

RESEARCH ARTICLE

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Knowledge, Attitude and Practice on Human Papillomavirus Vaccination among Healthcare Providers at a Tertiary Care Centre in North Delhi

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Abstract

Objective: In India, majority of cancer-related deaths are attributed to Human Papillomavirus (HPV), which is preventable through vaccines such as Gardasil and Gardasil 9. Despite their efficacy, uptake of these vaccines among healthcare providers (HCPs) remains low. This study aimed to evaluate knowledge, attitudes, and practices (KAP) regarding HPV vaccination among HCPs at a tertiary care center in India. **Methods:** A survey was conducted among 399 HCPs at a tertiary care hospital. Data were collected using an online questionnaire focusing on knowledge of HPV, attitudes towards HPV vaccination, personal vaccine uptake, and perceived barriers to vaccination. Statistical analysis was conducted using chi-squared tests, p-value of <0.05 were considered statistically significant. **Result:** Significant knowledge gaps were identified, particularly among nurses and paramedical staff. While 95.9% of doctors were aware of HPV, only 66.7% of nurses and 73.4% of paramedical staff had similar knowledge. Awareness of HPV transmission was highest among doctors (98.5%) compared to nurses (87.1%) and paramedical staff (91.7%). Despite 89.34% of doctors expressing confidence in the vaccine's safety, only 11.67% had received it. Fewer than 9% of nurses and paramedical staff reported being vaccinated. The primary barriers to vaccine uptake were affordability and lack of awareness. **Conclusion:** The study highlights the need for targeted educational efforts to improve knowledge about HPV and its vaccines among HCPs, especially nurses and paramedical staff. Addressing misconceptions and integrating the HPV vaccine into national immunization programs could improve vaccine accessibility and uptake, ultimately reducing cervical cancer burden in India.

Keywords: Practice- knowledge- awareness- healthcare providers- HPV vaccine

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Introduction

According to Globocan 2022, Cervical cancer is the second most common cancer among women after breast cancer, with an estimated 6,62,301 new cases and 3,48,874 deaths worldwide. In India alone, there were 1,27,526 new cases and 79,906 deaths in 2022 accounting for about one-quarter of the worldwide burden. Cervical cancer is mainly caused by HPV infection, which is a leading cause of cancer-related deaths among women in India.

Human Papillomavirus (HPV) is a diverse family of non-enveloped, double-stranded DNA viruses, comprising over 200 sequenced genotypes [1]. As one of the most common sexually transmitted infections worldwide, HPV affects individuals of all the genders equally [2]. It plays a significant role in the development of several cancers, most notably cervical cancer, oral cancers and

Ano-genital cancers (including Anal, Penile, Vaginal and Vulvar cancers) [3]. HPV is classified into low-risk (LR) and high-risk (HR) subtypes based on its anatomical site, genetic makeup, and clinical manifestations. Low-risk HPV types, such as HPV 6 and 11, are typically associated with non-oncogenic conditions like genital warts. In contrast, high-risk HPV types, including HPV 16 and 18, are known for their oncogenic potential, contributing to the majority of HPV-related cancers [4, 5].

Many countries have incorporated these vaccines into their national immunization programs, following recommendations from the World Health Organization (WHO) [6-8]. In India, however, the availability of HPV vaccines is limited to the private sector [9], with options such as the quadrivalent vaccines, Cervavac and Gardasil targeting (HPV 6, 11, 16, and 18) [10] and Nonavalent vaccine, Gardasil 9 targeting (HPV 6, 11, 16, 18, 31, 33,

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45, 52, and 58).

Despite the well-documented benefits of HPV vaccination, its widespread adoption in India faces several significant obstacles. High vaccine costs, concerns about potential side effects, socio-cultural barriers, and a general lack of awareness about HPV and its associated cancer risks hinder vaccination efforts, especially among less educated populations in rural areas [11, 12]. Additionally, hesitancy toward HPV vaccination can be traced to various factors, including limited knowledge about the vaccine, misconceptions about its necessity, unawareness of its availability, concerns over its safety, and cultural sensitivities regarding a vaccine for a sexually transmitted infection. Healthcare professionals, such as doctors, nurses, and paramedical staff, are vital in addressing these challenges by educating the public and dispelling myths.

