

Evaluation of Cervical Cancer by Colposcopy and HPV-DNA in President Abdul Hamid Medical College, Kishoreganj

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Abstract

Introduction: Cervical cancer, a significant public health issue, necessitates reliable diagnostic strategies for early detection and management. In the pursuit of effective cervical cancer screening strategies, the integration of colposcopy and HPV-DNA testing is critical, especially in high-risk populations. The study evaluates the diagnostic efficacy of these methods in patients presenting with symptoms indicative of potential cervical malignancy. **Methods:** This prospective observational study was conducted at the Department of Obstetrics and Gynecology, President Abdul Hamid Medical College and Hospital, Kishoreganj, Bangladesh. The study included a total of 82 participants collected over a 1-year period from July 2022 to June 2023 following the inclusion and exclusion criteria. Patients with VIA Positive diagnosis, abnormal pap-smear results, contact or abnormal per-vaginal bleeding, foul-smelling per-vaginal discharge, and an unhealthy cervix were included in the study, while currently pregnant women, nulliparous, and postmenopausal women, patients with cervical or vaginal growths, and non-cooperative patients were excluded from the study. **Result:** The mean age of participants was 36.51 years, with most marriages occurring at an average age of 17.07 years. The study identified a high prevalence of multipara status (50.0% had 2-3 children, 36.6% had more than 3). The majority of first deliveries occurred between ages 16 and 22. A significant correlation was found between age and parity ($r = .502, p < .01$), and a strong association between age of marriage and age at first delivery ($r = .815, p < .01$). HPV-DNA positivity was 7.3%, while abnormal colposcopy findings (CIN I-III) were observed in 40.7% of cases. Negative correlations were observed between age of marriage and colposcopy findings ($r = -.308, p < .01$). **Conclusion:** This study underscores the importance of age, marital history, and parity in the context of cervical cancer screening. The low HPV-DNA positivity rate compared to the higher incidence of abnormal colposcopy findings suggests the need for a combined diagnostic approach. The findings advocate for tailored cervical cancer screening strategies that integrate both colposcopy and HPV-DNA testing, especially in resource-limited settings.

Keywords: Cervical Cancer, Colposcopy, CIN grading, HPV-DNA.

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INTRODUCTION

Cervical cancer poses a significant global health burden, with an estimated 570,000 new cases and 311,000 deaths occurring worldwide in 2018 [1, 2]. The disease disproportionately impacts women in developing nations, where over 85% of cases are diagnosed largely

due to lack of organized screening programs [3]. In Bangladesh specifically, cervical cancer is the second most common cancer among women, with approximately 8,000 new cases and 4,500 deaths reported annually [4–6]. Several methods are commonly used for cervical cancer screening. The Papanicolaou

(Pap) test has long been a standard approach, involving microscopic examination of cells collected from the cervix [7,8]. However, the Pap test demonstrates variable sensitivity ranging from 40-96%, depending greatly on available resources and healthcare infrastructures [9]. Where cytology services are not well-established, alternative screening methods have been explored. Visual inspection with acetic acid (VIA) allows direct visualization of the cervix after application of acetic acid dye [10,11]. While feasible in low-resource settings, VIA alone has shown suboptimal accuracy for detecting precancerous lesions [12]. Recent studies have found that combining VIA with human papillomavirus (HPV) DNA testing, which identifies the viral cause of most cervical cancers, can improve diagnostic accuracy [10,13,14]. Colposcopy provides a more detailed examination of the cervix compared to traditional screening methods such as the Pap test or visual inspection. During a colposcopy, a clinician uses a colposcope, which is a special magnifying device, to closely examine the cervix under bright lighting after applying a solution such as acetic acid that temporarily stains abnormal areas [15]. The colposcope provides up to 15-30x magnification, allowing for clearer visualization of the cervix at a microscopic level. Features such as lesion shape, borders, color, and vascular patterns can be evaluated that may not be apparent to the naked eye. This higher level of examination sensitivity enables clinicians to more accurately identify precancerous lesions for directed biopsy. When used in combination with HPV testing, several large-scale studies have found the integrated colposcopy-HPV approach can detect precancerous cervical lesions more effectively than other screening methods alone [16,17]. For example, a 2009 trial in India involving over 130,000 women found colposcopy with HPV testing identified over 50% more high-grade lesions compared to visual screening or the Pap test [12]. The synergistic effect of directly visualizing the cervix alongside identifying underlying HPV infection provides a more comprehensive evaluation. International health organizations now recommend organized cervical cancer screening programs utilize this dual screening approach to maximize detection of precancerous lesions. Both the World Health Organization and the United States Preventive Services Task Force endorse initial HPV testing followed by colposcopy as needed as the preferred screening strategy. This integrated method forms the basis of national screening programs credited with dramatically reducing cervical cancer rates in developed nations. However, limited data exists

