated in 179 (46.98%) of all the students. There were 23 (17.96%) students in Group A were not vaccinated as they were sexually inactive. Some other reasons were high cost of the vaccine and was thought to be unnecessary. Some students responded that they were not recommended to be vaccinated (Table 5).

**Table 5: Reasons for not being vaccinated.**

Reasons	Group A (128)	Group B (135)	Group C (68)	Group D (50)
Lack of awareness	31 (24.21%)	103 (77.77%)	20 (29.41%)	25 (50%)
Not sexually active	23 (17.96%)	5 (3.7%)	2 (2.94%)	0
Unnecessary	18 (14.06%)	12 (8.88%)	2 (2.94%)	4 (8%)
Not recommended	25 (19.53%)	0	8 (11.76%)	2
Expensive	2 (1.56%)	0	0	0
No reason	29 (22.65%)	15 (11.11%)	36 (52.94%)	19 (38%)

*Will you get vaccinated and will you recommend this vaccine to your friends and family?*

All the students in all the groups wanted to be vaccinated. All students replied that they would recommend this vaccine to their family and friends.

## DISCUSSION

This study was aimed at knowing the awareness and acceptability of HPV vaccination among female students in medical and various paramedical courses. HPV vaccination and routine screening with pap smear has been documented to have a great potential in reducing the incidence of carcinoma cervix there by reducing the economic and health burden to the society. Many developed countries have been able to achieve almost complete coverage. In India carcinoma cervix still continues to be a major health problem as screening is not universal and awareness about the same is limited. Despite the HPV vaccine being available since long the uptake of HPV vaccine among the Indian population is low. This is a major concern as missing out on vaccination would mean a great opportunity for preventing cancer cervix is being lost. The potential of the vaccine to prevent HPV infection is maximum when it is given before onset of sexual activity. It has been estimated that if 70% of Indian target population (adolescent girls) are vaccinated there will be more than 50% reduction in mean lifetime risk for cancer.<sup>17</sup> It has also been found to be cost effective when DALYs averted were calculated and also in a modeled scenario has been shown to prevent 2 million future deaths among women vaccinated in their adolescence.<sup>17</sup> It has been found that female-only vaccination is cost effective when compared with Pap smear screening in preventing precancerous lesions and cervical cancer.<sup>18</sup> In India where the infrastructure for Pap smear screening is not well-developed vaccination would be ideal choice as it can be incorporated with the rest of the immunization schedule.

HPV vaccination protects against cervical pre cancer in adolescent girls and women between 15-26 years of age. There is reduction in CIN2+, CIN3+ and AIS. This protection is higher in individuals who are negative for hrHPV and HPV.<sup>16,18</sup> Vaccination in women between 25-45 years, the effect on pre cancer is smaller, as they would be already exposed to HPV and vaccination wouldn't clear the infection.<sup>19</sup>

With the present study we found that the overall awareness of HPV infection was better among medical students and most important source of information was medical college teaching. Nearly 40.57% of the students knew that it is a sexually transmitted infection in comparison with the study by Sumita et al where 38% of the students responded that HPV is sexually transmitted.<sup>20</sup> But this finding was in contrast to the study by Idowu et al where this awareness was 78.4% and study by Das N et al also found that 91.5% of the respondents knew that HPV was sexually transmitted.<sup>21,22</sup> Persistent HPV as a cause for carcinoma cervix was known to 30.57% of the students. A study by Pandey et al found that 89.2% of the students knew that HPV infection was the etiological agent for carcinoma cervix.<sup>23</sup>

Availability of HPV vaccine was known to 65.57% of the students. A study by Das N et al found that 75% of the students knew about the availability of vaccine.<sup>22</sup> The present study found that 30.96% of the students knew that this vaccine is given against carcinoma cervix. A study by Swarnapriya K et al showed that 60.1% of the respondents knew that HPV vaccine protects against cervical cancer.<sup>24</sup>