In the absence of robust national initiatives to promote HPV awareness, this study aims to evaluate the knowledge, awareness, and practices of healthcare providers through a structured survey. Understanding how these professionals perceive and approach HPV vaccination is crucial for developing effective strategies to increase vaccine uptake and reduce the burden of HPV-related cancers.

Materials and Methods

Data were collected over three months (February 2024 to April 2024) using an online survey distributed through social media platforms and institutional email lists. Each participant could submit the survey only once, ensuring data integrity.

Study Design

This study employed a cross-sectional design, suitable for assessing the knowledge, attitudes, and practices (KAP) of healthcare providers regarding HPV vaccination at a single point in time. This design is appropriate for identifying knowledge gaps, attitudes, and behavioral patterns among healthcare workers and serves as a basis for targeted interventions.

Sampling Technique

A convenience sampling technique was used to recruit participants. The approach was chosen due to its feasibility in engaging healthcare professionals across various departments within the tertiary care hospital. This method allowed for the inclusion of a diverse group of respondents, representing doctors, nurses, and paramedical staff. The required sample size was calculated using Cochran's formula as 384. After accounting for potential non-responses, 399 participants completed the survey, ensuring adequacy for statistical analysis.

Eligibility Criteria

Healthcare workers including doctors, nurses and paramedical staff actively employed at the tertiary care centre, aged ≥ 18 years, and willing to provide informed consent were eligible. Retired professionals, administrative staff, and incomplete responses in the survey were excluded.

Data Collection Instrument

A structured questionnaire was developed by the preventive oncology team to assess KAP. The questionnaire was available in English and included the following sections:

Knowledge

Assessed understanding of HPV, its transmission, and vaccine specifics.

Attitude

Explored perceptions of vaccine safety, affordability, and the necessity of national immunization inclusion.

Practice

Evaluated personal vaccine uptake, recommendation habits, and barriers.

KAP Scoring

Correct responses to knowledge-based questions were assigned 1 point each, with a total score range of 0–10. Scores were categorized as low (0–4), moderate (5–7), or high (8–10). Responses for attitude were captured using a 5-point Likert scale, with higher scores indicating a more positive attitude toward HPV vaccination. Practice Scores were based on vaccine uptake and recommendation frequency, categorized as active, moderate, or inactive practice. The composite score was calculated by summing individual KAP components, allowing for ranking and qualitative analysis.

Data Analysis

Data were analyzed using IBM SPSS Statistics (version 23). Descriptive statistics summarized demographic and KAP responses. Inferential analyses, including chi-squared tests, assessed associations between KAP scores and demographic factors. Statistical significance was set at $p < 0.05$.

Results

There were 399 participants in this study, and their demographic profile is presented in Table 1. The gender-wise and age-wise distribution of knowledge and awareness about HPV vaccination was found to be significant, as shown in Table 2 ($p < 0.05$). The knowledge and awareness of HPV vaccination among healthcare providers were statistically significant, as illustrated in Figure 1 and Table 3 ($p < 0.05$). Table 4 highlights the HPV vaccination uptake among healthcare providers, also demonstrating significance ($p < 0.05$). The responses to all survey questions are detailed below.

The results show that 95.9% of doctors correctly identified what HPV is, indicating a strong understanding among this group. However, awareness was lower among nurses (66.7%) and paramedical staff (73.4%). This gap highlights the need for enhanced education, particularly among non-physician healthcare providers, to ensure they have a solid understanding of HPV. Almost all doctors (98.5%) knew how HPV is transmitted, compared to 87.1% of nurses and 91.7% of paramedical staff. These

