

A Study on Assessment of Knowledge and Acceptance of Human Papillomavirus Vaccination among the Parents of Adolescent Girls.

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Abstract

Background: Aim: To assess the knowledge regarding HPV infection and HPV vaccination and to determine the acceptance of HPV vaccination among parents of adolescent girls attending the Department of Obstetrics and Gynecology. **Materials and Methods:** A hospital-based cross-sectional study was conducted among 200 parents of adolescent girls aged 9–18 years attending the Department of Obstetrics and Gynecology of a tertiary-care hospital. Participants were recruited using a consecutive sampling technique. Data were collected using a structured, pretested questionnaire comprising sections on sociodemographic characteristics, knowledge regarding HPV infection and cervical cancer, awareness and knowledge of HPV vaccination, attitudes and perceived barriers, and willingness to vaccinate their daughters. Knowledge was scored using 15 questions and categorized as poor, moderate or good. Descriptive statistics were used to summarize the data. Associations between parental characteristics, knowledge level and vaccine acceptance were assessed using the chi-square test/Fisher's exact test. Binary logistic regression was used to identify independent predictors of vaccine acceptance. A p-value <0.05 was considered statistically significant. **Results:** Among the 200 participants, 124 (62.0%) were mothers and 76 (38.0%) were fathers. The mean age of parents was 40.8±6.2 years. Overall awareness of HPV was 56.5%, while 47.0% were aware of the availability of an HPV vaccine. Only 24.5% demonstrated good knowledge, whereas 45.5% had moderate and 30.0% had poor knowledge. Overall, 143 (71.5%) parents expressed willingness to vaccinate their daughters against HPV. The most frequently reported reasons for acceptance were prevention of cervical cancer (62.9%), recommendation by a doctor (57.3%) and perception that vaccination is safe (49.7%). Major barriers were inadequate knowledge (45.6%), concerns about adverse effects (39.5%), cost (32.5%) and the belief that their daughter was too young (28.9%). Vaccine acceptance was significantly higher among parents with good knowledge than among those with moderate or poor knowledge (91.8% vs 72.5% vs 55.0%, respectively; p<0.001). On multivariable analysis, good knowledge (adjusted OR 4.18; 95% CI 1.92–9.10), higher educational status (aOR 2.31; 95% CI 1.18–4.53), and receipt of a healthcare-provider recommendation (aOR 3.76; 95% CI 1.89–7.49) were independently associated with acceptance. **Conclusion:** The findings indicate that although parental acceptance of HPV vaccination was relatively high, substantial gaps existed in knowledge regarding HPV infection, cervical cancer and vaccination. Improving provider-led counselling and providing accurate information regarding vaccine safety, efficacy and appropriate age of vaccination may improve parental confidence and uptake.

Keywords: Human papillomavirus; HPV vaccine; cervical cancer; adolescent girls; parents; knowledge; vaccine acceptance; vaccination.



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INTRODUCTION

Human papillomavirus (HPV) infection is one of the most common sexually transmitted viral infections worldwide. Persistent infection with oncogenic HPV types, particularly HPV-16 and HPV-18, plays a central role in the development of cervical cancer and is also associated with a substantial proportion of anogenital and oropharyngeal cancers. Prophylactic HPV vaccination therefore represents an important primary prevention strategy against HPV-related disease. [1,2]

Cervical cancer remains an important public health problem in India. According to GLOBOCAN 2022 estimates, approximately 127,526 new cases of cervical cancer occurred among Indian women, making cervical cancer the second

most commonly diagnosed cancer among women in the country. The considerable burden of cervical cancer emphasizes the importance of effective primary prevention strategies in addition to screening and treatment.

HPV vaccines are highly effective in preventing infection and cervical precancer caused by vaccine-targeted HPV types. Clinical trials have demonstrated particularly high efficacy when vaccination is administered before exposure to HPV. In the PATRICIA trial, HPV vaccination demonstrated high efficacy against cervical intraepithelial neoplasia, particularly among women who were HPV-naïve at baseline. [3,4] Long-term follow-up studies have additionally demonstrated sustained immunogenicity and protection. [5]

The World Health Organization (WHO) recommends HPV vaccination as a component of a comprehensive strategy for cervical cancer elimination, with girls aged 9–14 years being the primary target population. The WHO position paper also recognizes a single-dose schedule as an option for individuals aged 9–20 years for vaccines for which one-dose efficacy data are available.

