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Knowledge, awareness and attitude about human papilloma virus infection and its vaccine among medical students in West Bengal

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ABSTRACT

Background: HPV infection is commonly found in the anogenital tract of men and women with and without clinical lesions. The aetiological role of HPV infection among women with cervical cancer is well-established, and there is growing evidence of its central role in other anogenital sites. The key to preventing human papillomavirus (HPV) infection is education and immunization of youth. We investigated the awareness and knowledge of HPV infection/HPV vaccine and potential acceptability to HPV vaccine and explore the acceptability of vaccination among the medical students in West Bengal. **Methodology:** A cross sectional study was conducted in Jan-Feb 2019 to know the level of knowledge, awareness and attitude about various aspects of HPV infection and vaccine among medical students in two different medical colleges of West Bengal. There were 200 medical students between 18-25 years who participated in the study, out of which 137 were males and 63 were females. A self-administered questionnaire designed for the study was given to the students. Students were educated on the purpose of the study and contents and completion of questionnaire. **Results:** Majority of the students were well aware of the viral etiology of cervical cancer. The survey sample consisted of 200 medical students aged between 18-25 years with a mean age of 21.8 ± 1.57 years. There were 133 (66.5%) males and 67 (33.5%) females studying in second or third year of M.B.B.S and all of them were unmarried. Almost all the students heard about of HPV. Majority of the students (52%) thought lack of access and knowledge was the most important obstacle for receiving HPV vaccination followed by doubt about effectiveness. The most common source of information for our study population was teachers and textbooks (94%) followed by classroom teaching 43.5%. Other sources of information include internet (31%), news papers and television (10.5%) and friends (4.5%). Majority of the study group (99%) like to update their knowledge by experts. About 14.2% of our study participants had been questioned by friends and relatives regarding HPV vaccination. **Conclusion:** To conclude gaps in knowledge regarding HPV infection and vaccination existed amongst the medical students and a more integrated teaching regarding HPV carcinogenesis, vaccination and cervical cancer needs to be introduced.

Keywords: Human papilloma virus infection, HPV vaccine, Cervical cancer, Awareness and knowledge, Medical students

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INTRODUCTION

The human papillomavirus (HPV) is a DNA tumor virus that causes epithelial proliferation at cutaneous and mucosal surfaces. It is the most common sexually transmitted viral infection and studies estimate that globally 50-80% of ever sexually active men and women are infected with the virus at least once during their lifetimes.[1,2] HPVs have been classified into low and high risk types depending on their oncogenic

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potentials. Anogenital infections with high-risk HPV types (types 16, 18, 31, 33, 34, 35, 39, 45, 51, 52, 56, 58, 59, 66, 68, and 70) predispose men and women to the development of preinvasive and invasive disease in cervix, vulva, anus and penis.[3] Infection with oncogenic human papillomavirus (HPV) types is the primary cause of cervical cancer, the second most common cancer among women worldwide.[4] Cervical cancer is one of the leading causes of death among women in India. The estimated age-standardized incidence rate was 22.9/100,000 women in 2012. India contributed to one-fourth of the global burden of cervical cancer in 2000. [5]There are two types of HPV vaccines, bivalent and quadrivalent; both are licensed and available in India. The vaccines are already in use in the private sector. However, HPV vaccine is yet to be included in the immunization programme in India. [6]Quadrivalent vaccine protects against four HPV types (6, 11, 16 and 18) and the bivalent vaccine protects against two HPV types 16 and 18.[7] A recently introduced nonavalent (nine valent) vaccine protects against five HPV types 31, 33, 45, 52 and 58 in addition to the types covered in quadrivalent vaccine. All three available vaccines (bivalent, quadrivalent, and nonavalent) are administered intramuscularly. [8] The recently approved quadrivalent (types 6, 11, 16, and 18) HPV vaccine targets the HPV strains responsible for approximately 70% of cervical cancers and 90% of genital warts. It is also effective in reducing the incidence of HPV-related conditions, including cervical intraepithelial neoplasia (CIN) grades I, II, and III; adenocarcinoma in situ (AIS); vulvar and vaginal neoplasia; and genital warts, especially when given prior to exposure to HPV.[1]The HPV virus is transmitted through direct skin-to-skin contact. Although infection is most often spread through penetrative vaginal or anal intercourse, other types of sexual contact can transmit HPV, and infection has been reported in self-reported "virgins.''[1]

