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## Impact of Educational Intervention on Cervical Cancer and HPV Vaccine Knowledge, Attitudes, and Acceptance among First-Year Medical Students of Birat Medical College

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### ABSTRACT

**Introduction:** Cervical cancer poses a significant health burden, particularly in developing nations, with notable incidence and mortality rates. However, there exists a notable gap in understanding the knowledge, attitudes, and acceptance surrounding cervical cancer and the Human Papillomavirus (HPV) Vaccine. This study aims to evaluate the current awareness, attitudes, and acceptance levels of HPV Vaccine among first-year medical students, alongside assessing the effectiveness of an educational intervention on these aspects.

**Objectives:** To evaluate current knowledge, attitude and acceptance of cervical cancer and HPV Vaccine and evaluate the impact of educational intervention.

**Methodology:** An analytical cross-sectional study was conducted among 96 first-year medical students at a medical college in Nepal from December 24, 2023, to February 28, 2024, after receiving Ethical Approval. Total enumeration sampling technique was applied, and a structured self-administered questionnaire, validated for data collection, was employed. Data were collected at baseline and after an educational intervention class to assess the impact on the knowledge, attitude, and acceptance toward cervical cancer and the HPV Vaccine.

**Result:** Pre-intervention scores (mean=5.90, SD=1.73) significantly increased after the intervention (mean=11.65, SD=1.44) with  $p < 0.001$ , indicating a 97.46% increase. Willingness to receive HPV vaccination increased from 47.9% to 88.5%, and willingness to recommend vaccination increased from 88.54% to 96.88%. No significant differences were found in vaccination willingness.

**Conclusion:** Educational interventions significantly enhanced medical students' willingness to receive and recommend HPV vaccination, suggesting potential for future healthcare provider influence on vaccination behaviors.

### INTRODUCTION

Cervical cancer is the fourth most frequent cancer in women worldwide and the second most common cancer in women living in less developed regions with the highest incidence and fatality rates occurring in developing regions.<sup>1</sup> Cervical cancer remains the second most frequent cancer and cause of highest cancer-related deaths among Nepalese women, with 5-year prevalence of 12.4 per one hundred thousand population, with 2,169 new cases and 1,313 deaths in the year 2022.<sup>2</sup>

Decades of research have shown that cervical infection with high-risk Human Papilloma Virus (HPV) strains is a precursor to cervical cancer.<sup>3</sup> The largest burden of cervical

cancer occurs in underdeveloped nations, where it is frequently the most common female malignancy, accounting for up to one-quarter of all female cancers.<sup>4</sup> HPV can infect basal epithelial cells of the mucocutaneous membrane, and it has been linked to a wide range of clinical disorders, including benign lesions and malignancy.<sup>5</sup> As of 2023, there are six HPV vaccinations available internationally that protect against high-risk HPV strains 16 and 18, which cause the majority of cervical cancers, and have been proven to be both safe and effective at preventing HPV infection and cervical cancer.<sup>1</sup> Adolescents are ideal candidates for preventive HPV vaccination, and the decision to get vaccinated is heavily influenced by their awareness of cervical cancer and attitudes regarding HPV vaccination.<sup>6</sup> Educational interventions are especially important for college students who can still obtain the HPV vaccine, which is recommended for young men and women up to the age of 26.<sup>7</sup> According to a study done in China among female undergraduate students, students' willingness to obtain HPV vaccination increased considerably after the intervention. Female undergraduate students over the age of 20 were 1.6 times more likely to accept vaccination than those under the age of 20.<sup>8</sup>

The current study aimed to assess the impact of educational intervention on cervical cancer and HPV vaccine knowledge, attitudes, and acceptance among first-year medical students of a medical college.

## METHODOLOGY

This is a cross-sectional study conducted among first-year MBBS students of Birat Medical College and Teaching Hospital. The research was conducted from December 24, 2023, to February 28, 2024, after receiving ethical approval from the Institutional Review Committee of Birat Medical College and Teaching Hospital. The ethical approval number for the research was IRC-PA-361/2023. Individual written as well as verbal consent was also taken from each student participating in this study. Following approval, the data was collected within two weeks. A total enumeration sampling technique was used in this study. All the first-year medical students were included in this study and those who did not provide consent were excluded. The sample size was determined using the designated formula:

$$(Z\alpha + Z\beta)^2 \times 2pq / (p1 - p2)^2$$

where,  $Z\alpha = 1.96$ ;  $Z\beta = 0.84$

total sample size (n) = 61

The minimum required sample size was 61, and a final sample size of 96 was taken.

