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Clinicopathological Characteristics, Screening History, Treatment Patterns and Outcomes Among Cervical Cancer Patients Attending Bangladesh Medical University: A Hospital-Based Analysis of 100 Empirical Cases

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KEYWORDS

cervical cancer; Bangladesh; clinicopathological characteristics; FIGO 2018 staging; screening; VIA; chemoradiation; hospital-based study

ABSTRACT:

Objective: To describe the clinicopathological characteristics, screening history, treatment patterns, and outcomes among cervical cancer patients attending Bangladesh Medical University and to explore associations between advanced stage at presentation and death at last follow-up.

Methods: A hospital-based observational analysis was conducted on a structured dataset of 100 histologically confirmed cervical cancer patients. Data were collected across six domains: sociodemographic, reproductive/risk factors, screening/clinical presentation, examination/investigations, histopathology/staging (FIGO 2018), and treatment/outcomes. Descriptive statistics summarised distributions. Two exploratory logistic regression models were fitted: (i) predictors of stage III+ at presentation, and (ii) predictors of death at last follow-up. Reporting follows STROBE guidance[1][2].

Results: Mean age was 48.04 years (SD 9.02). Most patients were rural residents (61.0%) with primary education or below (70.0%). Early marriage (<18 years) occurred in 70.0%, and parity ≥3 in 55.0%. Prior cervical cancer screening was rare (7.0%). Irregular vaginal bleeding (69.0%), post-coital bleeding (66.0%), and foul vaginal discharge (55.0%) were the leading presenting symptoms. Anaemia (Hb <11 g/dL) was present in 74.0%. FIGO 2018 stage distribution showed predominance of locally advanced disease: IIB (45.0%), IIIB (17.0%), and 86.0% at stage IIB or higher. Squamous cell carcinoma accounted for 76.0%. Concurrent chemoradiation (CCRT) was the primary treatment (80.0%); 84.0% completed treatment as planned. At last follow-up, 30.0% were alive and disease-free, 33.0% alive with disease, 27.0% died of disease, and 10.0% were lost to follow-up. In adjusted analysis, stage III+ was significantly associated with death (adjusted OR 2.64; 95% CI 1.03–6.72; p=0.042).

Conclusions: This cohort demonstrates delayed presentation characterised by low prior screening, prolonged symptoms, large tumours, and predominance of locally advanced stages. Findings support strengthening screening-to-diagnosis linkage, community awareness, and definitive treatment capacity in Bangladesh.

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Introduction

Cervical cancer is the fourth most common cancer in women worldwide, with an estimated 662,301 new cases and 348,874 deaths in 2022[3][4]. Approximately 94% of deaths occur in low- and middle-income countries (LMICs), reflecting profound inequalities in access to prevention, screening, and treatment[5][6]. Despite being a largely preventable malignancy, cervical cancer continues to impose a disproportionate burden on women in resource-constrained settings.

Persistent infection with oncogenic human papillomavirus (HPV) is the established necessary cause of cervical cancer. The landmark work by Walboomers et al. (1999) demonstrated that HPV DNA can be detected in virtually 100% of invasive cervical cancers when adequately tested, establishing HPV as a necessary cause — a first in human cancer research[7][8][9][10]. This causal relationship underpins contemporary prevention strategies centred on HPV vaccination and HPV-based screening.

In 2020, the World Health Assembly adopted the Global Strategy to Accelerate the Elimination of Cervical Cancer as a Public Health Problem, anchored in the 90–70–90 targets: 90% of girls vaccinated against HPV by age 15, 70% of women screened with a high-performance test by ages 35 and 45, and 90% of women with cervical disease receiving appropriate treatment by 2030[11][12][13][14]. Mathematical modelling projects that achieving these targets would reduce cervical cancer incidence by 42% by 2045 and avert over 62 million deaths by 2120.

In Bangladesh, cervical cancer is the second most common cancer among women, with an estimated 9,640 new cases and 5,826 deaths in 2023[15]. The age-standardised incidence rate stands at 11.3 per 100,000 women. The national VIA-based screening programme, established after pilot activities in 2005 and expanded across approximately 600 health facilities, represents an important public health investment[16][17][18]. However, screening coverage remains critically low at approximately 7%, and a significant "screen-to-diagnosis" gap exists, with many VIA-positive women failing to attend colposcopy for confirmatory evaluation[19][20]. These programmatic realities explain why women in Bangladesh commonly present with symptomatic and locally advanced disease.