MATERIAL AND METHOD

A cross sectional study was conducted in Jan-Feb 2019 to know the level of knowledge, awareness and attitude about various aspects of HPV infection and vaccine among medical students in two different medical colleges of West Bengal. There were 200 medical students between 18-25 years who participated in the study, out of which 137 were males and 63 were females. A self-administered questionnaire designed for the study was given to the students. Students were educated on the purpose of the study and contents and completion of questionnaire. They were told that the data was confidential and for research purpose only. Verbal consent was taken from the participants. The returned questionnaires were checked for completeness and consistency. The participants were assured of anonymity and confidentiality and were requested to complete questionnaire regarding HPV infections and HPV vaccine. Improperly filled questionnaires are excluded. A total of 200 questionnaires were used for analysis. Data entry and analysis of results was done using Microsoft Excel[Table 1].

RESULTS

Table 1: Knowledge and awareness about HPV virus, infection and risk factors [n=200]

1. What is the HPV? a) Virus b) Bacteria c) Fungus d) Others e) Don't Know	 a) 100% b) 0 c) 0 d) 0 e) 0
2. What is the transmission route of HPV? a) Sexual transmission b) Mother to newborn transmission c) Transplacental transmission d) Others e) Don't Know	 a) 196 (98%) b) 41 (20.5%) c) 37 (18.5%) d) 2 (1%) e) 2 (1%)
3. Can the HPV virus cause cervical cancer? a) Yes b) No c) Don't Know	 a) 188 (94%) b) 7 (3.5%) c) 5 (2.5%)
4. High-risk HPV is more likely to cause cancer. Which one? a) Cervical cancer b) Oral cancer c) Anal cancer, d) Vulvar and vaginal cancers in women	 a) 188 (94%) b) 3 (1.5%) c) 3 (1.5%)

e) Penile cancer in men f) Others	d) 76 (38%) e) 02 (1%) f) Nil
5. What are the main hazards of HPV infection for female?	a) Cervical, vulvar, vaginal, and anal cancer 49 (24.5%) b) Genital warts (condyloma acuminata) 186 (93%) c) Cervical intraepithelial neoplasia (CIN) and Cervical adenocarcinoma *in situ* 87(43.5%) d) Vulvar intraepithelial neoplasia (VIN) 37 (18.5%) e) Vaginal intraepithelial neoplasia (VaIN) 23 (11.5%) f) Anal intraepithelial neoplasia 11 (5.5%)
6. What are the main hazards of HPV infection for male?	a) Anal cancer 13 (6.5%) b) Genital warts (condyloma acuminata) 111 (55.5) c) Anal intraepithelial neoplasia (AIN) 19 (9.5%)
7. Do you know the carcinogenic strains of HPV?	Specific strains 117 (58.5%) Don't Know 83 (41.5%)
8. Does HPV cause genital warts in women? a) Yes b) No c) Don't Know	 a) 188 (94%) b) 9 (4.5%) c) 3 (1.5)
9. Risk factors of cervical cancer include (a) Cervical infections including HPV, Chlamydia infection (b) Early age at first coitus (c) Multiparity (d) Family history (e) Poor hygiene (f) Smoking (g) Long-term use of oral contraceptives (birth control pills) (h) Being younger than 17 at your first full-term pregnancy (i) Being overweight	 a) 167 (83.5%) b) 33 (16.5%) c) 11 (5.5%) d) 88 (44%) e) 83 (41.5%) f) 32 (16%) g) 19 (9.5%) h) 68 (34%) i) 11 (5.5%)
10. Technique for detection of HPV (a) pap smear (b) blood investigations (c) PCR	 a) 188 (94%) b) 27 (13.5%) c) 19 (9.5%)
11. Is Cervical cancer preventable a) Yes b) No c) Don't Know	 a) 126 (63%) b) 65 (32.5%) c) 9 (4.5%)

