Original Research Article

Journal of College of Medical Sciences-Nepal, Vol-21, No.2, Apr-Jun 2025

ISSN: 2091-0657 (Print); 2091-0673 (Online) Open Access
DOI: 10.3126/jcmsn.v21i2.78075

Prevalence and Associated Factors of HPV DNA Test Status of Women Attending a Tertiary Cancer Hospital of Central Nepal

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ABSTRACT

Background

Human papillomavirus (HPV) is a significant cause of cervical cancer, and understanding the factors associated with HPV infection in women is crucial for preventive strategies. This study aimed to find the prevalence and associated factors of HPV DNA test results among women aged 30-50 years.

Methods

An analytical cross-sectional study was conducted at the BP Koirala Memorial Cancer Hospital from July 2024 to March 2025. Ethical approval was obtained from the Nepal Health Research Council (Ref No. 53-2024). Informed consent was collected from all participants. A total of 1,000 women aged 30-50 years were tested for HPV DNA. The dependent variable was HPV DNA status. Data were analyzed using SPSS software, and statistical associations were determined using Chi-square test. A p-value of <0.05 was considered as statistically significant.

Results

The prevalence of HPV DNA positivity was found to be 10% (95% CI: 8.14% - 11.8%). Significant associations were observed between HPV positivity and early sexual debut (p-value= 0.048), contraceptive use (p-value < 0.001), and BMI (p -value= 0.018), sexual bleeding during intercourse was also strongly associated with HPV DNA status (p -value < 0.001).

Conclusions

The study highlights early sexual activity, contraceptive use, and BMI as significant factors associated with HPV DNA positivity in women aged 30-50 years. These findings suggest the need for targeted public health interventions focused on sexual health education, contraceptive counseling, and HPV screening for women in this age group.

Keywords: HPV DNA; cervical cancer; BP Koirala

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Article received: 2025-01-16. **Article accepted**: 2025-05-15. **Article published**: 2025-06-30.

INTRODUCTION

Cervical cancer is a major global health problem and the fourth most common cancer among women, causing an estimated 348,709 deaths and 662,044 new cases in 2022.[1] It is caused by human papillomavirus (HPV), a group of over 150 viruses transmitted through sexual or skin-to-skin contact. HPV types are classified into high-risk and low-risk groups[2], high-risk HPV-16 and HPV-18 account for most cases, with HPV-16 linked to squamous cell carcinoma and HPV-18 to adenocarcinoma.[3] Global HPV DNA prevalence is 10.4%, highest in Africa (22.1%) and Central America/Mexico (20.4%), followed by North America (11.3%), Europe (8.1%), and Asia (8.0%), women under 35 are most affected.[4] In Nepal, overall HPV prevalence is 19.7% (11.7% low-risk, 8.7% high-risk).[5] As HPV infection correlates with low socioeconomic status, early marriage, childbearing, and multiple sexual partners. This study aims to study HPV DNA prevalence and its associated factors among women in a tertiary cancer hospital of central Nepal.

METHODS

An analytical cross-sectional study was conducted at the Gynecology Department of BP Koirala Memorial Cancer Hospital, Bharatpur, Chitwan, Nepal from July 2024 to March 2025, among women aged 30 -50 years. Ethical approval was taken from the Nepal Health Research Council (Ref No. 53-2024) before data collection. Written informed consent was obtained from all participants before the initiation of data collection. This research is part of a collaborative project between BP Koirala Cancer Hospital Bharatpur Chitwan and China. The primary objective of this study was to examine the HPV DNA status of 1,000 women aged 30–50 years. HPV DNA test result was dependent variable while independent variables included: age at menarche, current age, age at marriage, age at first sexual intercourse, age at pregnancy, body mass index (BMI), yearly family income, occupation, family history, marital status, regular menstruation status, menopausal status, bleeding during sexual intercourse, contraceptive use, number of sexual partners, number of deliveries, and participation in screening programs. Self structured questionnaire were used for data collection. After collecting data it was chech for completeness and then assigned unique serial numbers before being entered into Microsoft Excel. Data were entered and analyzed on SPSS 16 using descriptive and inferential Statisticl tools. In the descriptive statistics for categorical variables frequency along with percentage were used as well as some gramphic presentiation like pie charts were used. For continuous variables mean and Standard deviation were used. In the inferential Statistics to find the associations between the binary outcome (HPV DNA status: positive or negative) and independent variables were assessed using Chi-square tests and Fisher's Exact Test were used after checking their assumptions. A 95% confidence interval (CI) was calculated for the positive HPV results. p-value of less than 0.05 was considered as statistically signficant.