The 2018 FIGO staging revision for cervical cancer introduced clinically important changes: subdivision of Stage IB into IB1/IB2/IB3 based on tumour size, and the addition of Stage IIIC for lymph node involvement (IIIC1 for pelvic, IIIC2 for para-aortic nodes), with notation of whether the basis is imaging (r) or pathological (p)[21][22][23][24]. These refinements align staging more closely with the TNM system and strengthen prognostic stratification.

For locally advanced disease, concurrent chemoradiation (CCRT) with cisplatin-based chemotherapy remains the standard of care for stages IB3–IVA[25][26]. Understanding real-world presentation patterns, treatment pathways, and outcomes is essential for service planning in settings where late-stage diagnosis is common.

Against this backdrop, the present study analyses a structured hospital-based dataset (n=100) from Bangladesh Medical University to describe clinicopathological characteristics, screening history, treatment patterns, and outcomes among cervical cancer patients.

Objectives

Primary Objective

To describe the clinicopathological characteristics (including FIGO 2018 stage distribution and histopathological types/grades), screening history, clinical presentation, treatment modalities, and last follow-up status among 100 cervical cancer patients.

Secondary Objectives

- To explore associations between indicators of delayed presentation (prolonged symptoms, low awareness, low prior screening) and advanced stage at presentation (stage III+ vs stage I–II).
- To explore the association between stage at presentation and death at last follow-up, adjusting for basic clinical covariates.

Hypotheses (Exploratory)

- H1: Low screening history and prolonged symptoms are associated with advanced stage at presentation.

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- H2: Higher stage at presentation is associated with higher odds of death at last follow-up.

Methods

Study Design and Setting

This is a hospital-based observational analysis of 100 cervical cancer patients attending Bangladesh Medical University. The manuscript is drafted to align with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist for cross-sectional observational studies[1][2][27].

Data Source and Structure

Data were collected using a structured Excel workbook containing six patient-level sheets: (A) Sociodemographic, (B) Reproductive/Risk Factors, (C) Screening/Clinical Presentation, (D) Examination/Investigations, (E) Histopathology/Staging, and (F) Treatment/Outcomes, plus a comprehensive coding guide sheet. Each patient was identified by a unique anonymised PatientID (BMU-CC-001 through BMU-CC-100).

Participants

All 100 entries were included. Biopsy was performed in 100% of cases, confirming histological diagnosis across the cohort. No personal identifiers were present in the analytical dataset.

Variables and Operational Definitions

Variables were analysed as recorded using the provided coding guide. Advanced stage was defined a priori as FIGO 2018 stage III+ (IIIA, IIIB, IIIC1, IIIC2, IVA, IVB). Death at last follow-up was coded as a binary outcome (died of disease vs all others). Anaemia was defined as haemoglobin <11 g/dL.

Statistical Analysis

Descriptive statistics included means (SD), medians (IQR), and frequencies (%). Two exploratory multivariable logistic regression models were fitted:

- **Model A:** Predictors of stage III+ at presentation (age, rural residence, low education, symptom duration ≥6 months, prior screening, anaemia).
- **Model B:** Predictors of death at last follow-up (stage III+, age, treatment incompletion, anaemia).

Effect sizes are reported as adjusted odds ratios (aOR) with 95% confidence intervals. Two-sided p-values are reported at α=0.05. All analyses are exploratory and hypothesis-generating.

Ethics Statement

This study was conducted in accordance with the principles of the Declaration of Helsinki[28][29][30][31]. Ethics approval and written informed consent were obtained per institutional regulation. Authorship and conflict-of-interest disclosure follow ICMJE recommendations.

Results

Sociodemographic Characteristics

Mean age was 48.04 years (SD 9.02; range 29–72). The majority were Muslim (93.0%), married (83.0%), and rural residents (61.0%). Seven in ten (70.0%) had primary education or below (51.0% primary; 19.0% illiterate). Almost all patients (92.0%) were housewives. Monthly family income was predominantly BDT 10,000–40,000 (84.0% combined). Joint/extended families accounted for 52.0%.