The survey sample consisted of 200 medical students aged between 18-25 years with a mean age of 21.8 ± 1.57 years. There were 133 (66.5%) males and 67 (33.5%) females studying in second or third year of M.B.B.S and all of them were unmarried. Almost all the students heard about of HPV. According to 198 (96%) students, HPV infection spreads by sexual route but 41 (20.5%) said that it only spreads mother to newborn transmission. Eighty four percent of them answered that all cases of HPV infections progress to cervical cancer and 38% replied it may cause vulval and vaginal cancers in women. As replied by the participants the main hazards of HPV infections among women may be cervical, vulvar, vaginal, and anal cancer 49 (24.5%), genital warts (condyloma acuminata) 186 (93%), cervical intraepithelial neoplasia (CIN) and cervical adenocarcinoma *in situ* 87(43.5%), vulvar intraepithelial neoplasia (VIN) 37 (18.5%), vaginal intraepithelial neoplasia (VaIN) 23 (11.5%), anal intraepithelial neoplasia 11 (5.5%). HPV infections among men may cause anal cancer 13 (6.5%), genital warts (condyloma acuminata) 111 (55.5%), and anal intraepithelial neoplasia (AIN) 19 (9.5%). About 58.5% participants had recalled the carcinogenic strains of HPV. Students answered that the main risk factors of cervical cancer include cervical infections including HPV, chlamydia infection 167 (83.5%), family history88 (44%), poor hygiene 83 (41.5%) and being younger than 17 at your first full-term pregnancy 68 (34%) etc. About 126 (63%) participants answered that cervical cancer is preventable whereas 65 (32.5%) replied negative [Table 1].

Table 2: Attitude and knowledge of medical students towards HPV vaccination [n=200]

1. Vaccine prevents other cancer	
a) Yes	a) 132 (66%)
b) No	b) 62 (31%)
c) Don't Know	c) 6 (3%)
2. Vaccine prevent STDs	
a) Yes	a) 121 (60.5%)
b) No	b) 68 (34%)
c) Don't Know	c) 11(6.5%)
3. Is the HPV vaccine available in India?	
a) Yes	a) 176 (88%)
b) No	b) 17 (8.5%)
c) Don't Know	c) 7 (3.5%)
4. Is HPV vaccine part of a national program?	
a) Yes	a) 78 (39%)
b) No	b) 89 (44.5%)
c) Don't Know	c) 33 (16.5%)
5. Can HPV vaccine be given to sexually active women?	
a) Yes	a) 189 (94.5%)
b) No	b) 9 (4.5%)
c) Don't Know	c) 2 (1%)
6. Is Cervical cancer preventable	
a) Yes	a) 126 (63%)
b) No	b) 65 (32.5%)
c) Don't Know	c) 9 (4.5%)
7. Age at which HPV vaccine should be given	a) 33 (16.5%)
(a) 0-10 yrs	b) 156 (78%)
(b) 11-30 yrs	c) 11 (5.5%)
(c) 31-50 yrs	
8. Number of HPV vaccine doses required for protection	
(a) one	a) 68 (34%)
(b) two	b) 121 (60.5%)
(c) three	c) 11 (4.5%)
(d) four	d) 00
9. The types of HPV vaccine available are	a) 29 (14.5%)
(a) bivalent	b) 43 (21.5%)
(b) quadrivalent	c) 115 (57.5%)
(c) both	d) 13 (6.5%)
(d) don't know	
10. Schedule of HPV quadrivalent vaccine is	a) 47 (23.5%)
(a) 0, 1 & 6 months	b) 83 (41.5%)
(b) 0, 2 & 6 months	c) 51 (25.5%)
(c) 1, 2 & 6 months	d) 19 (8.5%)
(d) don't know	
11. The route of administration of vaccine is	a) 123 (61.5%)
(a) intramuscular	b) 61 (30.5%)
(b) subcutaneous	c) 00
(c) intravenous	d) 16 (8%)
(d) intradermal	
12. The site of vaccination is	
(a) deltoid region of the upper arm	a) 127 (63.5%)
(b) higher anterolateral area of the thigh	b) 57 (28.5%)
(c) gluteal region	c) 16 (8%)
(d) forearm	d) 0
(e) don't know	e) 0
13. The dose of vaccine is	
(a) 0.1 ml	a) 57 (28.5%)
(b) 0.5 ml	b) 108 (54%)
(c) 1.0 ml	c) 35 (17.5%)

