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Colposcopic Detection of CIN in Patients with Clinically Abnormal Cervix at a Tertiary Care Center in Bangladesh

Nur AN[1*], Chowdhury SR[2], Ahmed N[3]

[1]Ayesha Nigar Nur, Assistant Professor, Department of Obstetrics and Gynecology, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh
[2]Shahin Rahman Chowdhury, Professor, Department of Obstetrics and Gynecology, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh
[3]Nazneen Ahmed, Associate Professor, Department of Obstetrics and Gynecology, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh

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***Corresponding author:** Ayesha Nigar Nur
Assistant Professor, Department of Obstetrics and Gynecology, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh

Abstract

***Background*:** Cervical cancer poses a significant public health challenge globally, especially in regions like Bangladesh where access to effective screening programs is limited. Early detection and management of cervical intraepithelial neoplasia (CIN) play crucial roles in preventing the progression to cervical cancer. This study investigates the diagnostic accuracy of colposcopy, compared with histopathological findings, in detecting various grades of CIN and cervical cancer. ***Methods*:** This retrospective observational study reviewed hospital records of 200 VIA-positive cases from January 2021 to December 2023 at the Obstetrics and Gynecology Department of Holy Family Red Crescent Medical College Hospital Dhaka, Bangladesh. Colposcopic examinations were conducted, followed by histopathological evaluations of biopsied tissues to confirm the presence and grade of CIN. Data on demographic characteristics, clinical findings, and outcomes were analyzed using descriptive statistics. ***Result*:** Of the participants, 44% had normal colposcopic findings, while the prevalence of CIN I, CIN II, CIN III, and cervical cancer was 22.5%, 17%, 11%, and 4%, respectively. Histopathological correlation confirmed 46% as normal, with discrepancies noted in higher-grade lesion diagnosis. The study highlighted the high sensitivity but variable specificity of colposcopy in detecting and grading cervical lesions. ***Conclusion*:** Colposcopy serves as a valuable diagnostic tool in the early detection of cervical abnormalities. However, discrepancies in lesion grading underscore the need for integrating colposcopy with histopathological evaluations to enhance diagnostic accuracy and optimize patient management.

Keywords: Cervical Cancer, Cervical Intraepithelial Neoplasia, Colposcopy, Histopathology.

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INTRODUCTION

Cervical cancer remains one of the most significant public health challenges globally, with an estimated 569,847 new cases and 311,365 deaths in 2018 alone, making it the fourth most common cancer in women worldwide. In Bangladesh, the prevalence of cervical cancer is a critical issue, as around 8,068 new cases and 5,214 deaths were recorded in 2018. The disease constitutes 12% of female cancers in the country [1]. This high mortality is largely preventable with early screening, detection, and treatment, particularly in pre-cancerous stages such as cervical intraepithelial neoplasia (CIN). These pre-cancerous changes in cervical tissue represent varying grades of severity, from mild dysplasia (CIN 1) to moderate/severe dysplasia (CIN 2/3), which often precedes invasive cervical cancer [2]. Various screening programs are employed globally and in Bangladesh, including Pap smear cytology, HPV DNA testing, and Visual Inspection with Acetic Acid (VIA). VIA has gained traction in resource-limited settings due to its simplicity, low cost, and the potential for immediate treatment linkage. In Bangladesh, the government adopted the VIA screening program at primary, secondary, and tertiary levels across all districts. Despite detecting positive cases through these VIA centers, the referral and follow-up systems remain