Table 1: Sociodemographic characteristics (n=100)

Variable	Category	n (%)
Religion	Islam	93 (93.0)
	Hinduism	3 (3.0)
	Christianity	3 (3.0)
	Buddhism	1 (1.0)
Marital status	Married	83 (83.0)
	Widowed	15 (15.0)

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	Divorced/Separated	2 (2.0)
Education	Illiterate	19 (19.0)
	Primary	51 (51.0)
	Secondary	15 (15.0)
	Higher Secondary	10 (10.0)
	Graduate+	5 (5.0)
Residence	Rural	61 (61.0)
	Urban	24 (24.0)
	Semi-urban	15 (15.0)
Monthly income (BDT)	<10,000	4 (4.0)
	10,000–20,000	38 (38.0)
	20,001–40,000	46 (46.0)
	>40,000	12 (12.0)

Reproductive History and Risk Factors

Mean age at marriage was 16.27 years (SD 2.37), with 70.0% married before age 18 — consistent with documented high rates of early marriage in Bangladesh[15][32]. Mean parity was 2.61 (SD 1.44); 55.0% had parity ≥3. Contraceptive use was reported by 85.0%, with oral contraceptive pills (OCP) being the most common type (40.0%). Mean contraceptive duration among users was 9.87 years (SD 4.85).

HPV vaccination was not reported in any case: 93.0% were recorded as "not vaccinated" and 7.0% as "unknown"[16]. Smokeless tobacco use (betel nut/jorda) was present in 17.0%. Mean BMI was 22.94 kg/m² (SD 3.36).

Table 2: Continuous reproductive and clinical measures (n=100)

Measure	Mean (SD)	Median [IQR]
Age (years)	48.04 (9.02)	48.0 [41.0–54.0]
Age at marriage (years)	16.27 (2.37)	16.0 [14.0–18.0]
Parity	2.61 (1.44)	3.0 [2.0–3.2]
BMI (kg/m²)	22.94 (3.36)	23.0 [20.6–24.9]
Haemoglobin (g/dL)	9.71 (1.82)	9.6 [8.4–11.0]

Screening Awareness and Prior Screening

Only 43.0% of patients reported having heard of cervical cancer. Prior cervical cancer screening was extremely rare at 7.0% (6 VIA; 1 Pap smear), closely matching national estimates of approximately 7% lifetime screening coverage[15][20]. Among those unscreened, the most common barriers were lack of awareness, financial constraints, and fear/shyness. Distance to the nearest health facility was >5 km for 61.0% of patients.

Clinical Presentation

Presenting symptoms were dominated by irregular vaginal bleeding (69.0%), post-coital bleeding (66.0%), and foul vaginal discharge (55.0%). Pelvic/lower abdominal pain was reported in 43.0%, post-menopausal bleeding in 26.0%, and low back pain in 25.0%. Symptom duration before presentation was prolonged:

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67.0% reported symptoms for 3–12 months, and 11.0% for more than 12 months. Anaemia (Hb <11 g/dL) was present in 74.0%, with a median haemoglobin of 9.6 g/dL.

ECOG performance status was 0 in 23.0%, 1 in 40.0%, 2 in 25.0%, and 3 in 12.0%. Comorbidities included hypertension (22.0%) and diabetes mellitus (15.0%).

Examination Findings and Investigations

Clinical tumour size was >4 cm in 95.0% of cases. Parametrial involvement was documented in 86.0% (unilateral 32.0%, bilateral 30.0%, extending to pelvic wall 24.0%). Vaginal involvement was observed in cases with stage IIA/IIIA disease.

Pap smear was not performed in 28.0% of cases; among those tested, squamous cell carcinoma (SCC) was the predominant finding (48.0%). HPV DNA testing was not done in 74.0%; among the 26 patients tested, all were HPV-positive. HPV genotyping, where performed, showed HPV 16 predominance (65.4% of typed cases)[9][10].

Histopathological Characteristics

Squamous cell carcinoma was the predominant histological type at 76.0%, followed by adenocarcinoma at 15.0%, consistent with global patterns where SCC typically accounts for 80–85% of cervical cancers[23]. Histological grade was predominantly moderately differentiated (Grade 2) at 60.0%. Lymphovascular space invasion (LVSI) was present in 40.0% and not assessed in 25.0%. Pelvic lymph node positivity was documented in 30.0%.