14. Cervical cancer protection provided by HPV vaccine is (a) 91-100% (b) 71-90 % (c) 51-70% (d) 31-50% (e) 10–30 % (f) Don't Know	a) 48 (24%) b) 27 (13.5%) c) 67 (33.5%) d) 28 (14%) e) 12 (6%) f) 18 (9%)
15. Is it safe to have multiple sex partners after full course of HPV vaccine? (a)Yes (b) No (c) Don't know	a) 17 (8.5%) b) 176 (88%) c) 7 (3.5%)
16. Would you like to receive HPV vaccine? (a) Yes (b) No (c) Don't know	a) 53 (26.5%) b) 136 (68%) c) 11 (5.5%)
17. Who are eligible to take HPV vaccine? (a) girls and women 9 through 26 years of age (b) boys and women 9 through 26 years of age (c) both male & female 9 through 26 years of age (d) At any age (e) Don't know	a) 108 (54%) b) 27 (13.5%) c) 62 (31%) d) 03 (1.5%) e) 0
18. Should only adolescent/pre-adolescent girls take HPV vaccine? (a) Yes (b) No (c) Don't know	a) 178 (89%) b) 18 (9%) c) 04 (2%)
19. Are you vaccinated for HPV? (a) Yes (b) No (c) Don't know	a) 13 (6.5%) b) 177 (88.5%) c) 10 (5%)
20. Do you know the names of HPV vaccines? (a) Yes (b) No	a) 19 (9.5%) b) 181 (90.5%)
21. What is the reason preventing you to receive or advice HPV vaccination? (a) High cost (b) Side effects (c) Doubt about effectiveness (d) Lack of access & knowledge	a) 9 (4.5%) b) 11 (5.5%) c) 67 (33.5%) d) 113 (56.5%)
22. Is the persistent HPV infection the cause of cervical cancer? a) Yes b) No c) Don't Know	a) 192 (96%) b) 7 (3.5%) c) 1 (0.5%)
23. Can HPV vaccine effectively prevent genital warts of male? (a) Yes (b) No (c) Don't know	a) 113 (56.5%) b) 61 (30.5%) c) 26 (13%)
24. Is HPV vaccines effectiveness on HPV infected person? a) Yes b) No c) Don't know	a) 45 (22.5%) b) 137 (68.5%) c) 18 (9%)
25. Is screening necessary for HPV after receiving vaccine? (a)Yes (b) No (c) Don't know	a) 56 (28%) b) 134 (67%) c) 11 (5.5%)

Sixty six percent thought that it could protect against other cancers also and 60.5% expressed that HPV vaccine could protect against other sexually transmitted diseases. Eighty eight percent of the medical students were aware of availability of HPV vaccine in India. Only 39% answered that HPV vaccine is a part of National immunization program. About 189 (94.5%) students replied that HPV vaccine may be given to sexually active women. While evaluating the awareness regarding the target population for HPV vaccination, 92 participants 156 (78%) stated correctly as 11-30 years whereas 33 (16.5%) stated it as 0-10 years and 11 (5.5%) as 31-50 years. As replied by participants HPV vaccine doses required for protection were one 68 (34%), two 121 (60.5%), three 11 (4.5%) and four nil respectively. The vaccination schedule is known correctly by minor fraction of participants. The types of HPV vaccine available are bivalent 29 (14.5%), quadrivalent 43 (21.5%) or both 115 (57.5%). Majority of the participants (61.5%) mentioned intramuscular injection is used for HPV vaccine. About 63.5% students had mentioned deltoid region of the upper arm is the site for administering HPV vaccine. Out of 200 medical student participants only 13 (6.5%) were vaccinated with HPV vaccines. None of the male student was vaccinated with HPV. Ninety six percent students answered that persistent HPV infection the cause of cervical cancer. One hundred thirteen (56.5%) students had replied HPV vaccine effectively prevent genital warts of male. Approximately 22.5% students answered that HPV vaccines may show effectiveness on HPV infected person. About 67% students agreed that there is need of screening after receiving HPV vaccination. Majority of the students 181 (90.5%) didn't know the names of HPV vaccine. Correct dose (0.5 ml) of one vaccine was replied by 54% of the study participants. Cervical cancer protection provided by HPV vaccine was assumed 91-100% in 24% followed by 51-70% (13.5%) study participants. The reasons for preventing you to receive or advice HPV vaccination were high cost (4.5%), side effects (5.5%), doubt about effectiveness (33.5%) and lack of access & knowledge (56.5%). About 136 (68%) medical students positively had shown their interest for taking HPV vaccination [Table 2].

