

## ORIGINAL RESEARCH

**HPV VACCINE AWARENESS AND FACTORS ASSOCIATED WITH NON-ACCEPTANCE OF HPV VACCINATION AMONG SCHOOL GOING ADOLESCENT GIRLS IN AN URBAN AREA****Dr Manpreet Sodhi<sup>1</sup>, Dr Amandeep Kaur<sup>1\*</sup>, Dr Jasleen Kaur<sup>1</sup>**<sup>1</sup> Department of Pediatrics, Government Medical College and Rajindra Hospital, Punjab, India

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**ABSTRACT**

Cervical cancer is the fourth most common cancer among women worldwide and the second most common cancer among women in India. In 2020, an estimated 123,907 new cases of cervical cancer were diagnosed and 77,348 deaths occurred in India, corresponding to a crude mortality rate of 11.7%, despite the disease being largely preventable. Two prophylactic vaccines Gardasil and Cervarix are available, yet vaccine uptake in India remains very low. This study was undertaken to assess awareness of the HPV vaccine among adolescent girls and to identify the reasons for non-immunisation. A cross-sectional, descriptive study was conducted at Government Medical College and Rajindra Hospital, Patiala, Punjab, between March and May 2025, among school-going adolescent girls aged 10–19 years. Girls who provided informed consent were enrolled. Data were collected using a structured, pre-tested questionnaire covering personal and demographic details, awareness of HPV and the reasons for non-immunisation, and HPV vaccination status. Analysis was performed using SPSS, with a p value < 0.05 considered statistically significant for associations between sociodemographic factors and non-acceptance. Of 327 girls screened, only 12 (3.67%) had received the HPV vaccine. Most participants were aged 14–17 years (58.7%), followed by 10–13 years (26.3%) and >17 years (14.9%). Overall, 68.8% were unaware of cervical cancer, 87.7% had never heard of human papillomavirus (HPV), and 87.2% had never heard of the HPV vaccine; none could name any HPV vaccine, although 40.1% were willing to be vaccinated. Insufficient information about HPV was the predominant reason for non-acceptance (97.6%), followed by concern about safety or side effects (33.6%) and cost (15.3%); non-recommendation by a family physician (14.7%) and parental decision (2.8%) were cited infrequently. Lack of information about the vaccine was significantly associated with paternal education, paternal occupation, and socioeconomic status (all p = 0.001). Because the HPV vaccine is a recent introduction in India, providing adequate information and improving awareness among adolescents is essential to achieve a positive impact on uptake. Although the girls recognised that the risk of cervical cancer is high and that vaccination is required before disease onset, their overall knowledge of HPV and the vaccine was poor.

Keywords: Adolescent girls; School; Cervical cancer; HPV vaccine.

**INTRODUCTION**

Cervical cancer is the fourth most common cancer among women worldwide and the second most common cancer among women in India.[1,2] Globally, an estimated 604,127 new cases and 341,831 deaths were attributed to the disease in 2020. [2] In India, approximately 123,907 new cases are diagnosed and 77,348 deaths occur each year, giving a crude mortality rate of 11.7%, even though cervical cancer is largely preventable.[3] Persistent infection with high-risk human papillomavirus (HPV) is now recognised as a necessary cause of virtually all invasive cervical cancers.[4] Several factors are associated with the disease, including poor genital hygiene, early age at marriage, repeated pregnancies, multiple sexual partners, prolonged use of oral contraceptives, early age at first intercourse, smoking, and low socioeconomic status.[5] In many developing countries, inadequate screening and treatment allow precancerous lesions to progress to invasive disease, increasing the risk of death.[6]

In 2020, the World Health Organization (WHO) launched a global strategy to accelerate the elimination of cervical cancer as a public health problem, setting a target of fully vaccinating 90% of girls against HPV by 15 years of age by 2030.[7] Two HPV vaccines approved by the United States Food and Drug Administration (FDA) are in wide use: the quadrivalent vaccine Gardasil (against HPV types 6, 11, 16, and 18) and the bivalent vaccine Cervarix (against HPV types 16 and 18). [8] These vaccines are recommended for adolescent girls aged 9–13 years and for young women aged 13–26 years.[9] Despite their established efficacy, global HPV vaccination coverage remains well below the 90% elimination target, particularly in low- and middle-income countries.[10] In India, uptake has been especially low, partly because of cultural factors and limited awareness of HPV infection and cervical cancer.[11] Because population-based data on HPV vaccine awareness among adolescent girls remain scarce in North India, the present study was undertaken to assess such awareness and to examine the factors associated with non-immunisation.