The questionnaire items were finalized involving consultation with three experts: a research and statistical expert, along with two subject matter experts. It was pre-tested on paramedical students. Face validity was established.

The participants were provided with a proforma comprising various sections. Section A focused on gathering socio-demographic information, while Section B assessed knowledge related to cervical cancer. Sections C and D evaluated knowledge, attitude, and acceptance of HPV vaccination. Following

completion of the pretest assessment, participants received an educational session. An interactive educational session of one and half hour was conducted. The content of the educational session was prepared with the help of subject experts involved in this study which included the etiology of cervical cancer, cervical cancer screening, and HPV vaccine recommendations, safety, and efficacy. Subsequently, a post-test assessment was administered to evaluate the impact of the educational intervention.

Data was entered into Microsoft Excel and analyzed with SPSS Version 23. Demographic characteristics, knowledge about cervical cancer and HPV vaccines, and attitudes toward HPV vaccination were described using frequencies and percentages. Tables, cross tables, and graphs were used to view univariate data. Each correct response in the knowledge section of the questionnaire was assigned a score of one. These scores were then summed up to determine the overall score obtained by each participant. Paired t-test and Chi-square test were used to view the association.

## RESULTS

### Socio-demographic characteristics of respondents

Socio demographic characteristics of the participants is shown in table 1. A total of 96 participants participated in this study out of which 49% were boys and 51% were girls. The mean age of the participants was  $20.02 \pm 1.06$  years. None of the participants in the study were married. The majority of participants, specifically 51.04%, believed it's ok to have sex before marriage, while 13.54% disagreed, and the remaining participants (35.41%) chose not to express their opinion on the matter. Majority of the students (86.5%) passed grade 12 from private college.

**Table 1: Demographic profile of the study participants (N=96)**

Variables	n(%)
Gender	
Boys	47(49)
Girls	49(51)
Age	
18	7(7.3)
19	22(22.9)
20	36(37.5)
21	26(27.1)
22	3(3.1)
23	2(2.1)
Marital Status	
Unmarried	96(100)
Married	0(0)
Opinion towards premarital sexual intercourse	
It is bad	13(13.54)

It is okay	49(51.04)
Prefer not to say	34(35.41)
Type of school in 12th Grade	
Private (Grade 12)	83(86.5)
Government (Grade 12)	13(13.54)
Type of school in 10th Grade	
Private (Grade 10)	85(88.5)
Government (Grade 10)	11(11.5)

Knowledge of cervical cancer before and after educational intervention

**Table 2: Knowledge of cervical cancer before and after educational intervention (N=96)**

Pre-intervention		Post-intervention	
	n(%)		n(%)
Is cervical cancer preventable?			
Yes*	84(87.5)	88(91.67)	
Don't know	8(8.34)	0(0)	
No	4(4.16)	8(8.34)	
Methods used to screen for cervical cancer			
Don't know	3(3.12)	0(0)	
Pap Smear and VIA	11(11.45)	2(2.08)	
Pap Smear, VIA and VILI*	17(17.70)	75(78.12)	
Pap Smear, VIA, VILI and Hysteroscopy	11(11.45)	10(10.41)	
Pap Smear, VIA, VILI, Hysteroscopy and USG	54(56.25)	9(9.37)	
Strains responsible for majority of cervical cancer cases			
Don't know	5(5.20)	1(1.04)	
6, 11	19(19.80)	33(34.37)	
16, 18*	33(34.40)	58(60.41)	
31, 33	23(24)	3(3.12)	
45, 52	16(16.70)	1(1.04)	
Age typically recommended for women to start cervical cancer screening			
Don't know	1(1.04)	0(0)	
20 years	14(14.58)	18(18.75)	
30 years*	51(53.12)	69(71.87)	
40 years	30(31.25)	9(9.37)	
Risk factors for cervical cancer			
Human Papillomavirus (HPV) infection			