Table 3: Health-belief variables, HPV infection/vaccine knowledge, and intention to obtain [n=200]

1. Source of information for you on HPV vaccine a) Textbooks b) Classrooms teaching c) Internet d) News paper & TV e) Friends	 a) 188 (94%) b) 87 (43.5%) c) 62 (31%) d) 21 (10.5%) e) 9 (4.5%)
2. Would you like to update your knowledge about HPV vaccine by experts? (a) Yes (b) No	 a) 198 (99%) b) 2 (1%)
3. HPV vaccine does not eliminate the necessity for women to continue to undergo recommended cervical cancer screening. (a) Yes (b) No (c) Don't know	 a) 87 (43.5%) b) 91 (45.5%) c) 22 (11%)
4. Recipients of HPV vaccine should not discontinue anal cancer screening if it has been recommended by a health care provider. (a) Yes (b) No (c) Don't know	 a) 103 (51.5%) b) 80 (40%) c) 17 (8.5%)
5. HPV vaccine has not been demonstrated to provide protection against disease from vaccine and non-vaccine HPV types to which a person has previously been exposed through sexual activity. (a) Yes (b) No (c) Don't know	 a) 45 (22.5%) b) 137 (68.5%) c) 18 (9%)
6. HPV vaccine is not intended to be used for treatment of active external genital lesions; cervical, vulvar, vaginal, and anal cancers; CIN; VIN; VaIN, or AIN. (a) Yes (b) No (c) Don't know	 a) 128 (64%) b) 45 (22.5%) c) 27 (13.5%)

7. HPV vaccine has not been demonstrated to protect against diseases due to HPV types not contained in the vaccine. (a) Yes (b) No (c) Don't know	a) 157 (78.5%) b) 34 (17%) c) 09 (4.5%)

Majority of the students (52%) thought lack of access and knowledge was the most important obstacle for receiving HPV vaccination followed by doubt about effectiveness. The most common source of information for our study population was teachers and textbooks (94%) followed by classroom teaching 43.5%. Other sources of information include internet (31%), news papers and television (10.5%) and friends (4.5%). Majority of the study group (99%) like to update their knowledge by experts. About 14.2% of our study participants had been questioned by friends and relatives regarding HPV vaccination. About 43.5% participants agreed that HPV vaccine does not eliminate the necessity for women to continue to undergo recommended cervical cancer screening. Approximately 51.5% student participants had replied that recipients of HPV vaccine should not discontinue anal cancer screening if it has been recommended by a health care provider. Sixty four percent of study participants agreed that HPV vaccine is not intended to be used for treatment of active external genital lesions; cervical, vulvar, vaginal, and anal cancers; CIN; VIN; VaIN, or AIN. About 78.5% study participants answered that HPV vaccine has not been demonstrated to protect against diseases due to HPV types not contained in the vaccine [Table 3].

DISCUSSION

Sexually transmitted human papilloma virus (HPV) infection is the most important risk factor for cervical intraepithelial neoplasia and invasive cervical cancer. [9] HPV transmission is influenced by sexual activity and age. Almost 75% of all sexually active adults are likely to be infected with at least one HPV type. However, vast majority of the infections resolve spontaneously and only a minority (<1%) of the HPV infections progress to cancer. The lifetime risk for genital HPV is 50–80% and genital warts is approximately 5%. [10,11] The Pap test is used to find cellular abnormalities in cervical tissue, aiding early diagnosis. HPV is a necessary cause of cervical cancer, but it is not a sufficient cause. Other cofactors are necessary for progression from cervical HPV infection to cancer. Long-term use of hormonal contraceptives, high parity, early initiation of sexual activity, multiple sex partners, tobacco smoking and co-infection with HIV have been identified as established cofactors; co-infection with Chlamydia trachomatis and herpes simplex virus type-2, immunosuppression, low socioeconomic status, poor hygiene and diet low in antioxidants are other probable cofactors. Genetic and immunological host factors and viral factors such as variants of type, viral load and viral integration are likely to be important, but have not been clearly identified[10,12].Two vaccines licensed globally are available in India; a quadrivalent vaccine (Gardasil™ marketed by Merck) and a bivalent vaccine (Cervarix™ marketed by Glaxo Smith Kline). These vaccines do not protect against the serotype with which infection has already occurred before vaccination[13]. HPV vaccine is not licensed for use among males. Gardasil™ is a mixture of L1 proteins of HPV serotypes 16, 18, 6 and 11 with aluminum-containing adjuvant. This vaccine confers protection against both cervical cancer and genital warts. Cervarix™ is a mixture of L1 proteins of HPV serotypes 16 and 18 with AS04 as an adjuvant. This vaccine confers protection only against cervical cancer[13].The bivalent and quadrivalent vaccines available are prophylactic, not therapeutic. About 99–100% efficacy was reported against vaccine-type related genital warts, vaginal intraepithelial neoplasia and vulvar intraepithelial neoplasia. The vaccine dose is 0.5 mL given intramuscularly, either in the deltoid muscle or in the antero-lateral thigh. It is available as a sterile suspension for injection in a single-dose vial or a prefilled syringe, which should be shaken well before use. The recommended age for initiation of vaccination is 9–12 years. Catch-up vaccination is permitted up to the age of 26 years. A total of three doses at 0, 2 and 6 months are recommended with Gardasil™ or 0, 1 and 6 months with Cervarix™ (minimum interval of 4 weeks between the first and the second dose, 12 weeks between the second and third dose and 24 weeks between the first and third dose)[10]. Vaccines are not 100% protective against cervical cancer and not a replacement for periodic screening. Hence, screening programs should continue as per recommendations. Cervical cancer ranks as the 2nd leading cause of female cancer in India. Cervical cancer is the 2nd most common female cancer in women aged 15 to 44 years in India. Women have higher incidences of anal cancer than men. Quadrivalent HPV vaccine is administered intramuscularly as three separate 0.5-mL doses. The second dose should be administered 2 months after the

