

# Impact of Health Education on Knowledge, Attitude, and Practice towards Human Papilloma Virus and its Vaccination

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## ABSTRACT

**Background:** Despite the recommendation, the rate of Human Papilloma Virus (HPV) vaccine uptake is poor in developing countries. The possible reasons for this could be limited knowledge, poor acceptance, safety concerns, cost of the vaccine, and lack of awareness. Hence, a study was conducted to determine the effect of health education on knowledge, attitude, and practice toward HPV infection and its vaccination. **Methods:** An interventional study was conducted in the Tumkur district of India amongst female students studying in pre-university colleges. A questionnaire was provided to evaluate the knowledge, attitude, and practice about HPV infection and vaccination before and after health education. **Results:** After the health education, awareness about the effects of HPV and the mode of transmission of HPV increased from 62% to 71% ( $p < 0.001$ ) and 12% to 41% ( $p < 0.001$ ) respectively. Health education also increased knowledge about the availability of vaccination against HPV (34% to 87%;  $p < 0.001$ ), the population at risk for HPV infection (16% to 35%;  $p < 0.001$ ), the ideal age group for HPV vaccination (45% to 90%;  $p < 0.001$ ), and the overall knowledge score (5.6/17 to 12/17). Health education improved the willingness to pay for the vaccination from 34% to 56% ( $p < 0.001$ ) and the willingness to recommend others to vaccinate from 61% to 89% ( $p < 0.001$ ). **Conclusion:** The health education increased awareness about the symptomatology, mode of transmission, population-at-risk, and the effects of HPV infection. Health education also improved the willingness to pay for the vaccination and willingness to recommend others to vaccinate against HPV.

**KEYWORDS:** Attitude, Human papilloma virus, Health education, Knowledge, Practice

## INTRODUCTION

Human papilloma virus (HPV) is one the most common sexually transmitted diseases in adolescents and young women. [1] More than 75% of sexually active women and men are prone to develop HPV infection at least once during their lifetime. [2] Although most HPV infections are self-limiting, persistent HPV infection can lead to genital warts, anogenital cancers, and carcinoma cervix. [3, 4] Amongst the 170 odd serotypes of HPV, 14 are found to be oncogenic. [5] Every year, 123,907 women are diagnosed with cervical cancer in India, and 77,348 die from the disease. [6] This equates to one new case every four minutes and one death every seven minutes. [7] HPV types 16 and 18 are responsible for more than 90% of carcinoma cervix and types 6 and 11 are responsible for 90% of genital warts. [8]

The HPV vaccine is highly effective against high-grade cervical lesions when administered in girls 15 to 26 years of age. [9] Although introduced in 2008, HPV vaccination was incorporated into immunization programs of only three Indian states, Sikkim, Delhi, and Punjab, in 2016, achieving a remarkable 97% vaccination rate among targeted girls. [7] However, the HPV vaccination is yet to be included in India's Universal immunization programme. [7] The Indian Academy of Pediatrics recommends HPV vaccination for girls above 9 years of age, with two doses for those aged 9 to 14 years and three doses for those above 15 years. [10] Despite the recommendation, the uptake of the vaccine among the at-risk population in India remains low. [8] Factors contributing

to this include limited knowledge, poor acceptance, safety concerns, high vaccine costs, and a lack of awareness.<sup>[8]</sup> Studies indicate that health education can significantly improve the acceptability of HPV vaccination.<sup>[11]</sup> To explore this further, a study was conducted in the Tumkur district of India to assess the knowledge, awareness, and attitudes of the at-risk population toward HPV and HPV vaccination, as well as the impact of health education on these factors.

## MATERIAL AND METHODS

After obtaining ethical approval from the Institute Ethics committee (No. SIMSRH/IEC/2017-18/042), a few colleges were randomly selected in Tumkur district, Karnataka state, India. The Principals of these colleges were briefed about the study and permission was sought. Informed consent was obtained from the study participants. A pretested questionnaire was shared with each of the female students of these colleges and was collected back after it was filled out by the study participants. Care was taken to safeguard the identity of the study participants.

