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A Colposcopic Evaluation of VIA Positive Cases in a District Hospital of Chittagong Hill Tract, its Pattern and Association with CIN & Ca cervix.

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Abstract:

Background: *Cervical cancer remains a significant public health challenge, particularly in low-resource settings. Despite the high burden of cervical intraepithelial neoplasia (CIN) and invasive cancer in Bangladesh, data on disparities between tribal and non-tribal populations in the Chittagong Hill Tract (CHT) region remain scarce.*

Objective: *This study aimed to compare the patterns and associated factors of CIN and invasive cervical carcinoma among tribal and non-tribal VIA positive women undergoing colposcopy evaluation.*

Methods: *A cross-sectional study was conducted at Bandarban district hospital in CHT, including 284 VIA-positive women. Colposcopic evaluation with guided biopsy was performed, and histopathological findings were categorized as normal, CIN1, CIN2, CIN3, or invasive carcinoma. Sociodemographic and reproductive factors were analyzed for associations.*

Results: *Non-tribal women exhibited higher educational attainment but married earlier and delivered their first child at younger age compared to tribal women ($p<0.05$). Colposcopy revealed a healthy cervix in 51.4% (146/284), while CIN I, CIN II, CIN III, and invasive carcinoma were detected in 34.9%, 9.9%, 1.4%, and 2.5% of cases, respectively. No significant differences in colposcopy findings were observed between tribal and non-tribal groups ($p<0.05$). Paradoxically, women marrying after 18 years demonstrated a higher frequency of abnormal findings ($p = 0.030$) compared to those married younger.*

Conclusion: *While tribal and non-tribal women showed comparable cervical abnormality rates despite sociodemographic disparities, the unexpected association between later marriage and higher abnormality prevalence warrants further investigation.*

Keywords: *VIA, Colposcopy, CIN, invasive cancer, Tribal, Non-tribal.*

Introduction

Cervical cancer is a leading female reproductive system malignancy globally. While human papilloma virus (HPV) vaccination and screening have reduced the incidence in high-income countries, but low- and middle-income countries (LMIC) face higher burdens due to inequal healthcare access, limited resources, and insufficient policy support.[1] In Bangladesh, late-stage diagnosis contributes to elevated mortality, with over 50 million women at risk, resulting in approximately 17,686 new cases and 10,362 deaths each year.[2]

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Cervical cancer, characterized by a prolonged precancerous period, is largely preventable through early detection using screening methods such as Papanicolaou (Pap) smear, liquid-based cytology (LBC), HPV DNA testing, Visual Inspection with Acetic Acid (VIA), Visual Inspection with Lugol's Iodine (VILI), and colposcopy.[3] Among these, VIA has emerged as the preferred universal screening tool in low- and middle-income countries (LMIC) due to its cost-effectiveness, minimal infrastructure requirements, and feasibility in resource-limited settings, positioning it as a practical alternative to Pap smear in developing regions.[4] In contrast, colposcopy remains the gold standard for validating screening results and diagnosing early cervical neoplasia.[5,6] However, to optimize resource allocation, colposcopy is recommended selectively for VIA-positive cases rather than as a primary screening procedure. In Bangladesh—where access to Pap smear and colposcopy is limited in rural and low-resource areas—VIA serves as a critical first-line tool to identify cervical abnormalities, which can then be triaged for confirmatory testing via Pap or colposcopy.[7-12]

The Chittagong Hill Tract (CHT), a culturally diverse region & home of a large number of tribal populations, face unique challenges in healthcare delivery due to geographic isolation, socioeconomic inequities, and cultural barriers.[13,14] While VIA has been widely adopted as a cost-effective screening tool in resource-limited settings, follow-up strategies—such as colposcopy and biopsy—are critical for diagnosing CIN and invasive carcinoma. However, data on the distribution of precancerous lesions and associated risk factors among tribal populations in CHT remain scarce. Existing studies highlight disparities in cervical cancer screening uptake and outcomes between tribal and non-tribal populations globally, driven by differences in healthcare access, health literacy, and cultural practices.[15-17] This study addressed a critical gap and by evaluating colposcopic findings and sociodemographic/clinical correlation of CIN and carcinoma among VIA-positive tribal and non-tribal women in a District Level hospital, in CHT, Bangladesh.

Materials and Methods

A retrospective record review study was conducted at Bandarban District Hospital, Bandarban, Bangladesh. The study protocol was approved by the Ethical Review Board of Rangamati Medical College (Memo No.: RmMC/ERB/2024/01; Dated: 25/06/2024).

