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Original Article

Colposcopic Findings and Their Correlation with Histopathological Diagnosis in VIA-Positive Cervical Lesions: A Hospital-Based Study

Rehana Ferdoesh[1*], Tania Afroj[2], Sathi Boiragi[3], Mridula Kor[4]

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*Corresponding author

ABSTRACT

Background: Colposcopy is used to guide biopsy and treatment decisions in women who have a positive visual inspection with acetic acid (VIA) test, but the relationship between colposcopy and histopathology should be assessed locally. The purpose of this study was to describe the colposcopy findings and to correlate them with the histopathology diagnosis in VIA-positive women. **Methods & Materials:** This was a cross-sectional study conducted in the hospital setting with 120 women who were VIA-positive from January 2024 to December 2024 at the Department of Obstetrics and Gynaecology, Barishal General Hospital, Barishal, Bangladesh. Sociodemographic, reproductive, and clinical data were obtained; colposcopy was carried out, and directed biopsies were obtained. Histopathology was used as a reference method. The diagnostic performance for CIN II or worse and Cohen's kappa were computed. **Results:** Women aged 31-50 years made up 67.5%, 60.8% were rural, 64.2% had parity of three or more, 63.3% were married before 18 years, and 80.8% had no previous screening. Major changes were seen in 40.8% and suspicious for invasion in 6.7% on colposcopy. Histopathology revealed benign lesions in 20.8%, CIN I in 32.5%, CIN II in 20.8%, CIN III in 19.2%, and invasive squamous cell carcinoma in 6.7%. Major changes were associated with CIN II-III (81.6%), and all suspicious impressions were carcinoma. Sensitivity was 85.7%, specificity 85.9%, positive predictive value 84.2%, negative predictive value 87.3%, accuracy 85.8%, and kappa 0.715 for CIN II or worse. **Conclusions:** There was an agreement between colposcopy and histopathology and good diagnostic value of colposcopy for high-grade lesions in women with VIA-positive results, but directed biopsy is still necessary for confirmation.

Keywords: *Colposcopy; Histopathology; Cervical intraepithelial neoplasia; Visual inspection with acetic acid*

1. *Senior Consultant, Department of Obstetrics and Gynaecology, Barishal General Hospital, Barishal, Bangladesh (ORCID: 0009-0006-0176-045X)*
2. *Assistant Professor, Department of Obstetrics and Gynaecology, Barishal General Hospital, Barishal, Bangladesh*
3. *Assistant Professor, Department of Obstetrics and Gynaecology, Barishal General Hospital, Barishal, Bangladesh*
4. *Assistant Professor, Department of Obstetrics and Gynaecology, Barishal General Hospital, Barishal, Bangladesh*

INTRODUCTION

Cervical cancer is still one of the most significant preventable cancers in women globally. According to GLOBOCAN 2022, approximately 662,000 new cases and 349,000 deaths are estimated, making it the fourth most common cancer in women [1]. It is not evenly distributed, with the highest rates of incidence and mortality occurring in low- and middle-income countries where organized screening and treatment services are not available [2]. The World Health Organization (WHO) responded with a global plan to eradicate cervical cancer as a public health problem by 2030, which focuses on HPV vaccination, high-quality screening, and early treatment of precancer by 2030 [3]. Persistent infection with high-risk human papillomavirus is the most important cause, and early sexual exposure, multiparity, and lack of screening are important cofactors [4]. Cervical cancer is one of the two most prevalent cancers in Bangladeshi women, with an estimated 9,640 new cases in 2022 [5, 6]. Screening is mainly based on visual inspection with acetic acid (VIA) provided as part of a national programme for women aged 30 to 60 years, and women who test positive on VIA are referred for colposcopy. However, follow-up is not complete: only 40.4% of women with VIA were seen at colposcopy in national registry data [6]. In such settings, the success of screening depends more on programme organization than on the type of test used [7]. VIA is low cost and can be carried out by non-physician-trained providers, but has low specificity, leading to many false positives [8]. Colposcopy allows for the magnification of the transformation zone following acetic acid application and guides biopsy site [9]. Grading of acetowhite epithelium, vascular patterns, and overall Colposcopic impression using standardized terminology aids in identifying women who require treatment, but is subjective and not always accurate [10]. Current management guidelines are based on the risk of high-grade precancer, and cervical intraepithelial neoplasia (CIN) grade 2 or higher is the typical indication for treatment [11]. Histopathology of a directed biopsy is still the standard for this decision. Colposcopy is frequently the only procedure performed after a positive VIA in resource-poor hospitals. Colposcopic impression is useful for see-and-treat strategies if it is similar to histopathology, but if it is not similar, then there is a risk of overtreatment of benign or low-grade lesions and undertreatment of high-grade disease. The correlation of VIA with women in the local setting is still limited and is required to evaluate the safety of using Colposcopic impression to direct biopsy and management. Hence, the present study was conducted to describe the sociodemographic and reproductive parameters of VIA-positive women, to record the Colposcopic impression and histopathology diagnosis, and to evaluate the correlation and diagnostic value of Colposcopic impression with histopathology.