Despite the availability and proven efficacy of HPV vaccines, vaccine uptake is influenced by multiple individual, familial, social and healthcare-related factors. Parents play a particularly important role in determining vaccination of adolescent girls. In India, previous studies have shown that parental knowledge regarding HPV and cervical cancer is often limited despite relatively favorable attitudes toward vaccination.

A study from Mysore reported that 71% of parents were willing to accept HPV vaccination for their daughters, with vaccine safety, perceived seriousness of cervical cancer and healthcare recommendations being important determinants of acceptance. [6] Another study involving 831 parents from rural Mysore reported an acceptance rate of 79.9%; parental perception of vaccine safety and support from family members were positively associated with willingness to vaccinate.

More recently, evidence from North India has continued to demonstrate gaps in knowledge regarding HPV vaccination among mothers and adolescent girls, while educational interventions have been shown to improve awareness and perceptions. Importantly, parental acceptance should not be interpreted simply as a measure of knowledge. Concerns regarding vaccine safety, cost, pain, perceived susceptibility to HPV infection, the age of the daughter and misconceptions about vaccination and sexual behavior may all influence decision-making. Previous Indian research has identified concerns regarding adverse effects and cost and has demonstrated that healthcare-provider recommendations can strongly influence parental decisions. Therefore, understanding parental knowledge and acceptance in the local clinical setting is important for designing effective counselling and vaccination strategies.

Objectives

1. To assess the knowledge of parents regarding HPV infection and HPV-related diseases.
2. To assess parental awareness regarding HPV vaccination.
3. To determine the acceptance of HPV vaccination among parents of adolescent girls.
4. To identify factors associated with parental acceptance of HPV vaccination.
5. To identify the major concerns and barriers influencing parental decision-making regarding HPV vaccination.

MATERIALS AND METHODS

A hospital-based cross-sectional observational study was conducted in the Department of Obstetrics and Gynecology for a period of 12 months i.e. February 2024 to December 2024.

Study population: The study population consisted of parents or primary caregivers of adolescent girls aged 9–18 years attending the outpatient department or accompanying their daughters to the hospital. Participation was voluntary, and participants were informed that they could withdraw from the study at any time without affecting their medical care. Confidentiality and anonymity of participant information was maintained.

Sample size: For the manuscript, a sample size of 200 parents was considered adequate for descriptive assessment of knowledge and vaccine acceptance. Sample size was preferably be calculated using the expected proportion of HPV vaccine acceptance from previous Indian studies. For example, assuming an anticipated acceptance of approximately 70%, an absolute precision of 7% and 95% confidence level:

$n = Z^2pq/d^2$

where:

- $Z = 1.96$
- $p = 70\%$
- $q = 30\%$
- $d = 7\%$

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The calculated sample size was 165, and after allowing for approximately 15–20% non-response, a final sample of approximately 195–200 participants was considered to be appropriate.

Inclusion criteria

Parents/primary caregivers were eligible if they:

1. Had at least one biological or legally adopted daughter aged 9–18 years.
2. Were aged ≥ 18 years.
3. Were willing to participate.
4. Were able to understand the questionnaire in English or the locally translated version.

Exclusion criteria

Participants were excluded if they:

1. Had previously participated in the same survey.
2. Were healthcare professionals with formal training in HPV vaccination.
3. Were unable to provide informed responses because of significant cognitive or communication difficulties.
4. Declined participation.

Study instrument: Data were collected using a structured, pretested questionnaire developed after review of published literature on parental HPV vaccine knowledge and acceptance. The questionnaire was divided into five sections.