first dose and the third dose 6 months after the first dose. The vaccine is available as a sterile suspension for injection in a single-dose vial or a prefilled syringe. [14]Most of the participants in our study were well aware of the viral etiology and preventable nature of cervical cancer. Similar finding was observed by Pandey et al[15] and Mehta et al[16] while Saha et al[17] reported a very low level of awareness among the female students of premier colleges in Kolkata. S Mehta et al reported that 66.8% were willing to accept the HPV vaccine[16] and Snigdha Kamini et al[17] findings (64%) come close to this. Females were more willing to accept vaccination. Majority of students said that lack of adequate knowledge was the most important factor preventing them from getting vaccinated. This is consistent with several other studies in India, another main reason being high cost. Sufficient scientific evidence has clarified many of the misunderstandings related to vaccine safety, however, the concerns related to vaccination are still increasing. [18,19]In developing countries like India where HPV infection is high, introducing a national HPV vaccination programme may reduce the incidence of cervical cancer. The Indian Academy of Pediatrics Committee on Immunisation (IAPCOI) recommends offering HPV vaccine to all females who can afford the vaccine. [20]In Kamini S et al (2016) study, 64.9% were willing to receive/ advice HPV vaccination. The others were either unsure or unwilling. 80.8% of females were willing to receive vaccination while only 44% of males were willing to advice it to women. The most important factor that deterred the subjects from receiving/advising HPV vaccination was lack of enough knowledge, followed by high cost and then fear of complications. The most important source of knowledge was Medical education. [17]According to Challa N et (2011) the most common source of information for our study population was teachers and textbooks (59.8%). Other sources of information include internet (17.3%), news papers and television (14.2%) and friends (8.7%). Majority of the study group (92.9%) like to update their knowledge by experts. About 14.2% of our study participants had been questioned by friends and relatives regarding HPV vaccination. [21] The success and benefit of control and prevention of cervical cancer largely depend to a great extent on the level of awareness and knowledge about different aspects of the disease and the vaccine. It is therefore important to target immunizable young adult college-going girls and boys, as both are part of the infection chain and at risk for HPV infection as they are living a more independent lifestyle but have a choice to undergo vaccination with the consent from parents and are within the age group of successful vaccination outcome. Hence, assessment of their knowledge, awareness and attitude towards the causes of cervical cancer, HPV infection and vaccination available for the disease including adequate participation in immunization programs can lead to successful reduction in disease burden and control of cervical cancer in India.[22]

CONCLUSION

Human papillomavirus infection is now a well-established cause of cervical cancer and there is growing evidence of HPV being a relevant factor in other anogenital cancers (anus, vulva, vagina and penis) as well as head and neck cancers. Male circumcision and the use of condoms have shown a significant protective effect against HPV transmission. The results of this study show the importance and necessity of medical teaching to focus on upcoming issues like HPV vaccine. This clearly demonstrates the gap in knowledge. Overcoming this gap is necessary if we want to decrease the burden of cervical cancer in India. It is suggested that there is a need for educational intervention and awareness campaigns to augment HPV immunization program for control of cervical cancer in India.