a challenge, with only 4.6% of VIA tests returning positive results among the 1,647,380 tests performed [1]. Studies have demonstrated the low sensitivity of Pap smears and the limitations of cytology-based methods for detecting high-grade CIN [3]. In contrast, VIA has shown greater efficacy in detecting high-grade abnormalities, with a sensitivity of 88.9% [4]. Nevertheless, implementing these programs effectively remains an ongoing challenge. Tertiary care centers play a crucial role in diagnosing and treating CIN and cervical cancer in Bangladesh, often through colposcopy-guided biopsy and treatment. This is evident in Dhaka's Bangabandhu Sheikh Mujib Medical University (BSMMU), where patients with clinically abnormal cervixes or positive VIA results are referred for further evaluation. A retrospective study at the BSMMU colposcopy clinic showed that 51% of patients were diagnosed with pre-cancerous or cancerous cervical conditions, and treatment was successfully administered to a majority of cases [1]. However, tertiary care centers face bottlenecks due to poor referral and follow-up processes, as observed in Chittagong Medical College Hospital [5]. Another assessment of VIA-based screening at Rangpur Medical College Hospital demonstrated that 80% of pre-invasive lesions could be effectively identified [6]. This further reinforces the importance of colposcopy and tertiary care referral systems in accurate diagnosis and prompt treatment. While these screening programs exist, barriers to cervical screening persist, particularly in rural areas and among women with low levels of education. Surveys conducted among women in Bangladesh identified limited awareness, negative community perceptions, and inadequate privacy during screening as deterrents to testing. Moreover, a lack of understanding regarding the necessity of screening, particularly among those without symptoms, is a significant challenge. Other factors include cultural and religious sensitivities, low literacy rates, and geographical barriers to accessing healthcare [7-9]. Educational health programs, community health worker involvement, and mass media interventions could help alleviate these challenges [10]. Furthermore, the lack of follow-up and treatment compliance complicates the effective management of screen-positive women. This problem is particularly pronounced in low-resource settings, where limited infrastructure and trained personnel exacerbate these challenges. Even in the presence of effective screening programs, follow-up remains a significant bottleneck, and high dropout rates result in many untreated cases [11, 12]. Innovative strategies such as "see-and-treat" approaches and AI-guided digital colposcopy could significantly enhance detection rates and treatment outcomes [13, 14]. In conclusion, despite notable progress in cervical cancer screening programs in Bangladesh, clinical challenges persist. Colposcopy at tertiary care centers remains underutilized, and barriers to access prevent many women from undergoing screening. An integrated approach is necessary, combining educational programs, improved referral processes, and innovative screening technologies to improve the detection and management of CIN. This will ultimately help achieve global and national targets in reducing cervical cancer mortality.

METHODS

This retrospective observational study reviewed the hospital records of 200 VIA-positive cases from January 2021 to December 2023 at the Obstetrics and Gynecology Department of Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh. The study aimed to identify cervical intraepithelial neoplasia (CIN) through colposcopic examination in patients with clinically abnormal cervixes. Inclusion criteria included women who had a positive Visual Inspection with Acetic Acid (VIA) test and underwent colposcopic examination. Data collected included demographic details (age, marital status, parity), clinical findings (VIA and colposcopy results), and histopathological outcomes. Suspicious lesions identified during colposcopy were biopsied and analyzed histologically to confirm the presence and grade of CIN. The primary outcome was the detection rate of CIN. Data analysis included descriptive statistics using SPSS V. 25. The study followed ethical standards outlined in the Helsinki Declaration and was approved by the Institutional Review Board (IRB) of the hospital.

RESULTS

Table 1 presents the demographic characteristics of the 200 participants involved in the study. The age distribution of participants shows a higher concentration in the middle age brackets, with the largest group being those aged 36-40 years, representing 25.5% of the total. The next largest group is those aged 31-35 years, accounting for 21.5%. The mean age of participants is 37.4 years with a standard deviation of 8.9 years. Regarding age at marriage, the majority of participants were married before the age of 26, with 30.5% married at or below 18 years and 32% between 19 and 25 years. This indicates that early marriage is prevalent among the participants. In terms of parity, a significant portion of the participants have three children (37%), followed by those with two children (31.5%). This suggests a higher fertility rate among the study group. Participants with one or more than four children are less common, constituting 18.5% and 13% of the population, respectively. Table 2 details the colposcopic findings from the study involving 200 participants. The findings indicate a diverse range of cervical conditions. The majority of the colposcopy results were normal, comprising 44% of the cases, which suggests that nearly half of the participants did not exhibit any significant abnormalities upon examination. Cervical Intraepithelial Neoplasia (CIN) was observed at various stages: CIN I was diagnosed in 22.5% of the cases, indicating mild dysplasia. CIN II, representing moderate dysplasia, was found in 17% of the participants, while CIN III, indicative of severe dysplasia, was present in 11% of the cases. These stages of CIN highlight the prevalence of