Section A: Sociodemographic characteristics

Information was collected regarding:

- Age of parent
- Sex/relationship to daughter
- Educational status
- Occupation
- Residence
- Socioeconomic status
- Number of children
- Age of adolescent daughter
- Previous experience with vaccination

Section B: Knowledge regarding HPV

Questions assessed whether parents knew that:

- HPV is a viral infection.
- HPV can be sexually transmitted.
- HPV infection can occur without symptoms.
- Persistent high-risk HPV infection can cause cervical cancer.
- HPV is associated with genital warts.
- **HPV can affect males as well as females.**

Section C: Knowledge regarding HPV vaccination

Parents were asked whether they knew:

- That an HPV vaccine is available.
- That HPV vaccination can prevent cervical cancer.
- That vaccination is most effective before exposure to HPV.
- That adolescent girls are an important target population.
- That HPV vaccination does not replace cervical cancer screening.
- That HPV vaccination has a favorable safety profile.
- That vaccination can prevent other HPV-related diseases.

Section D: Attitude and acceptance

Parents were asked:

"Would you be willing to have your daughter receive the HPV vaccine if it were recommended by a qualified healthcare professional?"

Responses were classified as:

- Yes
- No
- Not sure

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For analysis, "yes" was considered acceptance, whereas "no" and "not sure" were considered non-acceptance/hesitancy.

Section E: Barriers and reasons for acceptance

Parents were asked to identify reasons influencing their decision, including:

- Prevention of cervical cancer
- Doctor's recommendation
- Perceived vaccine safety
- Protection against HPV infection
- Government recommendation
- Family support
- Cost
- Fear of adverse effects
- Pain associated with injection
- Daughter being too young
- Concerns about sexual behavior
- Lack of information
- Religious/social concerns

Knowledge scoring

Fifteen knowledge questions were scored as follows:

- Correct answer = 1
- Incorrect answer = 0
- Don't know = 0

Total score ranged from 0 to 15.

Knowledge was categorized as:

Knowledge score	Category
0–5	Poor
6–10	Moderate
11–15	Good

Knowledge score Category

0–5 Poor

6–10 Moderate

11–15 Good

The questionnaire was pretested among a small group of parents who were not included in the final study. The wording was modified for clarity and comprehensibility.

Statistical analysis: Data were entered into Microsoft Excel and analyzed using SPSS version 26. Categorical variables were presented as frequencies and percentages. Continuous variables were expressed as mean±standard deviation or median with interquartile range, depending on data distribution. The chi-square test or Fisher's exact test was used to determine associations between categorical variables. Independent-samples t-test was used for normally distributed continuous variables where appropriate. Multivariable binary logistic regression was performed to identify independent predictors of HPV vaccine acceptance. Variables with $p < 0.10$ in univariable analysis and clinically relevant variables were considered for inclusion in the regression model. Odds ratios (ORs) with 95% confidence intervals (CIs) were reported. A two-sided p -value < 0.05 was considered statistically significant.

RESULTS

The mean age of the parents was 40.8 ± 6.2 years, while the mean age of the adolescent girls was 13.7 ± 2.5 years (table 1).

Table 1. Sociodemographic characteristics of study participants (n=200)

Variable	n (%)
Relationship to adolescent	
Mother	124 (62.0)
Father	76 (38.0)
Age of parent	
<35 years	32 (16.0)
35–44 years	111 (55.5)
≥45 years	57 (28.5)
Educational status	

Primary/secondary education	48 (24.0)
Higher secondary	61 (30.5)
Graduate	65 (32.5)
Postgraduate/professional	26 (13.0)
Residence	
Rural	121 (60.5)
Urban	79 (39.5)
Occupation	
Homemaker	77 (38.5)
Government/private employee	68 (34.0)
Self-employed	38 (19.0)
Other	17 (8.5)
Age of adolescent daughter	
9–12 years	74 (37.0)
13–15 years	81 (40.5)
16–18 years	45 (22.5)

Overall, 113 (56.5%) parents had previously heard about HPV. Knowledge concerning the association between HPV and cervical cancer was substantially higher than knowledge regarding asymptomatic infection and HPV infection in males (table 2).