The questionnaire included questions regarding the age, class of study, socio-economic status of the family, religion, educational qualification and occupation of the parents, and co-occupants of the house. The questionnaire also requested information on menstrual hygiene, premarital sex, family history of malignancy, knowledge, attitude, and practice toward HPV. A revised BG Prasad classification was used to classify the socioeconomic status of the family.<sup>[12]</sup> The occupations of parents were classified as per the National classification of occupations 2015 compiled by the Government of India.<sup>[13, 14]</sup>

The questionnaire included 17 questions to determine the knowledge of the study participants and eight questions to determine the attitude/practice towards HPV. The knowledge was further assessed by scoring "one" for each correct response and was analyzed. The knowledge was considered good, moderate, or poor if the score was  $\geq 76\%$ , 50-75%, or  $<50\%$  respectively. The questionnaire was validated through expert review by two independent subject experts not involved in the study. It achieved a Cronbach's alpha of 0.87 for relevance and 0.94 for clarity, demonstrating strong internal consistency. Additionally, the questionnaire was further validated through a pilot study.

A 45 minutes health education lecture was delivered to all the study participants, which included the nature of HPV, its epidemiology, mode of transmission, effects of HPV, preventive measures, symptoms, treatment, long-term outcomes, and vaccination. The health education also included epidemiology of cervical cancer, screening, management, and its outcome. The same questionnaire was provided to all the study participants, collected back after it was filled, and analyzed.

**Sample size calculation:** To calculate the sample size, a prevalence of 22.8% for HPV infection among 15,267 women

was considered based on a study by Liu XX et al.<sup>[15]</sup> A precision of 0.05 was assumed, with a design effect of 1 (as participants were randomly selected). Using the OpenEpi (Version 3) open-source calculator (SSPropor), the calculated sample size was 271. The study by Liu XX et al was selected because it was recent at the time of planning of our study, included a large sample size, and was conducted in China, where the prevalence of HPV infection is similar to that in India.<sup>[16]</sup>

**Statistical analysis:** Descriptive parameters were expressed in number, percentage, mean and standard deviation. The McNemar test was used to find the difference between the responses before intervention to post-intervention. A chi-square or Fischer's exact test was used to find an association between the attributes. The difference between the groups was considered significant when the "p" value was  $<0.05$  with a 95% confidence interval. The data were analyzed using IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.

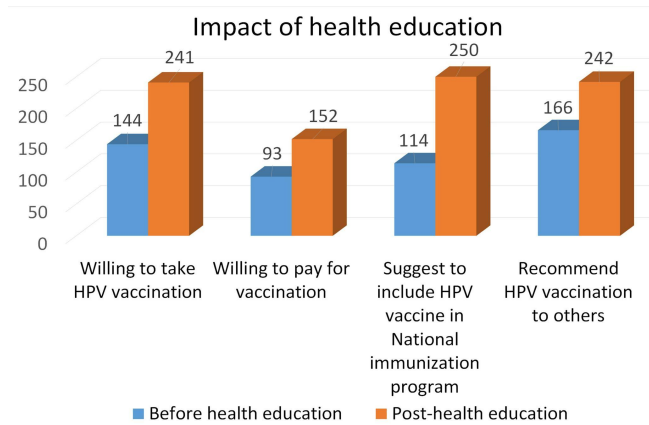
## RESULTS

The study included 271 female pre-university students. Two hundred and forty-four (90%) belonged to 2<sup>nd</sup>-year pre-university and the rest belonged to 1<sup>st</sup>-year pre-university. There were 111 (41%) participants from the rural area while 160 (59%) were from the urban area. 95% of the study population belonged between 16 and 17 years of age. Fathers of 147 (54%) study participants were qualified more than high school while the Mothers of 135 (50%) study participants were qualified more than high school. The majority (112; 41%) of fathers of the study population belonged to clerical/shop/farm occupation while the majority (125; 46%) of mothers of the study population belonged to semi-professional occupation. One hundred and fifty-eight (58%) families of the study population belonged to upper class while 26% belonged to either the lower middle class or lower class (Table 1). Two-twenty-eight (84%) participants were living with their parents. Two-forty-nine (92%) study participants were Hindus. Two-hundred-and-sixty-one (96%) of the study population was using hygienic sanitary pads while the rest were using cotton cloth during menstruation. Eleven (4%) study population had a family history of cancer and 1% of the study population had a history of premarital sex.

