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Colposcopic Evaluation of Clinically Unhealthy Cervix and Its Correlation with Histopathological Findings

Nurun Naher[1*], Fariha Tabassum[2], Mohammed Abdullah As Sajjad Rahimi[3]

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*Corresponding author

ABSTRACT

Background: A clinically unhealthy cervix, with features such as erosion, discharge, and bleeding, is often a symptom of underlying pre-malignant or malignant pathology, and therefore needs to be promptly evaluated. This study aimed to assess colposcopic findings in clinically unhealthy cervix cases and correlate them with histopathological diagnoses to ascertain the diagnostic accuracy of colposcopy. **Methods & Materials:** This is a cross-sectional study carried out at the Department of Gynaecology and Obstetrics, BIRDEM Women and Children Hospital, Dhaka, Bangladesh, from January to December 2024, with 146 women with an unhealthy cervix clinically. The diagnostic tests used were VIA, Pap smear, colposcopy, and colposcopy-directed biopsy, with histopathology being the gold standard method. Statistical analysis was performed using SPSS version 26, and Spearman's coefficient was used to determine the correlation between colposcopy and histopathology results. **Results:** Most of the patients were aged between 30 and 49 years (49.9%) and were living in rural areas (55.5%). The most common presenting symptom was a white vaginal discharge (31.5%). VIA was positive in 47.9% of cases. The positive rate of colposcopy was 71.2%. Histopathological findings showed CIN 1, 20.5%; CIN 2, 22.6%; CIN 3, 17.8%; carcinoma, 21.9%, and chronic cervicitis, 17.1%. The Spearman correlation between colposcopic and histopathological findings was 0.14 ($p = 0.309$). **Conclusion:** Colposcopy showed a high positivity rate in clinically unhealthy cervix with weak correlation with histopathological findings, thus highlighting the indispensable role of colposcopy-directed biopsy for definitive diagnosis. Integration of VIA, Pap smear, and colposcopy in the multimodal approach increases cervical cancer screening effectiveness, especially in resource-limited settings.

Keywords: *Colposcopy, cervical intraepithelial neoplasia, histopathology, unhealthy cervix, cervical cancer screening*

1. *Assistant Professor, Department of Gynaecology & Obstetrics, BIRDEM Women & Children Hospital, Dhaka, Bangladesh (ORCID: 0009-0007-4024-4340)*
2. *Medical Student, Department of Obstetrics & Gynaecology, Mymensingh Medical College, Mymensingh, Bangladesh*
3. *Medical Officer, Department of Urology, National Institute of Kidney Diseases & Urology, Dhaka, Bangladesh*

INTRODUCTION

Cervical cancer is the fourth most common cancer in women worldwide and the most common gynaecological cancer in many low and middle-income countries (LMICs) [1]. In South Asia, including Pakistan and Bangladesh, it is still a substantial burden of public health importance owing to low levels of awareness, insufficient screening coverage, and limited access to healthcare services [2]. The World Health Organisation (WHO) estimates that more than 90% of cervical cancer deaths occur in LMICs, where adequate early detection programs are often lacking. The term 'clinically unhealthy cervix' describes a cervix that has one or more abnormal features on speculum examination, such as cervical erosion, discharge, contact bleeding, hypertrophy, nabothian cysts, or polyps [3]. These presentations, although they are often benign, may be associated with an underlying pre-malignant or malignant process that must be evaluated systematically to rule out high-grade cervical intraepithelial neoplasia (CIN) or invasive carcinoma [4]. Human papillomavirus (HPV) infection, especially high-risk HPV 16 and 18, is now proven to be the predominant etiological factor in the pathogenesis of cervical cancer [5]. Persistent HPV infection can cause a spectrum of lesions in the cervix, which range from low-grade squamous intraepithelial lesions (LSIL) to high-grade squamous intraepithelial lesions (HSIL) and finally to invasive carcinoma [6]. Early identification of these lesions is extremely important to allow for timely intervention and prevention of disease progression. Colposcopy is a crucial diagnostic tool in the assessment of abnormal cervical results. It allows a magnified visualisation of the cervical transformation zone, allowing targeted biopsy of suspicious lesions for histopathological confirmation [7]. When used in conjunction with the application of acetic acid, colposcopy makes it easy to identify acetowhite lesions, atypical vessels, and other colposcopic features of cervical neoplasia [8]. Pap smear cytology and visual inspection with acetic acid (VIA) are both popular primary screening tools, especially in resource-constrained settings where testing for human papillomavirus (HPV) DNA may not be readily available [9]. But both modalities have intrinsic limitations in terms of sensitivity and specificity, requiring colposcopic evaluation and directed biopsy for definite diagnosis [10]. Despite increasing data on screening modalities on an individual basis, there is still little data on the correlation between colposcopic impressions and histopathological findings in women presenting with a clinically unhealthy cervix, especially in our local context [11]. A strong correlation between these two assessments would validate the use of colposcopy as a reliable diagnostic tool and may lead to a decrease in unnecessary biopsies. This study, therefore, aims to assess colposcopic findings in clinically unhealthy cervix cases and find out the correlation between colposcopic findings and histopathological diagnosis in imitation of the evidence base for improving cervical cancer diagnostic protocols.