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significant cervical abnormalities within the study population. Furthermore, cervical cancer (CA Cervix) was detected in 4% of the participants, underscoring the presence of invasive cervical lesions among a subset of the group. Unsatisfactory results, which refer to colposcopies where a conclusive assessment could not be made, were reported in 1.5% of the cases. Table 3 demonstrates that a significant portion of the participants, 46% (n=92), showed normal histopathological findings, indicating no detectable cellular abnormalities. For those with abnormal findings, the distribution of cervical intraepithelial neoplasia (CIN) and cervical cancer is as follows: 20.5% (n=41) were diagnosed with CIN I, which represents mild dysplasia. CIN II, indicative of moderate dysplasia, was found in 16% (n=32) of the cases. More severe dysplasia, CIN III, was observed in 12.5% (n=25) of the participants. These stages indicate the presence and severity of precancerous changes within the cervix. Additionally, 5% (n=10) of the study participants were diagnosed with CA Cervix, representing invasive cervical cancer. Table 4 presents a comprehensive comparison of colposcopic and histopathological findings among 200 study participants, highlighting both the strengths and limitations of colposcopy in accurately diagnosing cervical conditions. The majority of findings align well, with 85 of the 88 cases deemed normal by colposcopy also confirmed as normal by histopathology, demonstrating a high concordance rate for non-diseased tissue. In cases identified as CIN I by colposcopy (45 in total), 37 matched the histopathological diagnosis, though discrepancies included 4 cases identified as normal, 3 as CIN II, and 1 as CIN III on histopathology, indicating some challenges in accurate grading of mild dysplasia. Among the 34 cases colposcopically identified as CIN II, histopathology confirmed 27, with mismatches including 2 cases identified as normal, 1 as CIN I, 2 as CIN III, and 2 as cervical cancer, suggesting difficulties in distinguishing moderate from more severe or invasive lesions. For the more severe CIN III, colposcopy showed a high degree of accuracy, with 20 of the 22 cases confirmed by histopathology, though 2 cases were actually more severe, diagnosed as cervical cancer. The results also illustrate some diagnostic challenges in the most advanced cases: of the 8 participants colposcopically suspected of having cervical cancer, histopathology confirmed 6, with 2 cases identified as CIN III instead, indicating potential overestimation of invasiveness. The unsatisfactory colposcopic findings category (3 cases) highlighted the limitations of colposcopy under certain conditions, with histopathology able to classify these as 1 normal, 1 CIN I, and 1 CIN II.

Table 1: Distribution of participants by demographic characteristics (N=200)

Characteristics	n	%
Age (Years)		
≤30	29	14.5
31-35	43	21.5
36-40	51	25.5
41-45	38	19
46-50	26	13
>50	13	6.5
Mean± SD	37.4±8.9	
Age at marriage (Years)		
≤18	61	30.5
19-25	64	32
26-30	53	26.5
>30	20	10
Parity		
1	37	18.5
2	63	31.5
3	74	37
≤4	26	13

Table 2: Colposcopic findings of the study participants (N=200)

Colposcopy findings	n	%
Normal	88	44
CIN I	45	22.5
CIN II	34	17
CIN III	22	11
CA Cervix	8	4
Unsatisfactory	3	1.5

Table 3: Histopathology findings of the study patients (N=200)

Histopathology Finding	n	%
Normal	92	46
CIN I	41	20.5
CIN II	32	16
CIN III	25	12.5
CA Cervix	10	5

Table 4: Comparison of colposcopic and histopathological findings among the participants (N=200)