### Knowledge about HPV and HPV Vaccination:

One hundred and two (38%) study participants were unaware of the effects of HPV while 239 (88%) were unaware of the mode of HPV transmission. Forty-three (16%) study participants were aware of symptoms of HPV infection and 91 (34%) of the study participants were aware of vaccination against HPV. One hundred and forty-seven (54%) study participants knew about the availability of the HPV vaccine in India. One hundred and twenty-three (45%) participants knew the ideal age group for vaccination and 44 (16%)

participants were aware of the at-risk population (Table 2). The overall knowledge score was 5.6/17.



**Figure 1: Impact of health education**

After the intervention (health education), awareness about the effects of HPV and the mode of transmission of HPV increased from 62% to 71% and 12% to 41% respectively. The health education also increased the knowledge about the symptomatology of HPV infection (16% to 45%), availability of vaccination against HPV (34% to 87%), availability of HPV vaccination in India (54% to 93%), population at-risk for HPV infection (16% to 35%), and ideal age group for HPV vaccination (45% to 90%; (Table 2 ). The overall knowledge score increased to 12/17.

#### Attitude and Practice towards HPV and HPV Vaccination:

A total of 144 (53%) participants were willing to take HPV vaccination and the willingness increased to 241 (89%) after health education. Although 53% showed a willingness to vaccinate before health education, the number dropped to 34% after knowing the cost. Health education improved the willingness to pay for vaccination from 34% to 56%. One hundred and fourteen (42%) participants thought that the HPV vaccination should be included in the national immunization program and this number increased to 92% after the health education. One hundred and sixty-six (61%) participants were willing to recommend HPV vaccination to others and this number increased to 89% post-health education (Table 3 and Figure 1 ).

#### DISCUSSION

Human papilloma viruses are double-stranded, nonenveloped DNA viruses (family: Papillomaviridae) with a great affinity for the squamous epithelium of the genital tract.<sup>[1]</sup> Although most HPV infections are self-limiting, the persistent infection can lead to oropharyngeal cancers, genital warts, and anogenital cancers in men and women; and cancer cervix in women.<sup>[17]</sup> There are 170 odd strains of HPV and 40 of them are transmitted by sexual contact and by vertical transmission.<sup>[17, 18]</sup> The high-risk HPV types (e.g.,

16 and 18) are carcinogenic while low-risk types (e.g., 6 and 11) are responsible for genital warts, recurrent respiratory papillomatosis, and low-grade cervical cell changes.<sup>[17]</sup> At least 75% of sexually active individuals are prone to be infected with HPV infection in their lifetime.<sup>[2, 18]</sup> They are responsible for 90% of genital warts and 99% of cancer cervix worldwide.<sup>[3, 4]</sup>

One in 53 women in India is prone to develop carcinoma cervix in their lifetime, HPV is responsible for 99% of cervical cancers.<sup>[3, 4, 19]</sup> The factors, multiple pregnancies, long-term use of hormonal contraceptives, early age at marriage, early age at first sexual intercourse, and early age at first-term pregnancy are responsible for increased incidence and progression of HPV infection to neoplastic cervical lesions in India.<sup>[8]</sup> The presence of high-risk HPV strains and increased occurrence of neoplastic lesions are responsible for the increased incidence of carcinoma cervix in India.<sup>[8]</sup>