METHODS & MATERIALS

This cross-sectional observational study was carried out at the Department of Gynaecology and Obstetrics, BIRDEM Women and Children Hospital, Dhaka, Bangladesh, from January 2024 to December 2024. A total of 146 women with a clinically unhealthy cervix on speculum examination were recruited by consecutive sampling. Inclusion criteria

included women with signs of an unhealthy cervix (erosion, hypertrophy, discharge, contact bleeding or polyps) who were willing to give informed consent. Exclusion criteria were women who were pregnant, had a previous history of cervical surgery or radiotherapy, were currently menstruating at the time of examination, or had a known immunocompromising condition. All enrolled participants received an evaluation protocol that was standardised. Visual examination with acetic acid (VIA) followed by conventional Pap smear cytology was performed in the first place. Colposcopy was then done with a colposcope following application of 5% acetic acid and Lugol's iodine. Colposcopic data were categorised as positive (presence of acetowhite lesions, punctation, mosaicism or atypical vessels) or negative. Colposcopy-directed punch biopsy was performed on all of the positive colposcopy cases and clinically suspicious areas of negative colposcopy cases. The biopsy specimens were submitted for histopathological examination, and this was considered the gold standard for diagnosis. Key variables that were analysed were age group, area of residence, parity, presenting symptoms, VIA results, pap smear results, colposcopic results, and histopathological diagnoses. Data were entered and analysed using SPSS version 26. Descriptive statistics in the form of frequency and percentages were calculated. Spearman's rank correlation coefficient (coefficient of correlation (rho) was used to determine the correlation between colposcopic and histopathological findings. A p-value of <0.05 was regarded as being statistically significant.

RESULTS

The study included 146 women who had a cervix that was clinically unhealthy. The predominant age group was 30-39 years (32.2%), followed by 40-49 years (28.7%) and <30 years (21.2%). Only 5 subjects (3.4%) were aged >=60 years. Regarding residential distribution, most were from rural areas (55.5%) compared to urban areas (44.5%), reflecting the demographics of the catchment population served by the study institution (*Table I*).

Table I
Demographic and Sociodemographic Characteristics of the Study Population (*n* = 146).

Variable	Category	Frequency	Percentage (%)
Age group (years)	<30	31	21.2
	30-39	47	32.2
	40-49	42	28.7
	50-59	21	14.4
	≥60	5	3.4
Residence	Rural	81	55.5
	Urban	65	44.5

Parity distribution was wide, and nulliparous women accounted for 21.2% of the study population, while high parity (5 or more) was reported in 12.3%. The most common presenting symptom was white vaginal discharge (31.5%), followed by asymptomatic (n = 35; 24%), lower abdominal pain (23.3%), and postcoital bleeding (21.2%), indicating the wide range of clinical presentations of an unhealthy cervix encountered in gynaecological practice (*Table II*).

Table II
Reproductive and Clinical Profile of Patients with Clinically Unhealthy Cervix.