RESULTS

Among the 1,000 individuals tested for HPV DNA, 17(1.7%) were positive for HPV 16 alone, 6 (0.6%) for HPV 16 with other types, 8 (0.8%) for HPV 18 alone, 1 (0.1%) for HPV 18 with others, and 68 (6.8%) for other high-risk HPV types and 900(90%) were negative (Table 1).

Table 1. HPV DNA results. (n=100)

HPV DNA results	Frequency (%)
16 & Others Positive	6(0.6)
16 Positive	17(1.7)
18 & Others positive	1(0.1)
18 Positive	8(0.8)
Others high-risk positive	68(6.8)

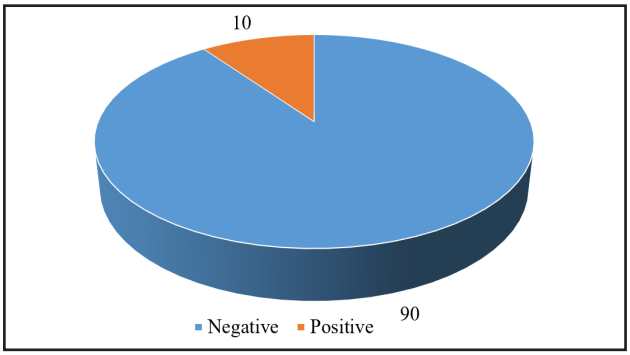

Figure 1. Prevalence of HPV DNA finding. (n=100)

The prevalence of HPV DNA positive was 10% (with 95% CI as 8.14% to 11.85%) (Figure 1).

Among the 100 individuals who tested positive for HPV DNA. Majority experienced menarche before the age of 15 (85%) and there is no statistically significant association between age of mensuration and HPV DNA result (p-value = 0.6). The highest proportion of HPV-positive were within the 35 - 40 year age range (29%), followed by those aged 40–45 years (25%) and 45–50 years (24%). Marital age did not demonstrate a significant relationship with HPV positivity (p-value = 0.4). Regarding age at first sexual intercourse was significantly associated with HPV infection (p-value = 0.048), with 70% of HPV-positive individuals reporting sexual debut between the ages of 10 and 20, compared to 57% among those who tested negative. Likewise, age at first pregnancy did not show a statistically significant association (p-value = 0.3) (Table 2).

Table 2. Association of HPV DNA result with age-related information of women. (n=1000)

Characteristic	HPV DNA result		p-value[2]
	Negative (n = 900[1])	Positive (n = 100[1])	
Age of mensuration (years)			
<15	745 (83%)	85 (85%)	0.6
≥15	155 (17%)	15 (15%)	
Current age (years)			
30-35	180 (20%)	22 (22%)	0.6
35-40	218 (24%)	29 (29%)	
40-45	264 (29%)	25 (25%)	
45-50	238 (26%)	24 (24%)	
Age at marriage (years)			
<15	58 (6.4%)	3 (3.0%)	0.4
15-30	834 (93%)	97 (97%)	
≥30	8 (0.9%)	0 (0%)	
Age at first sex (years)			
10-20	517 (57%)	70 (70%)	0.048
20-30	375 (42%)	30 (30%)	
30-40	8 (0.9%)	0 (0%)	
Age at pregnancy (years)			
<25	755 (84%)	88 (88%)	0.3
≥25	145 (16%)	12 (12%)	

[1] n (%)

[2] Pearson's Chi-squared test; Fisher's exact test

Body mass index (BMI) showed a statistically significant association with HPV DNA status (p = 0.018). Nearly half (49%) of HPV-positive individuals had a BMI in the normal range (18.5–24.99 kg/m²), compared to only 34% in the HPV-negative group. Overweight were more prevalent among HPV-negative participants (47%) than HPV-positive ones (31%). This suggests that individuals with normal BMI may be at comparatively higher risk of HPV infection in this population, warranting further investigation into behavioral or immunological

Table 3. Association of HPV DNA with sociodemographic characteristics of women. (n=1000)