## **MATERIALS AND METHODS**

### **Study design and setting**

This was a cross-sectional, descriptive study conducted at Government Medical College and Rajindra Hospital, Patiala, Punjab, over a three-month period from March to May 2025, among school-going adolescent girls in an urban area of Punjab.

### **Objectives**

The objectives were to assess awareness of the HPV vaccine among adolescent girls and to identify the reasons for not being vaccinated against HPV.

### **Participants**

In accordance with the WHO definition, adolescence was taken as the age range 10–19 years.[12] Girls aged 10–19 years who provided informed consent were eligible for inclusion. Verbal informed consent was obtained from the school authorities after the purpose of the study had been explained. Girls with a diagnosed chronic illness such as congenital heart disease, chronic renal failure, chronic liver failure, or a blood disorder and those with immunodeficiency or in an immunosuppressed state were excluded.

### **Sample size**

The sample size was estimated using the standard formula for a single proportion in a cross-sectional study:  $n = Z^2pq / d^2$

where  $Z = 1.96$  (95% confidence level),  $p$  is the expected proportion,  $q = 1 - p$ , and  $d$  is the absolute precision (margin of error). Drawing on earlier Indian data showing that approximately 72% of adolescent girls were unaware of HPV and the HPV vaccine [14], an expected proportion of  $p = 0.72$  was assumed, with an absolute precision of  $d = 5\%$ . This gave:

$n = (1.96^2 \times 0.72 \times 0.28) / 0.05^2 = 0.775 / 0.0025 \approx 310$ . After allowing approximately 5% for incomplete or non-responses, the minimum required sample was about 325. A total of 327 school-going adolescent girls were enrolled in the study.

### **Data collection**

Data were collected using a structured, pre-tested questionnaire comprising three sections: (i) personal and demographic information; (ii) awareness of HPV and the reasons for non-immunisation; and (iii) HPV vaccination status. Socioeconomic status was classified using the updated Modified Kuppuswamy scale.[13]

### **Statistical analysis**

Data were analysed using the Statistical Package for the Social Sciences (SPSS). The chi-square test was used to assess associations between sociodemographic characteristics and non-acceptance of the vaccine, with a  $p$  value  $< 0.05$  considered statistically significant.

## RESULTS

Of the 327 girls screened, 12 (3.67%) had already received the HPV vaccine. The majority were aged 14–17 years (58.7%), followed by 10–13 years (26.3%) and >17 years (14.9%). Mothers had been educated up to secondary level in 53.2% of cases and fathers up to secondary level in 44.0%. The father was engaged in semi-skilled work in 44.6% of families. Most girls belonged to nuclear families (87.7%), and 45.5% were of upper-lower socioeconomic status (Table 1).