As HPV infections can't be cured, the at-risk population should be screened for HPV-related diseases and followed up for their effects. HPV can't be cultured and hence HPV testing includes DNA detection from cells/tissue. Currently, HPV screening isn't recommended in men or adolescents, or at anatomical sites other than the cervix.<sup>[17]</sup> Currently, three vaccines are available for use against HPV. Cervarix is a bivalent vaccine protective against HPV strains 16 and 18 while Gardasil is a quadrivalent vaccine protective against HPV strains 6, 11, 16, and 18. Gardasil 9 is a polyvalent vaccine protective against 9 strains of HPV, namely, 6, 11, 16, 18, 31, 33, 45, 52, and 58. All three of these vaccines are more than 90% effective and completely safe.<sup>[20, 21]</sup> Despite the high efficacy of the vaccines, the vaccines didn't produce a potential health impact in India due to poor response from the at-risk population and their parents.<sup>[8]</sup> The possible reasons for poor response from the people include limited knowledge, cultural belief, misinformation about HPV, the cost of the vaccine, acceptance, socio-demographic factors, and lack of awareness.<sup>[9]</sup> There was a period of suspension of HPV vaccination in India due to the above factors. But, the vaccine was reapproved soon in India based on the effect of the vaccine in developed countries.<sup>[8]</sup> Currently, the Indian Academy of Pediatrics recommends HPV vaccination in girls from the age of 9 years onwards.<sup>[10]</sup>

Our study found that around 38% were unaware of HPV infection and 66% were unaware of vaccination against HPV. This is similar to other developing countries like Lebanon and Pakistan where studies by Dany M et al. and Khan TM et al. found that knowledge was only 37% and 57% respectively.<sup>[22, 23]</sup> The overall knowledge score of our study population was poor which was similar to a study by Liu Y et al, who found that the knowledge score was low-moderate (3.78/8) in the at-risk population in China.<sup>[24]</sup> Even in a developed country like Singapore, the knowledge was only 7/14.<sup>[25]</sup> Before health education, 53% of individuals showed a willingness to vaccinate, but this dropped to 34% after learning about the cost. However, health education significantly improved willingness to pay for vaccination,

Parameters	Total No. (%)	Parameters	Total No. (%)
<b>Father's Qualification</b>		<b>Mother's Qualification</b>	
Illiterate	25 (9)	Illiterate	7 (3)
Primary School	8 (3)	Primary School	10 (4)
Middle School	24 (9)	Middle School	20 (7)
High School	67 (25)	High School	99 (37)
Intermediate/ Diploma	54 (20)	Intermediate/ Diploma	55 (20)
Graduate	68 (25)	Graduate	67 (25)
Professional Degree	25 (9)	Professional Degree	13 (5)
<b>Father's Occupation</b>		<b>Mother's Occupation</b>	
Unskilled Worker	20 (7)	Unemployed	93 (34)
Semiskilled Worker	4 (2)	Unskilled Worker	12 (4)
Skilled Worker	23 (9)	Semiskilled Worker	8 (3)
Clerical/Shop/Farm	112 (41)	Skilled Worker	4 (2)
Semi-Profession	66 (24)	Clerical/Shop/Farm	24 (9)
Professional	46 (17)	Semi-Profession	125 (46)
		Professional	5 (2)
<b>Socio-Economic Status</b>			
I (Upper Class)	158 (58)	IV (Lower Middle Class)	39 (14)
II (Upper Middle Class)	18 (7)	V (Lower Class)	32 (12)
III (Middle Class)	24 (9)		

**Table 1: Socio-demographic profile of the study participants**

increasing it from 34% to 56%. This is similar to a study by You DY et al. where 54% study population showed a willingness to vaccinate against HPV. [26]