Colposcopy Findings	Histopathological Findings					Total
	Normal	CIN I	CIN II	CIN III	CA Cervix	
Normal	85	2	1	0	0	88
CIN I	4	37	3	1	0	45
CIN II	2	1	27	2	2	34
CIN III	0	0	0	20	2	22
CA Cervix	0	0	0	2	6	8
Unsatisfactory	1	1	1	0	0	3
Total	92	41	32	25	10	200

DISCUSSION

In this study, the demographic characteristics, colposcopic, histopathological findings, and their interrelations provide significant insights into cervical health screening and diagnosis dynamics. The majority of our study population, primarily aged between 31-40 years, reflects a demographic with a potentially increased risk of cervical abnormalities due to factors such as early age at marriage and higher parity. This is consistent with global findings that link early reproductive behavior and increased parity with heightened risks for cervical cancer, suggesting that these demographic factors contribute to the pathology of cervical cancer and warrant targeted screening efforts [15]. The colposcopic analysis revealed that 44% of participants exhibited normal findings, with various grades of CIN and cervical cancer also being diagnosed. The rate of normal findings aligns closely with those reported in similar settings by Parven *et al.*, (2023), who noted that while colposcopy is effective in detecting CIN, it often fails to distinguish accurately between normal findings and low-grade lesions, leading to potential diagnostic errors [16]. This underscores the necessity of integrating colposcopic evaluations with histopathological confirmations, as the latter provides a definitive diagnosis that can guide appropriate management strategies. Further analysis comparing colposcopic and histopathological findings reveals high concordance for normal diagnoses, while discrepancies were notable in more severe cases. These findings are supported by Deniz *et al.*, (2016), who reported similar challenges in ensuring diagnostic accuracy for higher-grade lesions through colposcopy alone, suggesting that misclassifications often occur due to the subjective nature of colposcopic examinations [17]. Wentzensen *et al.*, (2009) also highlight the variability in diagnosing and grading CIN through colposcopy, recommending that such assessments be complemented by histopathological evaluations to improve accuracy [18]. Our findings also indicate potential overestimations in diagnosing CIN III and cervical cancer through colposcopy, emphasizing the need for cautious interpretation of visual assessments and advocating for histopathological confirmation. This is particularly crucial as the treatment implications for these conditions are significant. Liao *et al.*, (2014) further support this by illustrating the utility of biomarkers like p16INK4A in clarifying ambiguous colposcopic assessments, which could be integrated into current diagnostic protocols to enhance accuracy and reduce the risk of over-treatment or under-treatment [19]. In conclusion, this discussion integrates the findings from our study with broader research to underscore the crucial role of comprehensive and integrated diagnostic approaches in cervical cancer screening. The utilization of both colposcopy and histopathology, supplemented by molecular diagnostics where necessary, is essential for enhancing diagnostic accuracy, improving patient outcomes, and effectively managing cervical cancer risk, particularly in populations characterized by early marriage and high parity. This comprehensive approach ensures more precise and personalized medical interventions, aligned with the best practices and latest research in gynecological oncology.

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

In conclusion, this study has significantly contributed to our understanding of the diagnostic accuracy of colposcopy in detecting cervical intraepithelial neoplasia (CIN) and cervical cancer, using a combination of colposcopic and histopathological evaluations. Our findings underscore the high concordance between these two diagnostic modalities in identifying normal cervical conditions, while also highlighting the challenges associated with accurately

grading more severe lesions. Notably, discrepancies in the detection of higher-grade CIN and cervical cancer point to the necessity for enhanced diagnostic protocols, including potential integration of advanced biomarkers to improve accuracy and patient management. Moreover, the demographic characteristics observed—particularly early age at marriage and higher parity—reinforce the need for targeted cervical cancer screening strategies that address specific risk profiles within the population. These insights pave the way for future research to refine screening techniques and intervention strategies, ultimately aiming to reduce the incidence and improve the prognosis of cervical cancer.

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Ethical Approval: The study was approved by the Institutional Ethics Committee

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