METHODS & MATERIALS

This hospital-based cross-sectional study was conducted at the Department of Obstetrics and Gynaecology, Barishal General Hospital, Barishal, Bangladesh, from January 2024 to December 2024. A total of 120 women were sampled consecutively from those who tested positive on visual inspection with acetic acid (VIA) and were referred to the colposcopy clinic. The inclusion criteria were women of all ages with VIA positivity, who were not pregnant, provided informed written consent, had undergone colposcopy with directed biopsy, and had a histopathology report available. Pregnancy, previous hysterectomy, previous biopsy of cervical precancer or cancer, and inadequate or unreportable biopsy specimens were exclusion criteria. After consent, a structured questionnaire recorded sociodemographic and reproductive

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variables: age, residence, educational status, socioeconomic status, age at marriage, parity, menopausal status, presenting complaints, contraceptive history, and previous cervical screening. The woman was examined by a trained colposcopic in lithotomy position, first with normal saline and then after the application of 5% acetic acid, and the results were recorded as acetowhite changes (absent, thin/faint, dense), vascular pattern (normal, fine punctation/mosaic, coarse punctation/mosaic, atypical vessels), and overall Colposcopic impression (normal/benign, minor changes [Grade 1], major changes [Grade 2], suspicious for invasion) in accordance with the 2011 IFCPC terminology. Directed punch biopsies were taken from the most abnormal area, fixed in 10% formalin, and examined by a pathologist; histopathological diagnosis (chronic cervicitis/benign, CIN I, CIN II, CIN III, invasive squamous cell carcinoma) was the reference standard. The data were entered into a computer database and analyzed using SPSS version 26. Categorical variables were summarized as frequencies and percentages. Colposcopic impression was cross-tabulated with histopathology. Major changes and suspicious for invasion were considered a positive colposcopy for CIN II or greater, and the sensitivity, specificity, positive and negative predictive values, and overall accuracy were determined from a 2×2 table, while agreement was assessed with Cohen's kappa.

RESULTS

Table I (N=120): age ≤30 years, 18 (15.0%); 31-40, 42 (35.0%); 41-50, 39 (32.5%); >50, 21 (17.5%). Residence was rural for 73 (60.8%) and urban for 47 (39.2%). Education was none in 32 (26.7%), primary in 43 (35.8%), secondary in 31 (25.8%), and higher secondary or above in 14 (11.7%). Socioeconomic status was lower for 48 (40.0%), middle for 61 (50.8%), and upper for 11 (9.2%). 76 (63.3%) were married before 18 years.

Table I
Sociodemographic characteristics of the study population (*n*=120).

Variables	Category	n (%)
Age (years)	≤30	18 (15.0)
	31-40	42 (35.0)
	41-50	39 (32.5)
	>50	21 (17.5)
Residence	Rural	73 (60.8)
	Urban	47 (39.2)
Educational status	No formal education	32 (26.7)
	Primary	43 (35.8)
	Secondary	31 (25.8)
	Higher secondary or above	14 (11.7)
Socioeconomic status	Lower	48 (40.0)
	Middle	61 (50.8)
	Upper	11 (9.2)
Age at marriage	<18 years	76 (63.3)
	≥18 years	44 (36.7)

Table II shows that parity was zero in 5 (4.2%), one to two in 38 (31.7%), and three or more in 77 (64.2%). Premenopausal women were 88 (73.3%). Abnormal discharge (76, 63.3%), postcoital bleeding (32, 26.7%), intermenstrual bleeding (27, 22.5%), postmenopausal bleeding (16, 13.3%), pelvic pain (39, 32.5%), and none (14, 11.7%) were the most common complaints with multiple symptoms recorded. Contraception was hormonal in 38 (31.7%), non-hormonal in 49 (40.8%), and none in 33 (27.5%); 23 (19.2%) had prior screening.

Table II
Clinical and reproductive characteristics of the study population (*n*=120).