evaluating the diagnostic accuracy and clinical impact of colposcopy combined with HPV testing within individual hospital populations in low-resource settings like Bangladesh. Country-specific information is needed to effectively implement national screening guidelines. This proposed study aims to address this evidence gap and provide valuable local data to inform more optimized cervical cancer prevention efforts in Bangladesh. The findings have the potential to inform more effective cervical cancer screening practices and guidelines within Bangladesh. Improved early detection strategies could ultimately reduce morbidity and mortality from this largely preventable disease. In summary, cervical cancer disproportionately impacts women in developing nations. This study aims to evaluate colposcopy and HPV DNA testing to enhance cervical cancer diagnosis in Bangladesh. Results may help achieve reductions in incidence and death rates comparable to developed countries with organized screening.

METHODS

This prospective observational study was conducted at the Department of Obstetrics and Gynecology, President Abdul Hamid Medical College and Hospital, Kishoreganj, Bangladesh, over a one-year period from July 2022 to June 2023. A total of 82 participants were included following specified inclusion and exclusion criteria. Women presenting with abnormal findings on VIA screening, abnormal Pap smear results, contact bleeding, abnormal vaginal discharge, or an unhealthy appearing cervix were eligible for inclusion. Pregnant women, nulliparous women who had not given birth, post-menopausal women, and those with cervical/vaginal growths or who were uncooperative were excluded. All enrolled participants underwent colposcopy examination of the cervix performed by trained physicians. Digital images of any observed lesions were captured and saved. Cervical samples were obtained from participants using an endocervical brush and spatula for Pap smear cytology. Additional samples were collected for HPV DNA testing using polymerase chain reaction (PCR). Data was managed and analyzed using SPSS software. Appropriate statistical tests were applied to determine significance of associations. Ethical approval regarding the study was obtained from the ethical review committee of the study hospital.

RESULTS

Table 1: Baseline demographic characteristics distribution among the participants (N=82)

Variables	Frequency	Percentage
Age		
≤20	2	2.44%
21-30	26	31.71%
31-40	34	41.46%
41-50	12	14.63%

Variables	Frequency	Percentage
51-60	7	8.54%
>60	1	1.22%
Mean±SD	36.51±10.07	
Range	19-70 years	
Age of Marriage		
<15	12	14.63%
15-18	47	57.32%
19-22	19	23.17%
23-26	4	4.88%
Mean±SD	17.07±2.96	
Range	10-26 years	
Occupation		
Housewife	71	86.59%
Teacher	3	3.66%
Garments Worker	3	3.66%
NGO worker	2	2.44%
Others	3	3.66%
Education		
No formal education	17	20.73%
Upto Primary levels	21	25.61%
Upto JSC	15	18.29%
Upto SSC	18	21.95%
Upto HSC	2	2.44%
Higher	9	10.98%

The majority of participants (41.46%) were between 31-40 years of age, with the mean age being 36.51 years. Most women were married between the ages of 15-18 years (57.32%), with a mean marriage age of 17.07 years. The vast majority of women were housewives (86.59%), while the remaining participants had occupations such as teaching, working in garments,

or for NGOs. In terms of education level, over 20% of women had no formal education, while approximately 25% completed primary level education or less. Around 22% completed secondary school education. Only a small percentage (10.98%) attained education beyond higher secondary certification.

Table 2: Distribution of parity among the participants (N=82)

Parity	Frequency	Percentage
Primipara	11	13.42%
Multipara (2-3)	41	50.00%
Multipara (>3)	30	36.59%

The majority of women were multiparous, with between 2-3 live births (50%). A close second were women with more than 3 live births (36.59%). Only a

small percentage were primiparous (12.20%), having had only one live birth previously.

Table 3: Distribution of participants by age at first delivery (N=82)

Age at first delivery	Frequency	Percentage
<15	3	3.66%
15-18	38	46.34%
19-22	32	39.02%
23 and above	9	10.98%
Mean±SD	17.75±3.70	
Range	13-27 years	

Most women had their first delivery between the ages of 15-18 years (46.34%) or 19-22 years (39.02%). The mean age at first delivery was 17.75

years. A small percentage had their first child below age 15 (3.66%) or above age 23 (10.98%).