Knowledge and awareness of HPV vaccination among HCP's

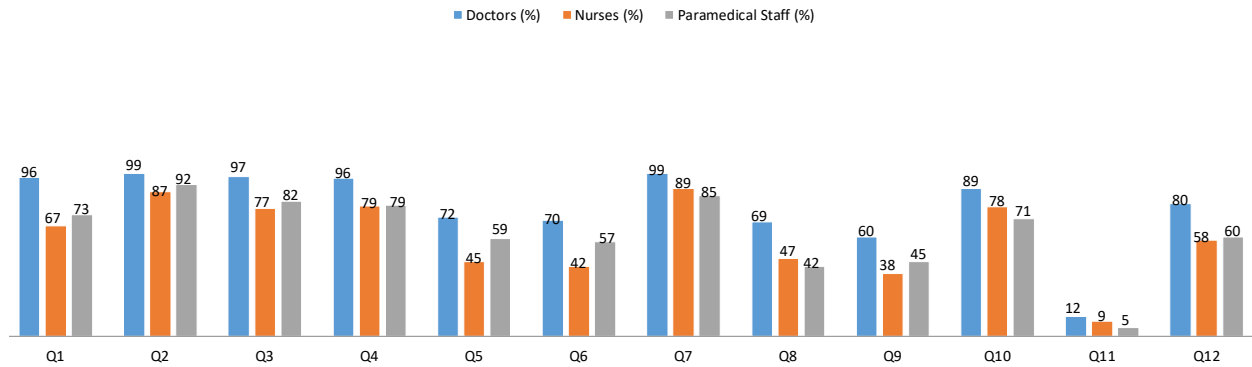


Figure 1. Knowledge and Awareness of HPV Vaccination among Healthcare Providers (p<0.05)*

Table 1. Demographic Profile of Healthcare Providers Included in Survey (n=399)

Characteristics of Respondents	Frequency	Percentage (%)
1. Gender		
Males	128/399 (32.15%)	32.15%
Females	271/399 (67.9%)	67.90%
2. Age (yr)		
Eligible for Vaccination (<18-26 years)	239/399 (59.9%)	59.90%
Non-eligible for Vaccination (>26 years)	160/399 (40.1%)	40.10%
3. Profession		
Doctors	197/399 (49.4%)	49.40%
Nurses	93/399 (23.3%)	23.30%
Paramedical Staff	109/399 (27.3%)	27.30%

results suggest that while most healthcare workers understand how the virus spreads, some gaps still exist, especially among nurses. Clearer guidance on HPV transmission could improve patient counseling efforts.

Awareness of the HPV vaccine was highest among doctors (96.5%), but lower among nurses (77.4%) and paramedical staff (81.59%). These numbers highlight a need to improve vaccine awareness, particularly for nurses and paramedical staff, as they are often involved in vaccination campaigns and patient education. When asked about the availability of the HPV vaccine in India, 95.5% of doctors were aware, while only 78.5% of nurses and 79% of paramedical staff answered correctly. This indicates that awareness of vaccine availability is

high among doctors but needs to be increased among other healthcare workers. Only 72% of doctors correctly identified the recommended groups for HPV vaccination, compared to 45% of nurses and 58.7% of paramedical staff. This knowledge gap, particularly among non-doctor healthcare workers, could limit their ability to advise patients about who should receive the vaccine.

Doctors had a 70% correct response rate for identifying the HPV vaccine, whereas nurses and paramedical staff had significantly lower rates (42% and 57%, respectively). This highlights the need for increased training on the specific vaccines available to help non-physician staff better understand what is being offered to patients. Doctors demonstrated a high level of knowledge (98.5%)

Table 2. Gender and Agewise Distribution of Knowledge and Awareness of HPV Vaccination (p<0.05)*

Respondents Characteristics	Q1, (%)	Q2, (%)	Q3, (%)	Q4, (%)	Q5, (%)	Q6, (%)	Q7, (%)	Q8, (%)
1. Gender								
Males	82.40%	94.50%	84.40%	86.70%	69.50%	67%	90.60%	55.50%
Females	84.10%	93.70%	89.60%	87%	61.20%	61.20%	93.70%	61.70%
2. Age(yr)								
<18-26	79.90%	93.70%	86.60%	83.60%	62%	60.20%	92.50%	57.30%
>26	87.50%	94.30%	90%	92%	67%	67.50%	93%	63.10%

Q1, What is HPV?; Q2, Mode of Transmission of HPV infection?; Q3, Are you aware of the HPV vaccine?; Q4, Is HPV Vaccine available in India?; Q5, HPV Vaccine is recommended for?; Q6, Which of the following is/are HPV Vaccine?; Q7, Best time to vaccinate against HPV?; Q8, Strains of HPV responsible for Cervical cancer are?