Variables	Category	n (%)
Parity	Nulliparous	5 (4.2)
	1-2	38 (31.7)
	≥3	77 (64.2)
Menopausal status	Premenopausal	88 (73.3)
	Postmenopausal	32 (26.7)
Presenting complaints	Abnormal vaginal discharge	76 (63.3)
	Postcoital bleeding	32 (26.7)
	Intermenstrual bleeding	27 (22.5)
	Postmenopausal bleeding	16 (13.3)
	Pelvic pain	39 (32.5)
	Asymptomatic	14 (11.7)
Contraceptive history	Hormonal	38 (31.7)
	Non-hormonal	49 (40.8)
	None	33 (27.5)
Previous cervical screening	Yes	23 (19.2)
	No	97 (80.8)

**Multiple symptoms were recorded.*

Colposcopy results are presented in *Table III*. Acetowhite changes were absent in 15 (12.5%), thin or faint in 47 (39.2%), and dense in 58 (48.3%). Normal vascular pattern was seen in 55 (45.8%), fine punctation or mosaic in 38 (31.7%), coarse punctation or mosaic in 19 (15.8%) and atypical vessels in 8 (6.7%). In 15 (12.5%) women, colposcopy was normal or benign; in 48 (40.0%) women, minor changes were seen; in 49 (40.8%) women, major changes were seen; and in 8 (6.7%) women, it was suspicious for invasion.

Table III
Colposcopic findings of the study population (*n*=120).

Variables	Category	n (%)
Acetowhite changes	Absent	15 (12.5)
	Thin/faint	47 (39.2)
	Dense	58 (48.3)
Vascular pattern	Normal	55 (45.8)
	Fine punctation/mosaic	38 (31.7)
	Coarse punctation/mosaic	19 (15.8)
	Atypical vessels	8 (6.7)
Colposcopic impression	Normal/benign	15 (12.5)
	Minor changes (Grade 1)	48 (40.0)
	Major changes (Grade 2)	49 (40.8)
	Suspicious for invasion	8 (6.7)

Histopathological diagnosis is shown in *Table IV*. Twenty-five (20.8%) women had chronic cervicitis or benign histology. Cervical intraepithelial neoplasia (CIN) grade I was diagnosed in 39 (32.5%), grade II in 25 (20.8%), and grade III in 23 (19.2%). Eight (6.7%) were diagnosed with invasive squamous cell carcinoma. All 120 participants were included in these categories, and the histopathology of directed biopsy was used as the reference standard for comparisons in the following tables.

Table IV
Histopathological diagnosis of the study population (*n*=120).

Variables	Category	n (%)
Histopathological diagnosis	Chronic cervicitis/benign	25 (20.8)
	CIN I	39 (32.5)
	CIN II	25 (20.8)
	CIN III	23 (19.2)
	Invasive squamous cell carcinoma	8 (6.7)

Table V cross-tabulates colposcopic impression and histopathology. Of 15 normal or benign impressions, 12 (80.0%) were benign, 2 (13.3%) were CIN I, and 1 (6.7%) was CIN II–III. Of 48 minor impressions, 11 (22.9%) were benign, 30 (62.5%) were CIN I, and 7 (14.6%) were CIN II-III. Of 49 major impressions, 2 (4.1%) were benign, 7 (14.3%) were CIN I, and 40 (81.6%) were CIN II-III. 100.0% of all suspicious impressions were carcinoma.

Table V
Colposcopic impression by histopathology (*n*=120).

Colposcopic impression	Benign	CIN I	CIN II-III	Carcinoma	p-value
Normal/benign (n=15)	12 (80.0)	2 (13.3)	1 (6.7)	0 (0.0)	0.0007
Minor (n=48)	11 (22.9)	30 (62.5)	7 (14.6)	0 (0.0)	<0.001
Major (n=49)	2 (4.1)	7 (14.3)	40 (81.6)	0 (0.0)	<0.001
Suspicious (n=8)	0 (0.0)	0 (0.0)	0 (0.0)	8 (100.0)	0.0017
Total (N=120)	25 (20.8)	39 (32.5)	48 (40.0)	8 (6.7)	-

The diagnostic accuracy of colposcopy for CIN II or greater is presented in *Table VI*, where major and suspicious impressions are considered a positive test. There were 48 true positives, 9 false positives, 55 true negatives, and 8 false negatives. The sensitivity, specificity, positive predictive value, negative predictive value, and overall accuracy were 85.7%, 85.9%, 84.2%, 87.3%, and 85.8%, respectively. The Cohen's kappa coefficient for agreement between colposcopy impression and histopathology was 0.715 (N=120).

Table VI
Diagnostic performance for CIN II+ (*n*=120).