VIA facility at Bandarban Sadar Hospital has been operational since August 16, 2009. Up to March 2024, a total 3,201 VIA procedures have been conducted at the facility. To enhance further the cervical cancer screening and diagnostic services, a Colposcopy Clinic was inaugurated at the hospital on March 4, 2021. By March 2024, 284 colposcopy had been performed at the clinic as part of follow-up care of the patients with screen positive results. Clinical data of the women aged between 18 to 60 years, with positive VIA test and had colposcopy from March 2021 to March 2024 were included in this study. Those with incomplete medical records were excluded from the study.

Colposcopy-guided punch biopsies were obtained from colposcopically positive and iodine-negative areas. The specimens were subsequently sent for histopathological examination to confirm cervical pathology. For cases with VIA-positive but colposcopically normal, were recommended follow-up colposcopy after six months to monitor potential changes. All data for this study were sourced retrospectively from the Government-provided Colposcopy Register book ensuring standardized documentation of procedures and outcomes.

Data were analyzed using SPSS Statistics (Version 27.0). Quantitative variables were categorized and summarized as frequencies (percentages) or proportions. Differences in categorical outcomes between groups (tribal vs. non-tribal; normal vs. abnormal colposcopy) were assessed using the Chi-square test, with a p-value < 0.05 considered statistically significant.

Results

This study enrolled 284 VIA-positive women, with the largest proportion (45.8%) aged 30–39 years, followed by 31.7% in the 40–49-year cohort. Over one-third of participants had completed secondary education, while the vast majority (89.1%) were homemakers. Socioeconomic and reproductive profiles revealed that 50% reported a monthly household income of 10,000–20,000 BDT, 60.2% had married between 15–18 years, and half of the women had 0–2 children (Table I). Notably, non-tribal women demonstrated higher educational attainment compared to tribal women; however, they married at an earlier age and delivered their first child younger than their tribal counterparts.

Table I

Sociodemographic characteristics of the studied patients

Chracteristics	Total (n=284)	Tribal (n=104)	Non-Tribal (n=180)	P value*
Age group				
20-29 years	34 (12.0)	12 (11.5)	22 (12.2)	0.067
30-39 years	130 (45.8)	38 (36.5)	92 (51.1)	
40-49 years	90 (31.7)	39 (37.5)	51 (28.3)	
e”50 years	30 (10.6)	15 (14.4)	15 (8.3)	
Education				
No formal education	68 (23.9)	41 (39.4)	27 (15.0)	<0.001
Primary	70 (24.6)	18 (17.3)	52 (28.9)	
Secondary	101 (35.6)	30 (28.8)	71 (39.4)	
Higher secondary	28 (9.9)	6 (5.8)	22 (12.2)	
Graduate	17 (6.0)	9 (8.7)	8 (4.4)	
Occupation				
Housemaker	253 (89.1)	88 (84.6)	165 (91.7)	0.066
Employed outside	31 (10.9)	16 (15.4)	15 (8.3)	
Monthly family income				
d”10,000 tk	48 (16.9)	22 (21.2)	26 (14.4)	0.127
>10,000-20,000 tk	136 (47.9)	53 (51.0)	83 (46.1)	
>20,000-30,000 tk	57 (20.1)	14 (13.5)	43 (23.9)	
>30,000 tk	43 (15.1)	15 (14.4)	28 (15.6)	
Age at marriage				
12-14 years	23 (8.1)	1 (1.0)	22 (12.2)	<0.001
15-18 years	171 (60.2)	55 (52.9)	116 (64.4)	
>18 years	90 (31.7)	48 (46.2)	42 (23.3)	
Age at 1st delivery				
d”18 years	119 (41.9)	28 (26.9)	91 (50.6)	<0.001
>18 years	165 (58.1)	76 (46.1)	89 (49.4)	
Parity				
0-2	142 (50.0)	64 (61.5)	78 (43.3)	0.009
3-4	110 (38.7)	29 (27.9)	81 (45.0)	
e”5	32 (11.3)	11 (10.6)	21 (11.7)	

Data were expressed as frequency (%). *Chi-square test.

As presented in Figure I, a colposcopically healthy cervix was observed in 146 cases. CIN I, CIN II, and CIN III were found in 99, 28, and 4 cases respectively. Invasive carcinoma was found in 7 cases.

Figure II showed that among the tribal women colposcopic findings of CIN I were 30.80%, CIN II 8.70%, CIN III 1.90% and invasive carcinoma of cervix were 2.90%, whereas among the non-tribal women colposcopic findings of CIN I were 37.20%, CIN II 10.60%, CIN III 1.10% and invasive carcinoma of cervix were 2.20%.

Table II demonstrates that abnormal colposcopy findings were more prevalent among non-tribal women, younger participants, and those with higher secondary education; however, none of these associations reached statistical significance ($p > 0.05$). Notably, women who married after 18 years of age exhibited a higher frequency of abnormal colposcopy findings compared to those married at a younger age.