Table 3. Knowledge and Awareness of HPV Vaccination among Healthcare Providers (p<0.05)*

Respondents Profession	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Doctors	96	99	97	96	72	70	99	69	60	89	12	80
Nurses	67	87	77	79	45	42	89	47	38	78	9	58
Paramedical	73	92	82	79	59	57	85	42	45	71	5	60

Q1, What is HPV?; Q2, Mode of Transmission of HPV infection?; Q3, Are you aware of the HPV vaccine?; Q4, Is HPV Vaccine available in India?; Q5, HPV Vaccine is recommended for?; Q6, Which of the following is/are HPV Vaccine?; Q7, Best time to vaccinate against HPV?; Q8, Strains of HPV responsible for Cervical cancer are?; Q9, Which cancers are associated with HPV; Q10, Do you have faith in safety of vaccine?; Q11, Have you received vaccine; Q12, Do you recommend HPV vaccine?

Table 4. HPV Vaccination Uptake among Healthcare Providers in the Survey (p<0.05)*

Respondents Characteristics	Do you have faith in safety & efficacy of HPV Vaccine? (%)	Have you received HPV vaccine? (%)
1. Gender		
Males	78.13%	3.90%
Females	83.76%	11.80%
2. Age(yr)		
<18-26	80.33%	10.80%
>26	84.37%	6.87%
3. Profession		
Doctors	89.34%	11.67%
Nurses	78.50%	8.60%

regarding the optimal timing for HPV vaccination, while nurses (89%) and paramedical staff (85%) were slightly less informed. Ensuring all healthcare workers know that early vaccination (before sexual activity) is most effective will help in guiding patient recommendations.

Knowledge about the HPV strains responsible for cervical cancer was low across all groups, with only 69% of doctors, 47% of nurses, and 42% of paramedical staff answering correctly. Since this is critical for understanding cervical cancer prevention, addressing this knowledge gap is essential. In terms of understanding which cancers are linked to HPV, only 60% of doctors, 38% of nurses, and 45% of paramedical staff provided correct answers. This reveals a considerable lack of awareness about HPV-related cancers, particularly among non-physician staff, who need more comprehensive education on this topic.

Confidence in the vaccine's safety was relatively high across all groups, with 89.34% of doctors, 78.5% of nurses, and 71.55% of paramedical staff trusting in its safety and efficacy. This suggests that, while healthcare workers largely believe in the vaccine, there is still a need to reinforce this trust, particularly among non-doctors. Despite the high levels of trust in the vaccine's safety, only a small percentage of healthcare providers have actually been vaccinated. Just 11.67% of doctors, 8.6% of nurses, and 5.55% of paramedical staff reported receiving the vaccine. This points to barriers such as cost or access that need to be addressed to increase personal vaccination rates among healthcare workers.

A large proportion of doctors (80%) recommended the HPV vaccine to their patients, while only 58% of nurses and 60% of paramedical staff did so. The lower recommendation rates among nurses and paramedical staff may be tied to gaps in their knowledge and personal

vaccination status. Addressing these gaps could improve their confidence in recommending the vaccine to patients.

Discussion

The findings from this study provide valuable insights into the knowledge, attitudes, and practices regarding HPV vaccination among healthcare providers at a tertiary care center. There are significant gaps in knowledge and vaccine uptake, particularly among non-physician healthcare staff, which may hinder broader adoption of the HPV vaccine in clinical practice.

Doctors demonstrated a higher level of knowledge about HPV and its vaccine, with over 95% correctly identifying HPV and its mode of transmission. However, nurses and paramedical staff displayed significant gaps, with only 66.7% of nurses and 73.4% of paramedical staff aware of what HPV is. This lack of foundational knowledge is concerning, as these healthcare providers are often the first point of contact for patients seeking information. The gap in knowledge regarding the specific HPV strains responsible for cervical cancer was particularly striking. Only 69% of doctors, and less than 50% of nurses and paramedical staff, were aware of the oncogenic strains (HPV 16 and 18), which are responsible for the majority of HPV-related cancers. This is a critical issue, as awareness of these high-risk strains is essential for healthcare workers to convey the importance of vaccination. The current study identified several reasons for HPV vaccine uptake hesitancy among HCWs, with the most reported reason being a lack of adequate knowledge about the vaccine. This finding is consistent with recent literature, emphasizing the need for improved education and awareness among HCWs to promote vaccine uptake

[13].