**Table 1. Sociodemographic characteristics of the study population (N = 327)**

Characteristic	Total, n (%)	Vaccinated, Yes (n = 12)	Not vaccinated, No (n = 315)	$\chi^2$	p value
<b>Age</b>					
10–13 years	86 (26.30)	0 (0)	86 (27.30)	8.759	0.013
14–17 years	192 (58.72)	12 (100)	180 (57.14)		
>17 years	49 (14.98)	0 (0)	49 (15.56)		
<b>Mother's education</b>					
Illiterate	28 (8.56)	0 (0)	28 (8.89)	39.967	0.001
Up to 5th class	59 (18.04)	0 (0)	59 (18.73)		
Secondary	174 (53.21)	2 (16.67)	172 (54.60)		
Senior secondary	41 (12.54)	4 (33.33)	37 (11.75)		
Graduate	25 (7.65)	6 (50)	19 (6.03)		
<b>Father's education</b>					
Illiterate	14 (4.28)	0 (0)	14 (4.44)	100.695	0.001
Up to 5th class	56 (17.13)	0 (0)	56 (17.78)		
Secondary	144 (44.04)	0 (0)	144 (45.71)		
Senior secondary	77 (23.55)	0 (0)	77 (24.44)		
Graduate	36 (11.01)	12 (100)	24 (7.62)		
<b>Father's occupation</b>					
Government employee	5 (1.53)	0 (0)	5 (1.59)	44.119	0.001
Skilled	72 (22.02)	12 (100)	60 (19.05)		
Semi-skilled	146 (44.65)	0 (0)	146 (46.35)		
Unskilled	102 (31.19)	0 (0)	102 (32.38)		
Deceased	2 (0.61)	0 (0)	2 (0.63)		
<b>Family type</b>					
Joint	40 (12.23)	0 (0)	40 (12.70)	1.736	0.188
Nuclear	287 (87.77)	12 (100)	275 (87.30)		
<b>Socioeconomic status</b>					
Lower	104 (31.80)	0 (0)	104 (33.02)	77.257	0.001
Lower middle	60 (18.35)	6 (50)	54 (17.14)		
Upper lower	149 (45.57)	0 (0)	149 (47.30)		
Upper middle	14 (4.28)	6 (50)	8 (2.54)		

Values are n (%).  $\chi^2$ , chi-square statistic. Socioeconomic status classified using the Modified Kuppuswamy scale.

Awareness of cervical cancer and HPV was low. Overall, 68.8% of girls were unaware of cervical cancer, 87.7% had never heard of HPV, and 87.2% had never heard of the HPV vaccine; only 1.8% reported any knowledge of the vaccine, and none could name a specific HPV vaccine. Nevertheless, 40.1% expressed willingness to be vaccinated (Table 2). When the items relating to non-acceptance were examined, 89.6% recognised that the vaccine can be given to females beyond

adolescence. Insufficient information about HPV was the principal barrier, cited by 97.6% of girls, whereas non-recommendation by a family physician (14.7%), concern about safety or side effects (33.6%), cost (15.3%), and family or parental decision (2.8%) were reported less frequently. All participants were aware that vaccination is needed to prevent the disease and that the risk of cervical cancer is high (Table 3).

**Table 2. Distribution of awareness and vaccination variables in the study population (N = 327)**

Variable	Response	Frequency	Percentage
Do you know what uterine cervical cancer is?	Yes	102	31.19%
	No	225	68.81%
Have you ever heard of HPV?	Yes	40	12.23%
	No	287	87.77%
Have you ever heard of HPV vaccines?	Yes	42	12.84%
	No	285	87.16%
Do you have knowledge of the HPV vaccine?	Yes	6	1.83%
	No	321	98.17%
Do you know the names of HPV vaccines?	Yes	0	0%
	No	327	100%
Are you willing to be vaccinated?	Yes	131	40.06%
	No	196	59.94%
Are you already vaccinated against HPV?	Yes	12	3.67%
	No	315	96.33%

**Table 3. Variables relating to non-acceptance of the HPV vaccine (N = 327)**

Variable	Response	Frequency	Percentage
Should only adolescent girls take the HPV vaccine?	Yes	34	10.40%
	No	293	89.60%
Not recommended by a family physician	Yes	48	14.68%
	No	279	85.32%
Safety / side effects	Yes	110	33.64%
	No	217	66.36%
Cost concern	Yes	50	15.29%
	No	277	84.71%
Family / parental decision	Yes	9	2.75%
	No	318	97.25%
Low risk of cervical cancer	Yes	0	0%
	No	327	100%
Not enough information available	Yes	319	97.55%
	No	8	2.45%
Vaccine is required only after getting sick	Yes	0	0%
	No	327	100%

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adolescence. Insufficient information about HPV was the principal barrier, cited by 97.6% of girls, whereas non-recommendation by a family physician (14.7%), concern about safety or side effects (33.6%), cost (15.3%), and family or parental decision (2.8%) were reported less frequently. All participants were aware that vaccination is needed to prevent the disease and that the risk of cervical cancer is high (Table 3).