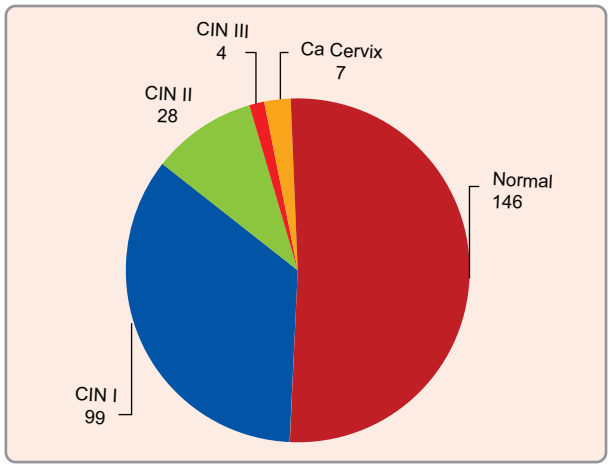

Figure 1: *Colposcopic findings of the women*

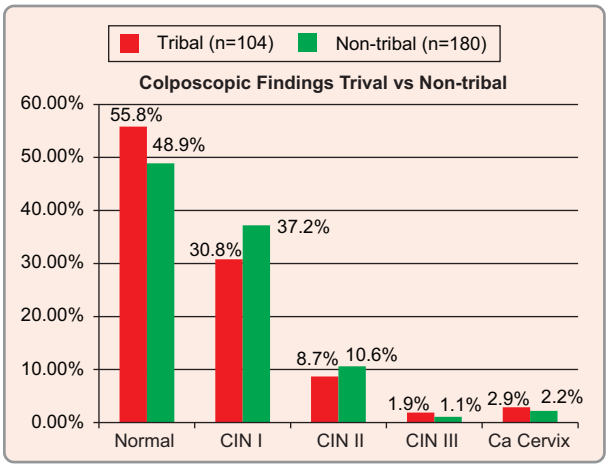

Figure 2: *Colposcopic findings of tribal vs non-tribal women.*

Table II

Factors associated with abnormal colposcopy findings in VIA positive cases

Chracteristics	Colposcopic findigns		P value
	Normal (n=146)	Abnormal (n=138)	
Ethnicity			
Tribal	58 (55.8)	46 (44.2)	0.264
Non-tribal	88 (48.9)	92 (51.1)	
Age group			
20-29 years	15 (44.1)	19 (55.9)	0.074
30-39 years	60 (46.2)	70 (53.8)	
40-49 years	50 (55.6)	40 (44.4)	
≥50 years	21 (70.0)	9 (30.0)	
Education			
No formal education	36 (55.9)	30 (44.1)	0.253
Primary	39 (55.7)	31 (44.3)	
Secondary	52 (51.5)	49 (48.5)	
Higher secondary	9 (32.1)	19 (67.9)	
Graduate	8 (47.1)	9 (52.9)	
Occupation			
Housemaker	129 (51.0)	124 (49.0)	0.686
Employed outside	17 (54.8)	14 (45.2)	
Monthly family income			
≤10,000 tk	29 (60.4)	19 (39.6)	0.165
>10,000-20,000 tk	71 (52.2)	65 (47.8)	
>20,000-30,000 tk	30 (52.6)	27 (47.4)	
>30,000 tk	16 (37.2)	27 (62.8)	
Age at marriage			
12-14 years	14 (60.9)	9 (39.1)	0.030
15-18 years	96 (56.1)	75 (43.9)	
>18 years	36 (40.0)	54 (60.0)	
Age at 1st delivery			
≤18 years	70 (58.8)	49 (41.2)	0.034
>18 years	76 (46.1)	89 (53.9)	
Parity			
0-2	72 (50.7)	70 (49.3)	0.398
3-4	54 (49.1)	56 (50.9)	
≥5	20 (62.5)	12 (37.5)	

Data were express as frequency (%). *Chi-square test.

Discussion

Invasive cervical cancer is typically preceded by a prolonged pre-invasive phase, characterized by a continuum of pathological changes progressing from cellular atypia to CIN of varying grades, ultimately culminating in invasive carcinoma. This cross-sectional study aimed to evaluate the colposcopic findings among VIA-positive women aged 18–60 years in a secondary-level hospital of Bangladesh.