Characteristic	HPV DNA result		p-value[2]
	Negative (n = 900[1])	Positive (n = 100[1])	
BMI (Kg/m²)			
<18.5	10 (1.1%)	1 (1.0%)	0.018
18.5-24.99	304 (34%)	49 (49%)	
25-29.99	423 (47%)	31 (31%)	
30-34.99	137 (15%)	17 (17%)	
35-39.99	26 (2.9%)	2 (2.0%)	
Yearly family income (Rs)			
<200000	69 (7.7%)	8 (8.0%)	0.7
200000-500000	394 (44%)	50 (50%)	
500000-1000000	275 (31%)	27 (27%)	
>1000000	162 (18%)	15 (15%)	
Occupation			
Unemployed	102 (11%)	9 (9.0%)	0.4
Farmer	137 (15%)	16 (16%)	
Job	42 (4.7%)	4 (4.0%)	
Worker	63 (7.0%)	10 (10%)	
Others	315 (35%)	27 (27%)	
Enterprise	241 (27%)	34 (34%)	
Family history			
No	776 (86%)	82 (82%)	0.3
Yes	124 (14%)	18 (18%)	
Marital status			
Unmarried	1 (0.1%)	0 (0%)	0.3
Married	878 (98%)	95 (95%)	
Divorced	7 (0.8%)	2 (2.0%)	
Widowed	11 (1.2%)	2 (2.0%)	
Others	3 (0.3%)	1 (1.0%)	

[1] n (%)

[2] Pearson's Chi-squared test; Fisher's exact test

factors. There is no significant associations were found between HPV status and other variables such as yearly family income (p-value = 0.7), occupation (p-value = 0.4), family history of related illness (p-value = 0.3), or marital status (p-value = 0.3). The distribution of income levels, occupational categories, and marital status were largely comparable between HPV-positive and HPV-negative groups (Table 3).

Table 4. Association of HPV DNA with personal characteristics of women. (n=1000)

Characteristic	HPV DNA result		p-value[2]
	Negative (n = 900[1])	Positive (n = 100[1])	
Regular menstruation			
No	280 (31%)	39 (39%)	0.11
Yes	620 (69%)	61 (61%)	
Menopausal			
Not menopause	798 (89%)	95 (95%)	0.14
Perimenopause	44 (4.9%)	3 (3.0%)	
Menopausal	58 (6.4%)	2 (2.0%)	
Bleeding during sexual intercourse			
Yes	55 (6.1%)	15 (15%)	<0.001
No	845 (94%)	85 (85%)	
Contraceptive use	1 (0.1%)	93 (93%)	<0.001
Number of sexual partners			
1	14 (1.6%)	4 (4.0%)	0.14
2	844 (94%)	89 (89%)	
3	34 (3.8%)	6 (6.0%)	
4	8 (0.9%)	1 (1.0%)	
Number of deliveries (n=984)			
0 - 2	718 (80%)	74 (74%)	0.4
2 - 4	155 (17%)	22 (22%)	
>4	13 (1.4%)	2 (2.0%)	
Participate screening			
1	446 (50%)	47 (47%)	0.6
2	454 (50%)	53 (53%)	

[1] n (%)

[2] Pearson's Chi-squared test; Fisher's exact test

Reproductive and sexual health characteristics showed varied associations with HPV DNA status. Regular menstruation (p-value = 0.11) and menopausal status (p-value = 0.14) were not significantly related to HPV. However, sexual bleeding was strongly associated with HPV DNA infection (p-value < 0.001), with 15% of HPV DNA positive individuals reporting bleeding compared to 6.1% in the negative group. Additionally, contraceptive use (p-value < 0.001) was significantly higher among HPV DNA positive individuals (93%) compared to HPV DNA negative (0.1%). The number of sexual partners was not strongly linked to HPV DNA (p-value = 0.14), but those with one partner were more likely to test positive. Finally, number of deliveries (p-value = 0.4) and screening participation (p-value = 0.6) showed no significant differences between the groups (Table 4).