**Table 4. Association (p values) of variables for non-acceptance of the HPV vaccine with sociodemographic characteristics**

Variable	Age	Mother's education	Father's education	Father's occupation	Family type	SES
Only adolescent girls should take the vaccine	0.001	0.301	0.03	0.001	0.52	0.135
Not recommended by a family physician	0.001	0.200	0.011	0.003	0.005	0.001
Safety / side effects	0.400	0.296	0.009	0.358	0.840	0.004
Cost concern	0.001	0.004	0.001	0.002	0.001	0.036
Family / parental decision	0.002	0.266	0.590	0.918	0.354	0.600
Not enough information about the vaccine	0.056	0.001	0.001	0.001	0.280	0.001

Values are p values from the chi-square test; bold denotes statistical significance ( $p < 0.05$ ). SES, socioeconomic status.

## DISCUSSION

Awareness of cervical cancer and HPV was poor in this cohort: 68.8% of girls were unaware of cervical cancer and 87.8% had not heard of HPV, while only 1.8% had any knowledge of the HPV vaccine. These findings are consistent with the study by Ramavath and Olyai in India, in which 72% of girls were unaware of cervical cancer and HPV,[14] and with that of Arunachalam and Subash Chandrabose, in which 56.7% of girls had inadequate knowledge of HPV.[15] Similarly, in a nationwide Chinese study by Zhang et al., 57.6% of girls were unaware of cervical cancer, 87.1% had not heard of HPV, and 82.9% were unaware of the HPV vaccine.[16]

Knowledge was higher in studies that enrolled older participants. Shetty et al. studied professional students aged 18–26 years in South India, of whom 95% had heard of cervical cancer and 89.3% of HPV,[17] while Rashid et al., in college students aged 16–26 years, reported that 82.4% had knowledge of cervical cancer and 45.6% of HPV.[18] In the present study, only 1.8% of girls had knowledge of the HPV vaccine and none could name a vaccine markedly lower than the 29.5% reported by Brunelli et al. in Italy, a high-income setting where vaccine uptake was also higher (33.2%).[19] Willingness to be vaccinated (40.1%) was likewise lower than the 72.6% reported by Zhang et al.[16] and the 66.6% reported by Shetty et al.,[17] most likely reflecting the poor baseline knowledge of cervical cancer and HPV vaccination in our cohort.

With respect to the barriers to acceptance, 89.6% of girls believed that the vaccine could be given at ages other than adolescence, in contrast to the findings of Rashid et al., in which 73.2% considered the vaccine to be intended only for adolescent girls.[18] Non-recommendation by a family physician was reported by 14.7% of girls, similar to the study by Sriram and Ranganathan.[20] Cost was cited less often in our study than in the study by Ramavath and Olyai (56.7%),[14] whereas concern about side effects was more frequent in our cohort than in other reports.[19,20] Only 2.8% of girls reported parental or family decision as a barrier i.e., parental opposition was largely absent which is broadly consistent with Sriram and Ranganathan.[20] The dominant barrier in the present study was insufficient information about the HPV vaccine (97.6%), which contrasts with studies conducted in other parts of India that enrolled older, professional students. [17,18]

When the barriers to acceptance were examined in relation to sociodemographic characteristics, paternal education was significantly associated with every variable except family or parental decision, followed in importance by the girl's age, paternal occupation, and family socioeconomic status. These observations reinforce the central role of household education and economic status in shaping vaccine awareness and acceptance. As the HPV vaccine is a recent introduction in India where the National Technical Advisory Group on Immunisation has recommended HPV vaccination for girls and an indigenously developed quadrivalent vaccine (CERVAVAC) received market authorisation in 2022 targeted health education is likely to be a key determinant of future uptake.[21]

## CONCLUSION

As the HPV vaccine is a recent introduction in India, providing adequate information and raising awareness among adolescents will be essential to achieve a positive impact on uptake. Although the girls in this study recognised that the risk of cervical cancer is high and that the vaccine should be administered before the disease is acquired, their overall knowledge of HPV and the vaccine was limited. Strengthening school- and community-based health education, with particular attention to families of lower educational and socioeconomic status, may help to improve acceptance and coverage.

**Limitations:** Sampling was non-random and based on convenience, which may limit the generalisability of the findings and introduce a degree of selection bias. Because recruitment was school-based, girls not attending school were not represented.

**Conflict of interest:** None declared.

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