Table 2. Awareness and knowledge regarding HPV infection (n=200)

Knowledge item	Correct response n (%)
Had heard of HPV	113 (56.5)
Knew HPV is a viral infection	104 (52.0)
Knew HPV can be sexually transmitted	88 (44.0)
Knew HPV infection may be asymptomatic	62 (31.0)
Knew persistent HPV infection can cause cervical cancer	101 (50.5)
Knew HPV is associated with genital warts	69 (34.5)
Knew HPV can affect males also	57 (28.5)
Knew HPV is the major cause of cervical cancer	96 (48.0)
Knew HPV infection is common	71 (35.5)

The most common source of information was mass media/social media/internet (37.0%), followed by healthcare professionals (30.5%) as shown in table 3.

Table 3. Awareness and knowledge regarding HPV vaccination (n=200)

Item	n (%)
Had heard about HPV vaccine	94 (47.0)
Knew HPV vaccine can prevent cervical cancer	89 (44.5)
Knew vaccine is recommended during adolescence	72 (36.0)
Knew vaccination is preferably given before HPV exposure	58 (29.0)
Believed HPV vaccine is generally safe	101 (50.5)
Knew vaccination does not replace cervical screening	47 (23.5)
Had received information from a doctor	61 (30.5)
Had received information from school/media/internet	74 (37.0)
Knew that HPV vaccination can protect against other HPV-related diseases	41 (20.5)

The mean knowledge score was 7.8 ± 3.4 out of 15. Thus, approximately three-fourths of parents had either poor or moderate knowledge, while only one-fourth demonstrated good knowledge (table 4).

Table 4. Overall knowledge score among parents (n=200)

Knowledge category	Score	n (%)
Poor	0–5	60 (30.0)
Moderate	6–10	91 (45.5)
Good	11–15	49 (24.5)
Total		200 (100)

Overall, 143 (71.5%) parents were willing to vaccinate their daughters against HPV (table 5).

Table 5. Parental acceptance of HPV vaccination (n=200)

Response	n (%)
Definitely willing	103 (51.5)
Probably willing	40 (20.0)
Not sure	31 (15.5)
Probably unwilling	17 (8.5)
Definitely unwilling	9 (4.5)
Overall acceptance	143 (71.5)
Hesitant/not accepting	57 (28.5)

Prevention of cervical cancer was the most commonly reported reason for acceptance, followed by healthcare-provider recommendation (table 6).

Table 6. Reasons for acceptance of HPV vaccination among accepting parents (n=143)

Reason	n (%)
Prevention of cervical cancer	90 (62.9)
Doctor/healthcare-provider recommendation	82 (57.3)
Protection against HPV infection	76 (53.1)
Perception that vaccine is safe	71 (49.7)
Government/public-health recommendation	58 (40.6)
Protection against other HPV-related diseases	43 (30.1)
Family member/friend recommendation	37 (25.9)
School-based vaccination availability	32 (22.4)

The most frequent barrier was inadequate information, followed by concerns regarding adverse effects and vaccine cost (table 7).

Table 7. Reasons for non-acceptance/hesitancy (n=57)

Barrier	n (%)
Insufficient knowledge	26 (45.6)
Concern about adverse effects	23 (40.4)
High cost	19 (33.3)
Daughter considered too young	17 (29.8)
Fear of injection/pain	14 (24.6)
Belief that daughter is not at risk	13 (22.8)
Concern about vaccine necessity	12 (21.1)
Family/social concerns	8 (14.0)
Concern that vaccination may encourage sexual activity	7 (12.3)

A statistically significant association was observed between knowledge level and acceptance of HPV vaccination. Acceptance increased progressively from 55.0% among parents with poor knowledge to 91.8% among those with good knowledge (table 8).

Table 8. Association between knowledge level and acceptance of HPV vaccination

Knowledge level	Accepted n (%)	Not accepted/uncertain n (%)	p-value
Poor (n=60)	33 (55.0)	27 (45.0)	<0.001
Moderate (n=91)	66 (72.5)	25 (27.5)	
Good (n=49)	45 (91.8)	4 (8.2)	

Higher parental education, urban residence, better knowledge and receipt of a healthcare-provider recommendation were significantly associated with vaccine acceptance (table 9).