Variable	Category	Frequency	Percentage (%)
Parity	0	31	21.2
	1	21	14.4
	2	24	16.4
	3	24	16.4
	4	28	19.2
	≥5	18	12.3
Presenting symptom	White vaginal discharge	46	31.5
	Lower abdominal pain	34	23.3
	Postcoital bleeding	31	21.2
	Asymptomatic	35	24

VIA was positive in 70 (47.9%) and negative in 76 (52.1%) women. Pap smear cytology showed a wide distribution: normal in 21.2%, inflammatory in 18.5%, ASCUS in 17.8%, LSIL in 21.2%, and HSIL in 21.2%. The large percentage of findings of LSIL and HSIL highlights the importance of systematic cervical screening in this population (*Table III*).

Table III
Screening Test Findings Among Study Population.

Test	Category	Frequency	Percentage (%)
VIA result	Positive	70	47.9
	Negative	76	52.1
Pap smear result	Normal	31	21.2
	Inflammatory	27	18.5
	ASCUS	26	17.8
	LSIL	31	21.2
	HSIL	31	21.2

Colposcopy showed a positive result in 104 participants (71.2%), in which some abnormal features were identified (acetowhite lesions, punctation, or mosaicism) on colposcopic examination. The other 42 women (28.8%) had a negative colposcopy. The high positivity rate (71.2%) is a reflection of the clinical significance of performing colposcopy in all women presenting with a clinically unhealthy cervix, as a large majority have identifiable abnormalities (*Table IV*).

Table IV
Colposcopic Findings in Clinically Unhealthy Cervix.

Finding	Frequency	Percentage (%)
Positive colposcopy	104	71.2
Negative colposcopy	42	28.8

Histopathological examination of biopsy specimens showed CIN 1 in 30 cases (20.5% of cases), CIN 2 in 33 cases (22.6%), CIN 3 in 26 cases (17.8%), carcinoma in 32 cases (21.9%), and chronic cervicitis in 25 cases (17.1%). The combined CIN 1-3 prevalence of 60.9% and the rate of carcinoma of 21.9% highlight the level of high burden of significant cervical pathology among women with an unhealthy cervix (*Table V*).

Table V
Histopathological Diagnosis of Cervical Biopsy Specimens.

Histopathological diagnosis	Frequency	Percentage (%)
CIN 1	30	20.5
CIN 2	33	22.6
CIN 3	26	17.8
Carcinoma	32	21.9
Chronic cervicitis	25	17.1

Spearman's correlation analysis between colposcopic findings and histopathological diagnoses gave a correlation coefficient of rho = 0.14 with a p-value of 0.309. This weak and statistically non-significant correlation indicates that colposcopic impression is not enough for the definitive categorisation of the cervical pathology. Among positive colposcopy cases (n = 104), carcinoma was diagnosed in 25 (24%), CIN 2 in 19 (18.3%), CIN 1 in 22 (21.2%), CIN 3 in 18 (17.3%), and chronic cervicitis in 20 (19.2%), thus proving the heterogeneous histopathological spectrum underlying positive colposcopic findings (*Table VI*).

Table VI
Correlation Between Colposcopic Findings and Histopathological Diagnosis.

Colposcopy Result	CIN 1 n (%)	CIN 2 n (%)	CIN 3 n (%)	Carcinoma n (%)	Chronic Cervicitis n (%)	correlation coefficient (ρ)	p-value
Negative	8 (19)	14 (33.3)	8 (19)	7 (16.7)	5 (11.9)	0.14	0.309
Positive	22 (21.2)	19 (18.3)	18 (17.3)	25 (24)	20 (19.2)		