The screening for CIN is usually carried out at the age of 30 years or above in Bangladesh.[18] But we included younger women as their sexual activity started at an earlier age (<20 years). The peak age group was 30-39 years (45.8% cases). About 31.7% in 40-49 years of age. Islam et al found the peak age group was 35-44 years (45% cases), followed by 30% were within 25-34 years of age.[19] Begum et al found in her study, about 32% in 40-49 years and 38.46% in the 26-35 years.[20] Previous studies agree well with this study that CIN is the disease of sexually active women. The World Health Organization (WHO) recommended upper limit of screening of women as 49 years of age,[21] and limiting screening at 49 years of age will fail to detect almost one third of the CC cases in Bangladesh and more in India. GOB adopted 60 years of age as the upper limit for CC screening.[18]

In the study over one-third of participants had completed secondary education, while the vast majority (89.1%) were homemakers. Socioeconomic and reproductive profiles revealed that 50% reported a monthly household income of 10,000–20,000 BDT, 68.3% had married before or at 18 years, and half of the women had 0–2 children. Though the legal age of marriage for women in Bangladesh is 18 years, a large proportion of marriage still take place before the women reach this age. In their study, Islam et al found that 34% of the VIA positive women's monthly family income was 5,000 to 10,000 taka. Regarding the age of first coitus, about 48% had their first coitus at the age between 14-18 years, and 45% of the women had more than 4 children.[19] The early age at marriage, early childbirth at young age and repeated pregnancies contribute to the risk of cervical cancer.[22]

Among 284 VIA-positive cases, colposcopy revealed normal findings in 51.4% of women and abnormal findings in 48.6%. Of the latter group, CIN I was identified in 34.9% of cases, CIN II in 9.9%, and CIN III in 1.4%, while invasive carcinoma was detected in 2.5%. These findings contrast with a study by Islam et al.[19] involving 100 VIA-positive cases, where 46% showed normal colposcopic results and 54% exhibited abnormalities. Among the abnormal cases in their cohort, CIN I was observed in 10%, CIN II in 7%, CIN III in 2%, and invasive carcinoma in 1%, suggesting a lower prevalence of high-grade lesions compared to the present study. Begum et al included 106 VIA positive cases and colposcopy evaluated those as CIN (CIN1-35.9%, CIN II -25.47%, CIN III -15% and 3.7% as invasive carcinoma.[20] A key advantage of VIA is its ability to provide real-time screening results, enabling immediate counseling and referral for treatment. However, its higher false-positive rate may lead to unnecessary referrals for colposcopy and biopsy, representing a significant limitation. Despite this drawback, VIA remains a practical and cost-effective screening tool for resource-limited settings like Bangladesh, where infrastructure for advanced diagnostics is often scarce.

Analysis of this study revealed no significant differences in colposcopy findings between tribal and non-tribal women. Contrary to expectations, however, women who married after 18 years of age demonstrated a higher prevalence of abnormal colposcopy results compared to those who married earlier.[22] This finding contrasts with existing epidemiological evidence associating early sexual debut and childbirth with elevated cervical cancer risk. Several factors may explain this unexpected association in this study, which focused exclusively on VIA-positive women. First, selection bias could arise if women in the CHT region who married later were more likely to pursue cervical screening, disproportionately influencing outcomes. Second, reliance on self-reported age at marriage and first childbirth introduces potential recall inaccuracies. Finally, the limited sample size for advanced lesions—only 13 cases of high-grade cervical abnormalities (CIN3 or carcinoma)—reduces statistical power, increasing susceptibility to Type I or Type II errors. These methodological constraints highlight the need for cautious interpretation and further investigation in larger, population-representative cohorts.

Limitation:

The study was conducted in a single district hospital in the CHT, limiting the generalizability of findings to broader populations, particularly other tribal and non-tribal groups in diverse geographic or socioeconomic settings. The sample size, though adequate for

preliminary insights, may lack statistical power to detect subtle differences between tribal and non-tribal groups. Additionally, hospital-based recruitment may introduce selection bias, as participants might differ systematically from the general population.

Conclusions

This study compares sociodemographic and clinical outcomes among VIA-positive tribal and non-tribal women in the CHT. While non-tribal women had higher education but earlier marriage and childbirth, cervical abnormality rates were similar across both groups. Over half (51.4%) of VIA-positive cases showed healthy cervices, suggesting potential VIA overdiagnosis or lesion regression, highlighting the need for improved diagnostics. Findings revealed no ethnic disparities in cervical abnormalities, advocating for universal screening access. The detection of invasive carcinoma in 2.5% of cases underscores the critical need for early diagnosis and intervention in this underserved region.

Recommendations

Integration of HPV DNA testing or cytology with VIA could be done to improve diagnostic accuracy and reduce false-positive referrals in resource-limited settings. Healthcare providers should be trained in colposcopy-guided biopsy and follow-up to improve diagnostic precision and clinical management of the cervical pathology. Longitudinal study is desirable to track CIN progression and identify predictors of regression or malignancy, particularly in younger women.

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