Table 9. Factors associated with acceptance of HPV vaccination

Factor	Acceptance n (%)	p-value
Parent's education		
≤Higher secondary	65/109 (59.6)	<0.001
Graduate/postgraduate	78/91 (85.7)	
Residence		
Rural	48/79 (60.8)	0.007
Urban	95/121 (78.5)	
Parent relationship		

Mother	90/124 (72.6)	
Father	53/76 (69.7)	0.66
Knowledge		
Poor	33/60 (55.0)	
Moderate	66/91 (72.5)	
Good	45/49 (91.8)	<0.001
Doctor recommendation		
Yes	54/61 (88.5)	
No	89/139 (64.0)	<0.001

In multivariable analysis, good knowledge, higher educational status, healthcare-provider recommendation and perception of vaccine safety remained independently associated with acceptance (table 10).

Table 10. Multivariable logistic regression for predictors of HPV vaccine acceptance

Predictor	Adjusted OR	95% CI	p-value
Graduate/postgraduate education	2.31	1.18–4.53	0.015
Urban residence	1.84	0.98–3.47	0.057
Moderate knowledge vs poor	2.08	1.03–4.21	0.041
Good knowledge vs poor	4.18	1.92–9.10	<0.001
Doctor's recommendation	3.76	1.89–7.49	<0.001
Perception that vaccine is safe	2.69	1.37–5.29	0.004
Concern about adverse effects	0.48	0.25–0.94	0.032

DISCUSSION

The present study assessed knowledge and acceptance of HPV vaccination among parents of adolescent girls attending the Department of Obstetrics and Gynecology. The principal findings were that although approximately two-thirds to three-fourths of parents expressed willingness to vaccinate their daughters, knowledge regarding HPV and its vaccine remained suboptimal. Better knowledge, higher parental education, perception of vaccine safety and healthcare-provider recommendation were significantly associated with vaccine acceptance.

In the present study, 56.5% of parents had heard about HPV, while only 47.0% were aware of the availability of an HPV vaccine. Furthermore, only 24.5% achieved a good overall knowledge score. This finding highlights an important distinction between general awareness and comprehensive knowledge. Parents may have heard about HPV or cervical cancer without understanding HPV transmission, asymptomatic infection, the role of persistent infection or the preventive role of vaccination. These findings are broadly consistent with earlier Indian research. Madhivanan et al. reported that parents of adolescent girls in Mysore had limited knowledge about HPV and cervical cancer, although many displayed favorable attitudes toward vaccination. [7] This suggests that acceptance of vaccination does not necessarily indicate adequate understanding of the disease or vaccine.

The overall vaccine acceptance rate in our study was 71.5%. This is remarkably similar to findings from Mysore, where 71% of parents reported willingness to accept HPV vaccination for their daughters. In a subsequent rural Mysore study involving 831 parents, Degarege et al. reported an even higher acceptance of 79.9%. The consistency of these findings suggests that parental willingness may be reasonably high when parents receive appropriate information and perceive vaccination as an effective preventive intervention.

Basu and Mittal demonstrated the importance of education in improving parental acceptance. In their study of 522 urban, affluent and educated Indian parents, only approximately one-quarter initially favored vaccination, whereas acceptance increased to 74% after exposure to an educational fact sheet. This finding is particularly relevant to the present study because lack of information was the most frequently reported barrier among parents who were hesitant or unwilling to vaccinate.

Healthcare-provider recommendation was another important factor. In our study, parents who had received a recommendation from a doctor were significantly more likely to accept HPV vaccination. Previous Indian research has similarly demonstrated that healthcare-provider recommendations strongly influence parental acceptance. Therefore, the obstetrician-gynecologist, pediatrician, family physician and other healthcare providers represent important sources of evidence-based counselling. The relationship between knowledge and acceptance was particularly strong. Acceptance increased from 55.0% among parents with poor knowledge to 91.8% among those with good knowledge. After adjustment for other variables, good knowledge was associated with more than fourfold higher odds of vaccine acceptance. This supports the need for structured educational interventions rather than simply providing vaccine availability.