Table 3: Histological type distribution (n=100)

Histological Type	n (%)
Squamous cell carcinoma	76 (76.0)
Adenocarcinoma	15 (15.0)
Others	4 (4.0)
Small cell carcinoma	3 (3.0)
Adenosquamous	2 (2.0)

FIGO 2018 Stage Distribution

The FIGO 2018 stage distribution demonstrates predominance of locally advanced disease. Stage IIB was the most common (45.0%), followed by IIIB (17.0%). Overall, 86.0% presented at stage IIB or higher, and 41.0% at stage III+. Only 14.0% presented with stage ≤IIA2 disease[21][22].

Table 4: FIGO 2018 stage distribution (n=100). Stage IIB predominates; 86% present at IIB or higher.

FIGO 2018 Stage	n (%)	Cumulative %
IB1	1 (1.0)	1.0
IB2	2 (2.0)	3.0
IB3	5 (5.0)	8.0
IIA1	2 (2.0)	10.0
IIA2	4 (4.0)	14.0
IIB	45 (45.0)	59.0
IIIA	2 (2.0)	61.0
IIIB	17 (17.0)	78.0
IIIC1	7 (7.0)	85.0
IIIC2	2 (2.0)	87.0
IVA	7 (7.0)	94.0
IVB	6 (6.0)	100.0

Staging method was clinical with imaging in 55.0%, clinical with imaging plus pathological confirmation in 30.0%, and clinical examination only in 15.0%.

Treatment Patterns

Concurrent chemoradiation (CCRT) was the predominant primary treatment modality (80.0%), consistent with guideline-based management for locally advanced cervical cancer[25][26][33]. Weekly cisplatin (40 mg/m²) was the most common chemotherapy

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regimen (86.0%). Surgical approaches (surgery alone, surgery with adjuvant RT, or surgery with adjuvant CCRT) accounted for 14.0% of cases, predominantly among those with earlier-stage disease. Palliative care was the primary approach for 6.0% (predominantly stage IVB). Treatment was completed as planned in 84.0%.

Table 5: Primary treatment modality (n=100)

Primary Treatment	n (%)
CCRT	80 (80.0)
Surgery + Adjuvant RT	7 (7.0)
Palliative	6 (6.0)
Surgery + Adjuvant CCRT	4 (4.0)
Surgery only	3 (3.0)

Outcome at Last Follow-Up

At last follow-up, 30.0% were alive and disease-free, 33.0% were alive with disease, 27.0% had died of disease, and 10.0% were lost to follow-up. Among the 63 patients with known alive status, 21 (33.3%) had documented recurrence. Local (pelvic) recurrence was the most common site (45.2% of recurrences), followed by distant lung metastasis (19.0%).

Exploratory Logistic Regression Models

Model A: Predictors of Stage III+ at Presentation

No covariate reached statistical significance, though longer symptom duration (≥6 months) and anaemia showed trends toward higher odds of advanced stage.

Table 6: Model A — Predictors of stage III+ at presentation (n=100)

Predictor	aOR (95% CI)	p-value
Age	1.01 (0.96–1.05)	0.806
Rural residence	1.24 (0.53–2.91)	0.624
Low education	0.94 (0.38–2.37)	0.903
Symptoms ≥6 months	1.72 (0.74–4.00)	0.208
Prior screening	1.34 (0.26–6.95)	0.726
Anaemia	2.14 (0.78–5.84)	0.138

Model B: Predictors of Death at Last Follow-Up

Stage III+ was significantly associated with higher odds of death at last follow-up after adjustment.

Table 7: Model B — Predictors of death at last follow-up (n=100). Stage III+ is the only significant predictor (p=0.042).

Predictor	aOR (95% CI)	p-value
Stage III+	2.64 (1.03–6.72)	0.042
Age	0.98 (0.93–1.04)	0.518
Treatment incomplete	0.26 (0.05–1.30)	0.100
Anaemia	0.93 (0.32–2.68)	0.894

Discussion

Principal Findings

This hospital-based cohort demonstrates a classic late-presentation pattern of cervical cancer characterised by low prior screening uptake (7.0%), prolonged symptom

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duration (67.0% reporting ≥3 months), frequent anaemia (74.0%), very large clinical tumours (>4 cm in 95.0%), extensive parametrial involvement (86.0%), and predominance of FIGO 2018 stage IIB and above (86.0%). These findings are consistent with the broader global observation that cervical cancer mortality is concentrated in LMICs where screening and timely treatment access remain constrained[4][6].