DISCUSSION

This study assessed colposcopic findings in 146 women with a clinically unhealthy cervix and correlated them with histopathological diagnoses. Ours showed a high colposcopy positivity rate (71.2%) and a high burden of pre-malignant and malignant cervical pathology, with detection of CIN in 60.9% and invasive carcinoma in 21.9% of cases. However, the correlation between colposcopic findings and histopathological diagnoses was poor and not statistically significant (rho: 0.14, p value: 0.309), which reinforces the need for colposcopy-directed biopsy for definitive diagnosis. The age distribution in our study, with the highest prevalence in the 30-39 year age group (32.2%), is in accordance with Vaccarella et al., who suggested that the major age distribution of cervical neoplasia is women of reproductive age [12]. Similar results have been reported in similar studies by Fowler et al., where women aged 30-50 years are the majority of cervical cancer cases [13]. The predominance of rural women (55.5%) in our cohort reflects the pattern of healthcare seeking in our institutional catchment area and the importance of outreach screening programmes in rural areas. White vaginal discharge was the most common presenting symptom (31.5%), followed by asymptomatic presentation (24%) and postcoital bleeding (21.2%). Postcoital bleeding is a recognised red flag symptom for the presence of cervical pathology, and its prevalence in our study is in line with Kaveri et al. [14]. The large percentage of asymptomatic women (24%) indicates the importance of systematic cervical examination because there is a substantial percentage of women with a clinically unhealthy cervix who have significant pathology despite a lack of symptoms. VIA positivity was observed in 47.9% of the participants. VIA is widely used as a primary mode of cervical cancer screening in LMICs because it is cheap and easy to administer [15]. However, its poor specificity has been well-documented, and our results support the importance of colposcopic confirmation after a positive VIA result [16]. The results of the Pap smear in our study showed that 42.4% of subjects contained either LSIL or HSIL, which is similar to other studies done in similar subjects. The colposcopy positivity rate of 71.2% of our study is similar to that of Waxman et al., who reported colposcopy positivity between 60 - 75% in women with a clinically unhealthy cervix, which supports our findings [17]. The high rate of positivity supports the clinical utility of colposcopy in this particular population and demonstrates the heavy burden of colposcopically evident cervical abnormalities among women with unhealthy cervical features. Histopathological examination showed that the most common diagnosis was CIN 2 (22.6%), followed by carcinoma (21.9%), CIN 1 (20.5%), CIN 3 (17.8%), and chronic cervicitis (17.1%). The high prevalence of invasive carcinoma (21.9%) in this cohort is of particular alarm and may reflect delayed healthcare-seeking behaviour and limited access to early screening services [18]. The low correlation between colposcopic and histopathological results (correlation = 0.14, p = 0.309) was one of the interesting results reported in this study. Wentzensen et al. also showed moderate-to-weak correlation between colposcopic impression and biopsy-confirmed diagnosis, especially in low-resource settings where colposcopy training and standardisation can be limited [19]. Colposcopic impression had a sensitivity of about 70% and specificity of 60% compared with histopathology; therefore, there is a significant discordance between the two modalities [20]. Several factors may explain this poor correlation, such as inter-observer variation in colposcopic interpretation, the subjectivity of colposcopic impression grading, poor visualisation of the transformation zone, and sampling error during biopsy [21].

These limitations underscore the importance of colposcopy-guided biopsy and histopathological confirmation as the standard of diagnosis, as opposed to the sole use of colposcopic impression in clinical decision making [22]. Despite this limitation, colposcopy remains a necessary weapon in the process of diagnosing cervical cancer. Its role in guiding targeted biopsy, especially in directing the pathologist to the most abnormal part of the transformation zone, is well established [23]. A multimodal approach that combines VIA, Pap smear cytology, and colposcopy with directed biopsy is the most effective strategy for cervical cancer screening and early detection, especially in resourced limited settings where HPV DNA testing is not available universally.

LIMITATIONS

This study was conducted at a single tertiary care centre and had a relatively small study sample size that may impact the generalizability of this study to a wider population. In addition, Inter-observer variability in the colposcopic interpretation was not formally evaluated, which may have affected the correlation analysis.

CONCLUSION

This study shows that a clinically unhealthy cervix has a significant burden of high-grade pre-malignant and malignant cervical pathology. Colposcopy revealed a high positivity rate of 71.2%, confirming its value as a diagnostic tool among this population. Histopathological examination showed high-grade lesions and invasive carcinoma in more than 60% of the participants, which highlights the urgent need for systematic evaluation. The poor correlation of colposcopic and histopathological findings emphasises that the colposcopic impression of the lesion is inadequate to make a definitive diagnosis and that it must be accompanied by directed biopsy and histopathological diagnosis.

RECOMMENDATIONS

Future multicenter studies with larger sample sizes and standardised protocols for colposcopy training are recommended to establish more robust normative data for colposcopy-histopathology correlation. Integration of HPV DNA testing into the screening algorithm to improve the diagnostic accuracy of cervical cancer screening programmes in resource-limited settings should be explored.

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CONFLICT OF INTEREST

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