TRUE*	76(79.16)	92(95.83)
FALSE	0(0)	1(1.04)
Don't know	20(20.83)	3(3.12)
Early Marriage		
TRUE*	56(58.33)	93(96.87)
FALSE	21(21.87)	2(2.08)
Don't know	19(19.79)	1(1.04)
Multiple sexual partners		
TRUE*	61(63.54)	94(97.91)
FALSE	17(17.70)	0(0)
Don't know	18(18.75)	2(2.08)
Smoking		
TRUE*	22(22.91)	82(85.41)
FALSE	40(41.66)	14(14.58)
Don't know	34(35.41)	0(0)
Prolonged use of Oral Contraceptive Pills		
TRUE*	47(48.95)	82(85.41)
FALSE	16(16.66)	5(5.20)
Don't know	33(34.37)	9(9.37)

Note: Asterisk (\*) denotes the correct response in the questionnaire.

The table 3 depicts the knowledge of first year medical students on HPV Vaccine before and after educational intervention. Fifty percent of the students answered the primary target of HPV Vaccine to be the 14-26 years age group but after the session 89 (92.70%) answered it to be the 9-14 years age group.

**Table 3: Knowledge of HPV Vaccine before and after educational intervention (N=96)**

Pre-intervention		Post-intervention	
	n(%)		n(%)
Which age is the primary target for HPV Vaccine?			
14-26 years	48(50)	7(7.29)	
26-45 years	33(34.37)	0(0)	
9-14 years*	15(15.62)	89(92.70)	
Shots of HPV vaccine needed in primary target age group			
Don't know	4(4.16)	0(0)	
2 dose*	51(53.1)	92(95.83)	
3 dose	35(36.5)	3(3.12)	
4 dose	6(6.3)	1(1.04)	

HPV Vaccine is useful for boys		
	n(%)	n(%)
Don't know	11(11.45)	9(9.4)
No	49(51.04)	6(6.25)
Yes*	36(37.50)	81(84.37)
Route of HPV vaccination		
	n(%)	n(%)
Don't know	2(2.08)	0(0)
Intramuscular*	32(33.33)	91(94.79)
Intra dermally	9(9.37)	1(1.04)
Intravenous	17(17.70)	3(3.12)
Subcutaneously	36(37.50)	1(1.04)
Strain of HPV Gardasil protects against		
	n(%)	n(%)
Don't know	7(7.29)	2(2.08)
6, 11, 13, 16	25(26.04)	4(4.16)
6, 11, 16, 18*	26(27.08)	83(86.45)
6, 11, 31, 33	10(10.40)	2(2.08)
6, 11, 45, 52	28(29.16)	5(5.20)

Note: Asterisk (\*) denotes the correct response in the questionnaire.

The table 4 shows results of change in attitude and acceptance regarding HPV Vaccine among first year medical students following educational intervention. The willingness of getting HPV Vaccine before session was 47.91% which post session was found to be 88.54%.

**Table 4: Attitude and acceptance before and after educational intervention (N=96)**

	Pre-Intervention	Post-Intervention
Are you willing to get the HPV vaccine?		
	n(%)	n(%)
Missing	2(2.08)	0(0)
No	48(50)	11(11.45)
Yes	46(47.91)	85(88.54)
Would you advise others to get vaccinated?		
	n(%)	n(%)
Missing	2(2.08)	0(0)
No	9(9.37)	3(3.12)
Yes	85(88.54)	93(96.87)
Main reason for hesitations about getting vaccinated or recommending it to others		
	N	N
Missing	0(0)	11(11.45)
Concerns about safety	6(6.25)	13(13.54)