REFERENCES

1. Braaten KP, Laufer MR. Human Papillomavirus (HPV), HPV-Related Disease, and the HPV Vaccine. Rev Obstet Gynecol. 2008;1(1):2–10.
2. Koutsky L. Epidemiology of genital human papillomavirus infection. Am J Med 1997; 102: 3-8.
3. Ghosh I, Ghosh P, Bharti AC, Mandal R, Biswas J, Basu P. Prevalence of human Papillomavirus and co-existent sexually transmitted infections among female sex workers, men having sex with men and injectable drug abusers from Eastern India. Asian Pacific J Cancer Prev 2012; 13: 799-802.
4. Baseman JG, Koutsky LA. The epidemiology of human papillomavirus infection. J Clin Virol. 2005; 32:S16–S24.
5. International Agency for Cancer, World Health Organization. Globocan 2012: Estimated Cancer Incidence, Mortality and Prevalence Worldwide in 2012. India Cancer Cervix Incidence and Mortality Estimates. Lyon; 2012. Available from: http://globocan. iarc.fr/Pages/ fact_sheets _population .aspx, accessed on October 21, 2019.
6. Kaur P, Mehrotra R, Rengaswamy S, Kaur T, Hariprasad R, Mehendale SM, et al. Human papillomavirus vaccine for cancer cervix

prevention: Rationale & recommendations for implementation in India. Indian J Med Res 2017; 146:153-7.
7. Human papillomavirus vaccines: WHO position paper.Wkly Epidemiol Rec 2014; 89: 465-91.
8. Saraiya M, Unger ER, Thompson TD, Lynch CF, Hernandez BY, Lyu CW, et al. US assessment of HPV types in cancers: implications for current and 9-valent HPV vaccines. J Natl Cancer Inst 2015; 107: djv086.
9. Schiffman M, Castle PE, Jeronim J, Rodrigue AC, Wacholde S. Human papillomavirus and cervical cancer. Lancet. 2007; 370:890–907.
10. Kaarthigeyan K. Cervical cancer in India and HPV vaccination. Indian J Med Paediatr Oncol. 2012; 33(1):7–12.
11. Myers ER, Mc Crory DC, Nanda K, Bastian L, Matchar DB. Mathematical model for the natural history of human papillomavirus infection and cervical carcinogenesis. Am J Epidemiol. 2000; 151:1158–71.
12. Castellsague X, Munoz N. Cofactors in human papillomavirus carcinogenesis - role of parity, oral contraceptives, and tobacco smoking. J Natl Cancer Inst Monogr. 2003; 31:20–8.
13. Singhal T. Indian Academy of Pediatrics Committee on Immunisation (IAPCOI) Consensus Recommendations on Immunization. Indian Pediatr. 2008; 45:635–48.
14. Quadrivalent Human Papillomavirus Vaccine, Recommendations of the Advisory Committee on Immunization Practices (ACIP). https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5602a1.htm
15. Pandey D, Vanya V, Bhagat S, Binu VS, Shetty J. Awareness and Attitude towards Human Papillomavirus (HPV) Vaccine among Medical Students in a Premier Medical School in India. PLoS ONE 2012;7(7):e40619.
16. Mehta S, Rajaram S, Goel G, Goel N. Awareness about Human Papilloma Virus and its vaccine among medical students. Indian Journal of Community Medicine 2013; 38:92-4.
17. Kamini S, Bhimarasetty DM. Awareness about human papilloma virus vaccine among medical students. Asian Journal of Medical Sciences.2016; 7(4): 64-67.
18. Saha A, Nag Chaudhury A, Bhowmik P, Chatterjee R. Awareness of Cervical Cancer Among Female Students of Premier Colleges in Kolkata, India. Asian Pacific Journal of Cancer Prevention 2010; 11:1085-1090.
19. Chatterjee A, O'Keefe C. Current controversies in the USA regarding vaccine safety. Expert Rev Vaccines. 2010; 9(5):497–502.
20. Kaarthigeyan K. Cervical cancer in India and HPV Vaccination. Indian J Med Paediatr Oncol.2012; 33(1): 7-12.
21. Challa N, Madras V, Challa S. 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.
22. Rashid S, Labani S, Das BC. Knowledge, Awareness and Attitude on HPV, HPV Vaccine and Cervical Cancer among the College Students in India. PLoS ONE 11(11): e0166713.

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