Variables	Category	Value
Classification	True positive	48
	False positive	9
	True negative	55
	False negative	8
Performance	Sensitivity	85.7%
	Specificity	85.9%
	Positive predictive value	84.2%
	Negative predictive value	87.3%
	Overall accuracy	85.8%
Agreement	Cohen’s kappa	0.715

DISCUSSION

Histology revealed CIN II or worse in 56 (46.7%) cases, and colposcopic impression detected these lesions with a sensitivity of 85.7%, specificity of 85.9%, and overall accuracy of 85.8% and Cohen's kappa of 0.715, which is considered substantial agreement. All eight women had suspicious impressions for invasion confirmed as carcinoma, and 81.6% of major change impressions were CIN II-III. The closest comparison is with the data from Bangladesh. In 16,147 women with VIA-positive women, colposcopy detected CIN I in 36.7%, CIN II/III in 10.6%, and carcinoma in 7.1%, with a sensitivity of 73.8%, specificity of 92.7%, positive predictive value of 64.4%, and negative predictive value of 95.2% for CIN II or worse [12]. We have a comparable carcinoma proportion, but a higher sensitivity and slightly lower specificity. In a small study of 62 women at the same center, high accuracy was observed for CIN II (87.1%) and CIN III (90.3%) with low sensitivity of 25% for each grade [13]. Sensitivity and specificity for any CIN were 66.7% and 76.3%, respectively, in a retrospective register of 58 women [14]. The better performance in this study may be due to dichotomizing at CIN II or higher, where the presence of dense acetowhite epithelium and coarse vascular patterns are more easily identified. Findings from neighboring countries are broadly similar. In Bhutan, colposcopy for CIN II or worse had a sensitivity of 66.7%, specificity of 73.7% and accuracy of 72.2% in 299 women, with senior colposcopy having higher sensitivity (80.0%) than the junior colposcopy [15]. Among HPV DNA-positive women, the sensitivity was 83.3%, specificity 63.6%, and accuracy 73.3%, and colposcopic findings were related to age, prior screening, and postcoital bleeding in Nepal [16]. In women with an abnormal or unhealthy cervix, the sensitivities of the Indian hospital series were 91.5% and 83.3%, while the specificities were 72.2% and 72.7%, respectively [17, 18]. Our sensitivity is similar to these studies, and our specificity of 85.9% is higher, perhaps because our participants were VIA-positive and referred for evaluation. In other parts of the world, a Chinese study limited to women with a type 3 transformation zone had a lower sensitivity of 51.2%, specificity of 96.5%, and lower accuracy for junior colposcopists and women 60 years or older [19]. This indicates that colposcopic performance is influenced by the visibility of the lesions and the experience of the examiner, and that our findings are most relevant to women with visible lesions. The profile of the participants is similar to the one described elsewhere in Bangladesh. The majority were multiparous (64.2%), married before 18 years (63.3%), and rural residents (60.8%). Almost three-quarters of women in that clinic series married before 18 years, and older age, low education, lower socioeconomic status, and higher parity were significantly associated with cervical precancer and cancer [12]. Symptoms were common; 26.7% reported postcoital bleeding, 13.3% postmenopausal bleeding, and colposcopy with biopsy has been recommended for women who have these symptoms despite negative screening [13]. Only 19.2% had previous screening. This is higher than the 6.2% of Bangladeshi women who reported ever screening in a national survey but still low, and limited awareness, especially among rural and less-educated women, is likely a contributor [20, 21]. In general, our results confirm the use of colposcopy as a useful triage procedure following a positive VIA, especially for the detection of high-grade and invasive lesions. The 14.6% of minor change impressions that contained CIN II-III, and the eight false negatives, suggest that directed biopsy should still be performed to confirm the histology before treatment. Further improving the training and quality assurance of colposcopy may further enhance reliability, as reported elsewhere to be related to experience [15, 19].

LIMITATIONS

This was a hospital-based study with a small number of sample size (N=120) of VIA-positive women, so the results may not be applicable to other women, and inter-observer variation among colposcopies was not evaluated.

CONCLUSION

Among 120 women with VIA, there was good agreement between colposcopy impression and histopathology (kappa 0.715). It had a sensitivity of 85.7%, specificity of 85.9% and accuracy of 85.8% for CIN II or worse. Major changes were associated with 81.6% of the cases of CIN II-III, and all suspicious cases of invasion were carcinoma. Colposcopy is therefore a reliable triage procedure following positive VIA, but directed biopsy is still required, as some high-grade lesions were seen as minor or normal impressions.

RECOMMENDATIONS

Larger multicenter studies including HPV testing and studies on colposcopic experience are recommended, as is training and quality assurance to enhance the role of colposcopy in the national VIA-based screening programme.

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CONFLICT OF INTEREST

None declared.

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