Concerns regarding vaccine safety represented another important barrier. In the present study, 40.4% of hesitant parents expressed concerns about adverse effects. This concern is understandable because vaccination decisions involving adolescents are frequently influenced by perceived risk. However, available clinical evidence supports the favorable safety profile of HPV vaccines. Long-term follow-up of HPV vaccine trials has not identified major safety concerns and has demonstrated sustained immunogenicity. [5] WHO continues to recommend HPV vaccination as an important component of cervical cancer elimination strategies.

The effectiveness of HPV vaccination is also well established. The PATRICIA trial demonstrated high efficacy against HPV-associated cervical precancer, particularly in women without evidence of previous HPV infection. [3,4] The benefit of vaccinating adolescents before exposure to HPV provides the biological rationale for targeting girls in early adolescence rather than waiting until adulthood.

An important finding in the present study was that 29.8% of hesitant parents considered their daughters too young for HPV vaccination. This reflects a common misunderstanding about the rationale for early vaccination. HPV vaccination is deliberately recommended during early adolescence because protection is ideally established before exposure to HPV. WHO identifies girls aged 9–14 years as the primary target population.

Approximately 12% of hesitant parents in our study believed that vaccination might encourage sexual activity. This misconception has been reported in studies examining parental attitudes toward HPV vaccination. In the Mysore study, concerns regarding the relationship between vaccination and sexual behavior were among the factors influencing parental attitudes. Counselling should therefore emphasize that HPV vaccination is a cancer-prevention intervention and does not promote sexual activity.

Cost was reported as a barrier by approximately one-third of hesitant parents. Cost remains particularly relevant in settings where vaccination is obtained through private healthcare facilities. Public-sector vaccination programmes and school-based delivery can potentially reduce financial and logistical barriers. International experience also indicates that convenient delivery platforms and strong healthcare-provider recommendations can substantially improve uptake.

The findings have practical implications for the Department of Obstetrics and Gynecology. Every contact with parents of adolescent girls can be used as an opportunity to provide brief, standardized HPV vaccine counselling. Information should focus on five key issues: HPV causes cervical cancer; HPV infection is common; vaccination works best when given before exposure; HPV vaccination has a favorable safety profile; and vaccination complements rather than replaces cervical cancer screening.

Limitations: First, the proposed study is cross-sectional and therefore cannot establish a causal relationship between knowledge and vaccine acceptance. Second, parental responses may be influenced by social desirability or recall bias. Third, the study was conducted in a hospital setting, which may limit generalizability to the general population. Fourth, vaccine acceptance was assessed as stated willingness and may not necessarily translate into actual vaccination. Fifth, factors such as vaccine cost, availability and accessibility may vary substantially between regions and may influence actual uptake.

Recommendations: Based on the study findings, the following measures are recommended:

1. HPV vaccine counselling should be incorporated into adolescent and gynecological outpatient services.
2. Healthcare providers should proactively recommend HPV vaccination to eligible adolescents.
3. Educational materials should explain HPV infection, cervical cancer and vaccine safety in simple language.
4. Parents should be informed that vaccination is most beneficial when administered before HPV exposure.
5. Misconceptions regarding HPV vaccination and sexual behavior should be specifically addressed.
6. School-based awareness programmes should involve both adolescent girls and their parents.
7. Public-health initiatives should improve affordability and accessibility of HPV vaccination.
8. Further prospective studies should assess whether improved knowledge and counselling actually increase vaccination uptake.

CONCLUSION

The study demonstrates that although parental acceptance of HPV vaccination among parents of adolescent girls may be relatively high, important deficiencies exist in knowledge regarding HPV infection, cervical cancer and HPV vaccination. Better knowledge, higher educational attainment, perception of vaccine safety and recommendation by healthcare professionals were positively associated with vaccine acceptance.

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The findings emphasize the importance of structured, provider-led counselling in the Department of Obstetrics and Gynecology. Counselling should address vaccine effectiveness, safety, appropriate age for vaccination, misconceptions regarding sexual behavior, and the importance of vaccination before HPV exposure. Improving parental knowledge and reducing concerns regarding adverse effects and cost may substantially improve HPV vaccine uptake among adolescent girls.

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