Health education improved knowledge about HPV and HPV vaccine amongst the at-risk population. The overall score increased from 5.6/17 to 12/17 in our study population. This is similar to other studies by Patel H et al., Gerend MA et al., and Berenson AB et al. [11, 27, 28] A study by Joshi SV et al. found that the awareness of HPV and the vaccination against it was only 10% and after health education, the awareness increased to 99%. [29] Both these studies were conducted on university students. Health education also increased the willingness to vaccinate against HPV which was similar to a study by Zhang X et al. who found that health education improved the willingness to vaccinate from 36% to 46% and encourage others to vaccinate from 71% to 84%. [30] Joshi SV et al. found that 22% showed a willingness to vaccinate after health education. [29] Joshi SV et al also found that the cost was the main factor for refusing vaccine (78%) followed by religious belief (8%). [29]

The state and national government should promote health education about HPV infection and the vaccination against it involving the health care department. The government should use media such as television and the internet to promote education. Although health education improved awareness and willingness to vaccinate, many studies found that there's not much change in behavioral action. [29-31] Hence, health education should also provide information about the vaccination behaviors and techniques, such as the place and the method of vaccination. [30] The government should include HPV vaccination under the national immunization program which will resolve the most common cause (cost factor) of vaccine refusal. The Delhi, Sikkim, and Punjab state Governments of India have become role models by including the HPV vaccine in their state immunization program. [7, 32, 33]

## CONCLUSION

The health education increased awareness about the symptomatology, mode of transmission, population-at-risk, and the effects of HPV infection. It also increased the overall

Question	Correct answers before health education No. (%)	Correct answers after health education No. (%)	McNemar test 'p' value
What does HPV cause?	169 (62)	192 (71)	< 0.001
How is HPV transmitted?	32 (12)	111 (41)	< 0.001
Who can be infected with HPV?	162 (60)	231 (85)	< 0.001
Do you think condoms protect from HPV infection?	68 (25)	115 (42)	< 0.001
What may be the symptoms of HPV infection?	43 (16)	121 (45)	< 0.001
Can HPV be cured by taking antibiotics?	64 (24)	106 (39)	< 0.001
Do you think all HPV-infected people develop cancer?	77 (28)	102 (38)	< 0.001
Where do you think cervical cancer is common, rural or urban?	126 (47)	172 (63)	< 0.001
PAP test is for screening of HPV infection?	19 (7)	65 (24)	< 0.001
Is HPV infection common?	63 (23)	153 (57)	< 0.001
Are you aware of the HPV vaccine?	91 (34)	237 (87)	< 0.001
Do you think the HPV vaccine is available in India?	147 (54)	252 (93)	< 0.001
Do you believe vaccination against HPV is helpful?	187 (69)	250 (92)	< 0.001
What is the ideal age group for HPV Vaccination?	123 (45)	244 (90)	< 0.001
Who should be vaccinated against HPV?	44 (16)	96 (35)	< 0.001
Does the HPV vaccine help treat patients infected with HPV?	21 (8)	59 (22)	< 0.001
Can HPV spread from Mother to Baby?	127 (47)	180 (66)	< 0.001

**Table 2: Knowledge about HPV and HPV vaccination**

knowledge about HPV infection and the vaccination against it. Health education improved the willingness to pay for the vaccination and willingness to recommend others to vaccinate against HPV.

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	Correct answers before health education N (%)	Correct answers after health education N (%)	McNemar test 'p' value
<b>Attitude Assessment</b>			
If provided, will you take HPV vaccination?	144 (53)	241 (89)	< 0.001
Do you think your family members will agree to vaccinate children?	104 (38)	160 (59)	< 0.001
Are you willing to spend approximately 10,000 rupees for the full course of HPV vaccination?	93 (34)	152 (56)	< 0.001
Do you think white discharge per vagina be examined and treated?	98 (36)	217 (80)	< 0.001
Do you think HPV vaccination should be included in the national immunization program?	114 (42)	250 (92)	< 0.001
<b>Practice assessment</b>			
Have you received an HPV vaccination?	17 (6)	-	-
Will you recommend others to be vaccinated against HPV?	166 (61)	242 (89)	< 0.001
Once vaccinated is it necessary to screen that person?	80 (30)	121 (47)	< 0.001

**Table 3: Attitude and Practice assessment in study participants before and after health education**

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