While awareness of the HPV vaccine was high among doctors (96.5%), it was considerably lower among nurses (77.4%) and paramedical staff (81.59%). This highlights that non-physician healthcare providers often have lower awareness and understanding of vaccines. This lack of awareness is problematic, particularly as nurses and paramedical staff play key roles in delivering vaccinations and educating patients. The limited awareness of vaccine availability in India, particularly among non-physicians, further underscores the need for improved communication within healthcare settings. Despite high levels of trust in the vaccine's safety, particularly among doctors (89.34%), actual vaccination rates were alarmingly low across all groups. As shown in Table 4, only 11.67% of doctors and fewer than 9% of nurses and paramedical staff reported receiving the HPV vaccine. This finding is in line with a previous study which stated that physicians are more likely to have positive attitudes towards vaccination than nurses [14]. This reflects broader trends observed in other studies, where healthcare workers acknowledge the benefits of the vaccine but do not get vaccinated themselves due to various barriers, such as cost and access. The affordability issue is significant in India, where the vaccine is often only available in the private sector [14].

The inclusion of the HPV vaccine in India's National Immunization Programme (NIP) could dramatically increase vaccine uptake by addressing financial barriers. Countries where the vaccine is subsidized through national programs have seen higher uptake and greater public trust. To address these knowledge gaps and increase vaccine uptake among healthcare providers, several interventions are recommended. First, targeted educational programs providing up-to-date information on HPV, its oncogenic strains, and the benefits of vaccination are essential. Such programs should focus particularly on nurses and paramedical staff, who currently lack sufficient knowledge to confidently promote vaccination. Second, increasing the accessibility of the HPV vaccine, either through its inclusion in government-run immunization programs or through cost-reduction initiatives, would help overcome financial barriers. Finally, healthcare institutions should encourage personal vaccination among their own staff, as healthcare providers who are vaccinated are more likely to recommend the vaccine to their patients.

This study has several limitations. First, it relied on self-reported data, which may be subject to reporting bias or inaccuracies in recall. Second, the convenience sampling technique used for participant recruitment may limit the generalizability of the findings to healthcare providers in other regions or settings. Lastly, the cross-sectional design captures information at a single point in time, making it difficult to assess changes in knowledge, attitudes, or practices over time.

In conclusion, our study highlights that while doctors possess a high level of basic knowledge about HPV and its transmission, significant gaps remain in their understanding of critical aspects such as HPV-associated cancers and the specific strains causing cervical cancer, which impacts their ability to confidently recommend

vaccination to patients. Nurses and paramedical staff demonstrate lower levels of knowledge, particularly regarding vaccine specifics and target recommendations, which may hinder their capacity to counsel patients effectively. Despite a high level of trust in the vaccine's safety across all groups, actual vaccination rates among healthcare providers are notably low. Affordability and lack of awareness emerged as the primary barriers to vaccination. To address these issues, we recommend strengthening educational initiatives to enhance healthcare providers' knowledge and confidence in HPV vaccination and advocate for the inclusion of the HPV vaccine in the National Immunization Programme to improve accessibility and coverage.

Author Contribution Statement

Indu Aggarwal: Conceptualization, study design, manuscript reviewing and editing. Diksha Mehta: Manuscript drafting, data analysis, reviewing and editing. Pinky Yadav: Manuscript reviewing and editing. Shashi Rakheja: Manuscript reviewing and editing. Harmeet Goel: Manuscript reviewing and editing. Aishwarya Vinod: Data curation. Dhriti Dhawan: Data curation.

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Scientific Approval

Approval was obtained from the Scientific committee of Rajiv Gandhi Cancer Institute and Research Centre, Rohini.

Ethical Declaration

Approval was obtained from the Institutional Review Board of Rajiv Gandhi Cancer Institute and Research Centre, Rohini. Participation was voluntary, with informed consent obtained online before survey initiation. Anonymity and confidentiality of participant data were strictly maintained.

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