Table 4: Distribution of participants by presenting symptoms (N=82)

Presenting Symptoms	Frequency	Percentage
Post-coital bleeding	7	8.54%
Foul Smelling per-vaginal discharge	22	26.83%
Vaginal Bleeding	28	34.15%
Lower abdominal pain	51	62.20%

The most common presenting symptom among participants was lower abdominal pain, reported by 62.20% of women. Vaginal bleeding was the second most frequently observed complaint, affecting 34.15% of

participants. Foul smelling vaginal discharge was presented by 26.83% of women. A smaller percentage, 8.54%, reported post-coital bleeding.

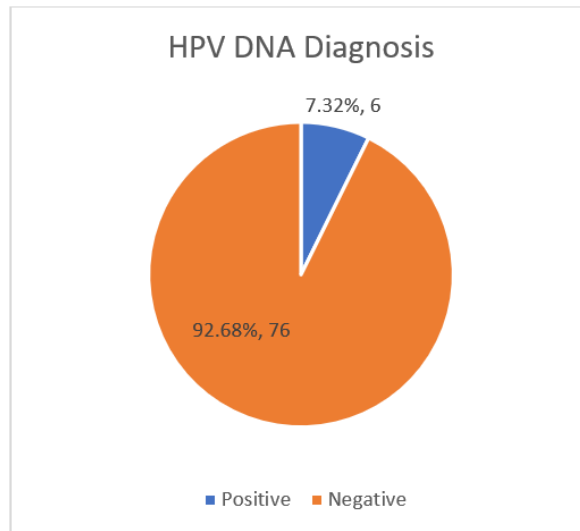


Figure 1: Distribution of participants by HPV-DNA diagnosis (N=82)

The vast majority of women (92.68%) screened were negative for HPV infection on DNA testing.

However, a small yet concerning percentage (7.32%) did test positive.

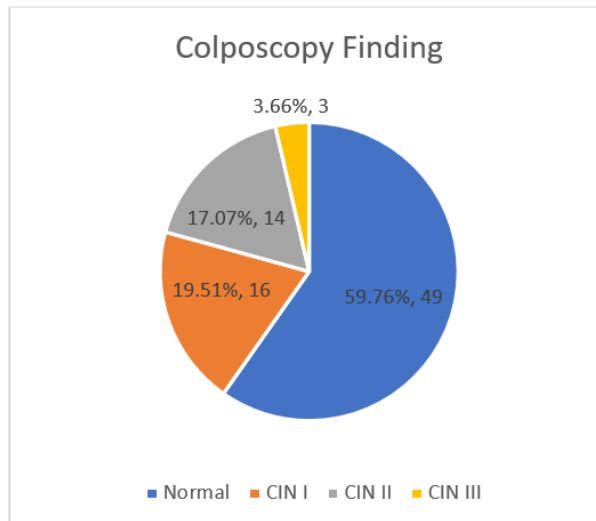


Figure 2: Distribution of participants by colposcopy diagnosis (N=82)

Of the 82 women who underwent colposcopy examination, 49 (59.76%) were found to have a normal cervix with no visible abnormalities. However, colposcopy did detect precancerous lesions in 33 women (40.24%). The most common finding was Cervical

Intraepithelial Neoplasia grade 1 (CIN I) in 16 women, representing 19.51% of participants. CIN grade 2 lesions (CIN II) were seen in 14 women or 17.07%. The most severe diagnosis of CIN grade 3 (CIN III) was observed in 3 women, comprising 3.66% of the study sample.

Table 5: Bivariate correlation of 2-tailed significance among variables (N=82)

		Age	Age of marriage	Para	Age at first delivery	HPV DNA	Colposcopy Findings
Age	Pearson Correlation	1	0.052	.502**	0.053	0.197	0.2
	Sig. (2-tailed)		0.642	<0.001	0.641	0.077	0.077
Age of marriage	Pearson Correlation	0.052	1	-0.176	.815**	0.102	-.308**
	Sig. (2-tailed)	0.642		0.115	<0.001	0.36	0.006
Para	Pearson Correlation	.502**	-0.176	1	-0.085	0.011	0.154
	Sig. (2-tailed)	<0.001	0.115		0.453	0.921	0.177
Age at first delivery	Pearson Correlation	0.053	.815**	-0.085	1	0.096	-0.095
	Sig. (2-tailed)	0.641	<0.001	0.453		0.395	0.407
HPV DNA	Pearson Correlation	0.197	0.102	0.011	0.096	1	0.053
	Sig. (2-tailed)	0.077	0.36	0.921	0.395		0.643
Colposcopy Findings	Pearson Correlation	0.2	-.308**	0.154	-0.095	0.053	1
	Sig. (2-tailed)	0.077	0.006	0.177	0.407	0.643	