DISCUSSION

HPV infection is a major cause of cervical cancer in this study, the prevalence of HPV infection was found to be 10%, and the majority of cases were other high-risk and HPV 16 positive is 2.3%, and HPV 18 is 0.9% other high-risk positive is 6.8%. our result is similar to the worldwide prevalence of 10.4, and in Asian it is 8%.[4] Our result which is little higher than the study done in Ethiopia which was 7.8%[6] but lower than the study done in rural Nepal, USA and brazil where it is 19.7%,39.6%, and 25.41% respectively[5, 7, 8] and study done in tertiary center in India and China shows prevalence of 13.89% and 18.43%[9,10] some other literature from Nepal also showing similar results from 8.6% to 14.4%.[11-14] These differences can be due to geographical variation and different rural development conditions. Among HPV positive age wise distribution is 35-40 years showed 29% and 40-45 showed 25% and 45-50 years showed 24% this is clear that younger age group have high prevalent to HPV infection. Similarly study from Ethiopia showed prevalence of 46.9% in age of 31-40 years age group which is higher than our study.[6] In contrast study from Jumla, Nepal showed the highest among age group of 21-29, which is 40.4%[5]. As this group of people is not included in our study, it is not comparable at this time. In contrast to this study literature from China showing highest among age group of 55-59 years others results were quite lower than our study age group of 30-35 is 10.9%,35-40 is 11.5%, 40-45 is

12.1% and 45-50 is 12.1%.[15] This may be due to the socioeconomic differences between two countries. As our study have shown the statistical significant between HPV DNA positivity and age at first sexual contact with p value of 0.048 is highest among the first sexual contact age group of 10-12 years and is 70% positivity among these groups this mean early age of sexual exposure is high risk for HPV infection as well as HPV related pathologies. Similar to our study, studies from Africa have below 18 years of age had sexual contact with 20 people with HPV infection out of a total of 24 HPV positive women.[6] A similar higher rate was found in the study from India, where those below 19 years had their first sexual contact with 10 out of 15 HPV infection patients.[9] In this study, HPV DNA positivity is higher with early menarche, as more people 8.5% with HPV positive results have started menstruation below 15 years of age. In contrast study from China showed that more HPV infected woman have started their menarche at 21-23 years of age, and the positive HPV percent is 11. Other parameters, women with marriage age 15-30 years have shown the highest HPV positive finding, as well as women with their first child in their early twenties have shown higher positive HPV finding Similar result was found by U Sharma et al[16], Kang et.al.,[15] and Thapa et al., [5] It may be due to the early marriage leading to early exposure to the HPV infection, and leading to positivity.

As our study further sinks into the HPV DNA positivity in association with sociodemographic characteristics what we found that statistical significance was not found, but positivity was higher in normal BMI of 18.5-24.99, with 49% and which was statistically significant. Which is similar to study done by Jung US et.al.,[17] where HPV DNA positive was found in the married women of 95% in our study which is similar to the study done by kang et al.,[15] Tesfaye et al.,[18] U Despande et al.,[9] where positivity of HPV and yearly income and occupation is not statistically significant which result was in contrast to the study done by Kang et al[15] where they have included the women with much lower yearly income. As further we have gone through the personal characteristics of women such as regularity of the menstruation, menopausal status, no of sexual partner, no of deliveries and participation on screening has shown statistical insignificant to the HPV positive. In contrast to the study done by Zang et al., which showed statistical significant on no of pregnancy and menopausal status.[10] Regarding sexual partners some studies have shown higher the partner and more association of the HPV positivity with statistical significant and p-value of <0.001=0.014 these studies have shown that not only HPV infection but also bacterial vaginosis and pre-cancerous lesions are associated with multiple sexual partners.[15, 19]

In our study, the prevalence of the HPV DNA was statistically significant to the contraception use with p value of <0.001, whereas similar result shows the association of oral contraceptive and HPV infection.[20] In contrast to our study, one multicenter study showed statistically in-significant results with p-value of 0.33.[21]

CONCLUSIONS

The prevalence of HPV DNA positivity was 10%, While most HPV-positive individuals experienced menarche before the age of 15. The majority of HPV-positive individuals were in the 35-40 year age group. Age at first sexual intercourse was significantly associated with HPV positivity, highlighting early sexual activity as a potential risk factor. BMI showed a significant association with HPV positivity. Reproductive and sexual health factors, such as sexual bleeding and contraceptive use were strongly linked to HPV DNA status. These findings underline the importance of early sexual activity and contraceptive use as potential risk factors for HPV infection, and highlight the need for further research into BMI and its role in HPV transmission.

Conflict of interest: None

Funding: Yes

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Citation: Acharya BC, Subedi H, Gurung SR, Pandey G, Rana A, Upadhyay HP. Prevalence and Associated Factors of HPV DNA Test Status of Women Attending a Tertiary Cancer Hospital of Central Nepal. JCMS Nepal. 2025; 21(2): 97-103.