In the present study 26.73% of the students were vaccinated. This was higher when compared with studies by Sarnapriya et al and Sunite GA et al where vaccination coverage was 6.8% and 5.5% respectively.<sup>24,25</sup> In the present study 73.26% of the students were not vaccinated and the chief reason for which was lack of awareness in 46.98% of the students. This finding is similar to the studies done by Sunite et al.<sup>25</sup> In the study done by Nivedita et al high cost of the vaccine was the reason for not being vaccinated.<sup>22</sup> All the students who were not vaccinated were willing to get vaccinated in the present and they were also willing to recommend it to their family and friends in the present study. In the study done by Swarnapriya et al 48.54% of the participants were not keen on getting vaccinated.<sup>24</sup> Nivedita et al reported that 83% of respondents were willing to get vaccinated but 9% felt that vaccination would lead to promiscuity.<sup>22</sup>

The finding of the present study was contrasting with studies done in some of the developing countries where nearly 67% were vaccinated and 95% of women and 80% of men were aware that it was against cervical cancer.<sup>26</sup> In the present only 30.96% were aware that this vaccine is protective against cervical cancer.

The limitation of this study is that the study population are students associated with medical field. As was noted it was found that the main source of information for these students were their study materials and it's obvious that their knowledge would be better than the general population. Systematic review by Thulaseedharan et al highlights this striking reduction in knowledge in the general population where the awareness about pap smear was 3.5-9.7% and majority were unaware about HPV vaccine.<sup>27</sup> A study by Madhivanan P et al parents of adolescents had very poor knowledge about HPV and its relation to cervical cancer.<sup>28</sup> A systematic analysis found that 13-75% of the parents were willing to vaccinate their daughters.<sup>27</sup>

As noted from this study there is a difference in the awareness of the availability of HPV vaccine and its coverage. Nearly 43.75% of the students knew that this vaccine is protective against cervical carcinoma but only 26.73% of them were vaccinated. This shows that there is lack of encouragement and guidance to be vaccinated. They have just gained knowledge from their books and classroom teaching but have some inhibitions in being vaccinated. But the most promising finding from this study was that all the students were willing to get vaccinated after the study. We have distributed

information leaflets after collecting the questionnaire from the students. This was aimed at improving their knowledge of HPV infection and uses of HPV vaccination.

The main goal in achieving high vaccine coverage is to educate the parents of the adolescent students who are attending primary and high school about the vaccine. This is the age where vaccination gives maximum protection, before their sexual debut.

A study by Hussain S et al showed that 15% of students knew about cervical carcinoma among whom 73% knew it was due to HPV infection. In the same study it was also noted that only 13% of parents were willing to vaccinate their children but 63.6% of students were willing to be vaccinated. This study involved students less than 18 years also.<sup>29</sup> This was in contrast with the findings by Jessica et al where 79% of the parents and 82% of physicians were willing to vaccinate.<sup>30</sup>

Another study from Netherlands by Lenselink et al, showed that 29.5% had ever heard of HPV, and 14.3% parents knew HPV is related to cervical cancer and 87.9% were willing to vaccinate their children.<sup>31</sup> In a study done by Saha et al among students of 4 women's colleges in Kolkata it was noted that awareness about cancer cervix was very low and only 15% of them were familiar with cancer cervix.<sup>32</sup>

Indian parents are less interested in vaccinating their children and hence the vaccine coverage in the target population is not up to the required level. There are various prejudices against vaccination among the parents. Common barriers as reported by Paul P et al were side effects, vaccine cost, and missing work to receive vaccine. Parents were strongly influenced by healthcare providers' recommendations.<sup>33</sup> Periodic reinforcement of awareness in the form health camps by health care professionals among school students and their parents would improve the vaccine uptake. The aim should be that at least all girls are vaccinated before their sexual debut.

## CONCLUSION

There is large gap to be filled in order to improve the awareness about HPV vaccination. Research in field of disease prevention has armed us with the potential of being able to eradicate carcinoma cervix. But this requires that every child needs to be vaccinated and every mother needs to be screened. The onus of this lies with the health care providers to be able motivate the eligible clients for vaccination and screening.

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