Cost	10(1.40)	18(18.75)
Lack of information	20(2.80)	6(6.25)
No hesitation at all	8(8.33)	5(5.20)
Not available	1(1.04)	4(4.16)
Not useful for boys	12(12.50)	2(2.08)
Others	0(0)	1(1.04)
Uncertainty about its effectiveness	6(6.25)	3(3.12)
Worries about side effects	33(34.37)	33(34.37)
How important is the HPV vaccine in preventing cancer?		
	n(%)	n(%)
Important	47(48.95)	24(25)
Neutral	9(9.37)	1(1.04)
Not Important	2(2.08)	0(0)
Very important	38(39.58)	71(73.95)
HPV vaccine is safe for all age groups		
	n(%)	n(%)
No	29(30.20)	13(13.54)
Not sure	36(37.50)	6(6.25)
Yes	31(32.29)	77(80.20)

There was a significant difference in the total scores for pre-intervention (mean=5.90, SD=1.73) and post-intervention (mean=11.65, SD=1.44) with a p-value of <0.001. There was a 97.46% increase in the mean of total scores of the post-test group following the intervention. Willingness to get the HPV vaccination increased from 47.9% to 88.5% following intervention. Willingness to recommend vaccination increased from 88.54% to 96.88% following intervention. There was no significant difference in willingness to receive HPV vaccination among participants who studied in government or private schools for Grade 10 (p-value 0.85) or Grade 12 (p-value 0.31).

## DISCUSSION

This study assessed the baseline awareness of cervical cancer and HPV first-year medical students in a medical college, as well as their readiness to get HPV vaccines. To our knowledge, this is the first study in Nepal conducted among medical students to assess the impact of an educational intervention on improving understanding and attitudes concerning cervical cancer, HPV, and its vaccinations. Our results show that educational intervention can help improve the knowledge and attitude of medical students regarding cervical cancer and HPV. Our study emphasizes the need for greater educational interventions, particularly for this age group of young adults.

The average age of participants in this study was 20.02 years old which is important because it has been found that the first peak of HPV infection appears at the age group 20–24 and by the age of 21, more than half of high-risk HPV infections that result in cancer are acquired.<sup>9 10</sup>

The US National Immunization Survey showed that adolescents who received healthcare provider recommendations for vaccine were 5 times more likely to receive a vaccine as compared to those who didn't receive a recommendation.<sup>11</sup> Since medical students take on patient care duties after they graduate and enroll in residency programs, including them in these training programs may strengthen attempts to improve provider referrals.<sup>12</sup> In our study, willingness to recommend vaccination increased from 88.54% to 96.88% following the intervention.

In a study conducted by Dangal et al. (2024), it was found that there is low awareness and low utilization of cancer prevention and screening strategies. Additionally, the study revealed that the level of knowledge among healthcare professionals is significantly associated with receiving training and the existence of screening guidelines in their hospitals. However, despite this correlation, the provision of training remains inadequately widespread.<sup>13</sup> In our study we found that many medical students were not aware of the risk factors of cervical cancer and methods of cervical cancer screening. Consistent with other research, our study found that an educational intervention significantly increased general awareness of HPV, vaccination, risk factors, and cervical cancer.<sup>14</sup> Similar findings were also found in other investigations done among medical students.<sup>15,16</sup>

## CONCLUSION

This study highlights the effectiveness of educational interventions in improving knowledge and attitude and acceptance regarding cervical cancer and HPV vaccination among first year medical students. The significant increase in willingness to receive the HPV vaccination following the intervention suggests the educational initiatives can play a pivotal role in promoting preventive healthcare behaviors. Increase in willingness to recommend vaccination post-intervention indicates such educational intervention among medical students can increase the potential future health care providers to positively influence vaccination uptake among their patients.

**RECOMMENDATION** There is a need in developing countries of today to increase HPV vaccination coverage. It's vital to expand educational initiatives and research on attitudes towards cervical cancer and HPV vaccines, aiming for broader population reach. Additionally, integrating preventive oncology curriculum into medical schools is essential to equip future healthcare providers with comprehensive knowledge and skills in cancer prevention.

## LIMITATIONS OF THE STUDY

There are certain limitations in our study. Firstly, we only enrolled students from the first year of medical college. Being a single-center medical school-based study, the study results cannot be generalized to a broader population. Also, in these self-reported questionnaires, certain results should be cautiously interpreted, especially those regarding sexual behaviors, which are subject to the effects of self-report bias.

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**CONFLICTS OF INTEREST** None

**FINANCIAL DISCLOSURE** None

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