** Correlation is significant at the 0.01 level (2-tailed).

The bivariate correlation analysis revealed several significant associations between the variables studied. There was a positive correlation observed between age and parity ($r=.502$, $p<0.001$), with older women found to have a higher number of live births on average. A very strong correlation was seen between age of marriage and age at first delivery ($r=.815$, $p<0.001$), indicating that earlier marriage was strongly linked to earlier childbearing. Additionally, a negative correlation was found between age of marriage and colposcopy findings ($r=-.308$, $p=0.006$), suggesting later age at marriage was associated with less severe cervical lesions on screening. No other significant correlations were detected between HPV DNA testing results, colposcopic diagnosis, and the other socio-demographic factors captured in this study.

DISCUSSION

This study provides valuable new insights into the epidemiology of cervical cancer among symptomatic women in Bangladesh. The mean age of presentation at 36.51 years aligns with global trends showing peak symptom onset during the late 30s, when precancerous lesions have had sufficient time and hormonal milieu to progress to invasive disease [18,19]. However, as this study only included women with symptoms suggestive of cervical cancer, it does not capture the full age distribution of disease burden in the population. Notably, over 41% of participants presented with symptoms between ages 31-40, suggesting screening may currently be inadequate for detecting pre-cancer earlier in this high-risk decade when lesions are most amenable to treatment [20,21]. Earlier diagnosis and treatment in this group could help prevent the development of invasive cancer. While the average age of 17.07 years at marriage corresponds with socioeconomic norms in Bangladesh, initiatives to increase the legal minimum age of marriage could help reduce lifetime exposure to HPV infection and subsequent cervical cancer risk, given that 57.32% of women were married during adolescence when the cervix is still developing and more susceptible to HPV integration [14,22]. The preponderance of women with

2-3 live births aligns with studies showing an association between higher parity and increased cervical cancer risk, potentially due to hormonal and immunological changes accompanying multiple pregnancies that facilitate HPV persistence and progression to precancer [23]. Family planning education targeted toward adolescents could help mitigate future disease burden by empowering women to space pregnancies and limit total fertility. The findings of this study provide important insights into optimizing cervical cancer screening in low-resource settings through a combined approach of HPV testing and colposcopy. While the majority (92.68%) of participants tested negative for HPV via DNA analysis, colposcopy identified precancerous cervical lesions in over 40% of women examined. This higher detection rate by colposcopy concurs with other reports showing it can identify 2-3 times as many cervical intraepithelial lesions compared to primary HPV screening alone [24,25]. Integrating HPV testing with colposcopy may allow for a more efficient "test of cure" approach. Using HPV testing to triage women for colposcopy evaluation could help focus limited resources on those at highest risk while avoiding unnecessary procedures. Correlations between modifiable factors like age at marriage further reinforce their clinical and public health relevance as targets for intervention strategies. Correlation analyses revealed significant associations between certain variables. Specifically, a noteworthy positive correlation was found between age and parity (Pearson correlation coefficient = 0.502, $p < 0.001$), indicating a moderately strong relationship. Similarly, a significant positive correlation exists between age of marriage and age at first delivery (Pearson correlation coefficient = 0.815, $p < 0.001$). However, negative correlations were observed between the age of marriage and colposcopy findings (Pearson correlation coefficient = -0.308, $p = 0.006$), suggesting an inverse relationship. Other correlations between variables such as age, age at first delivery, HPV DNA, and colposcopy findings did not reach statistical significance at the 0.01 level.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

The average presentation age aligns with global trends, yet the study's limitation to symptomatic cases underestimates disease burden distribution. Over 41% presenting between 31-40 highlights potential gaps in early detection. Early diagnosis during this high-risk period could prevent invasive cancer development. Addressing early marriages (57.32% during adolescence) could curb HPV exposure and cervical cancer risk. The prevalence of 2-3 live births aligns with higher cervical cancer risk, warranting focused family planning education for disease prevention. The study underscores the effectiveness of combining HPV testing with colposcopy, where colposcopy detected more precancerous lesions than HPV testing alone. Integrating these methods could optimize screening and resource allocation. Correlations highlight age, parity, age at marriage, and colposcopy findings' interconnectedness, emphasizing their significance for intervention strategies.

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