The mean age at presentation (48.04 years), the stage distribution pattern (IIB most common at ~45%), and the histological predominance of SCC are consistent with recent Bangladeshi tertiary referral data[15][34][35]. The convergence between independently collected studies increases face validity of this presentation profile.

Screening Gap in Bangladesh

Bangladesh has maintained a VIA-based screening programme since 2005, expanded across approximately 600 health facilities with data tracked through the DHIS2 electronic registry[16][17][18][19]. However, screening coverage has remained critically low — only 7% lifetime screening coverage according to WHO 2021 country profiles[15]. More critically, case-based electronic registry data demonstrate a substantial "screen-to-diagnosis" gap: many VIA-positive women do not complete the referral pathway to colposcopy and treatment[19][20]. In the present dataset, the 7.0% prior screening rate mirrors these national estimates precisely.

WHO guidance now emphasises HPV testing as the preferred high-performance screening method, with VIA remaining operationally necessary in some contexts[11][13]. The absence of HPV vaccination in this cohort (0% documented vaccination) reflects the reality that Bangladesh's HPV vaccination programme remains in early implementation phases[16].

Histopathological Profile

The dominance of squamous cell carcinoma (76.0%) with adenocarcinoma comprising 15.0% is broadly consistent with global distributions[23]. The incomplete HPV testing coverage (74.0% not done) represents a diagnostic gap that limits genotype-level surveillance and programme evaluation, even though HPV testing of established cancers is not required for clinical diagnosis[9][10].

Treatment Patterns

The predominance of CCRT (80.0%) is clinically coherent given the advanced stage distribution. CCRT with cisplatin-based chemotherapy is the established standard for locally advanced cervical cancer (FIGO stages IB3–IVA)[25][26][33]. Weekly cisplatin at 40 mg/m² was the most common regimen, consistent with guideline recommendations. Treatment completion at 84.0% is reasonably high for a resource-constrained setting, though the 16.0% non-completion rate warrants investigation of contributing barriers (toxicity, financial constraints, access).

Recent evidence from the KEYNOTE-A18 trial demonstrates that pembrolizumab added to CCRT followed by maintenance immunotherapy significantly improves outcomes in high-risk locally advanced cervical cancer, with a 33% reduction in death risk at 3 years[36]. This emerging evidence may reshape treatment paradigms as access to immunotherapy expands.

Stage and Survival

The exploratory finding that stage III+ is significantly associated with death (aOR 2.64; 95% CI 1.03–6.72; p=0.042) is biologically plausible and consistent with the established prognostic significance of FIGO staging[21][24]. While the absence of follow-up duration data prevents formal survival analysis (Kaplan–Meier/Cox regression), the directionality of this association aligns with known outcomes literature.

Implications for Policy

These findings carry several implications aligned with the WHO elimination strategy[13]:

- **Strengthen screening-to-diagnosis linkage.** The national electronic registry shows that completing the referral pathway from VIA-positive screen to colposcopy remains a critical gap[19][20].
- **Increase awareness and reduce delay.** Only 43.0% had heard of cervical cancer, and most presented with ≥3 months of symptoms. Targeted community education and patient navigation programmes could compress diagnostic delays.

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- **Expand HPV vaccination.** Zero vaccination coverage in this cohort underscores the urgency of HPV vaccine rollout. IARC modelling shows Bangladesh could eliminate cervical cancer by 2054 if 90–70–90 targets are achieved with rapid scale-up[16].
- **Ensure radiotherapy capacity.** Given late-stage predominance requiring CCRT, sustaining and expanding brachytherapy and concurrent chemotherapy capacity is essential.

Strengths and Limitations

Strengths include structured data capture spanning six comprehensive domains, consistent patient-level identifiers, FIGO 2018 staging enabling contemporary comparability, and complete histological confirmation (100% biopsy rate).

Limitations include the single-centre design, relatively small sample size (n=100), limited HPV testing coverage (74.0% not tested), absence of follow-up duration data precluding time-to-event analysis, substantial "not applicable" categorisation for recurrence (suggesting incomplete follow-up ascertainment), and the cross-sectional nature precluding causal inference. These limitations should be explicitly acknowledged in journal submission and supplemented where possible (e.g., adding follow-up months from source records for survival modelling).

Conclusions

In this hospital-based dataset from Bangladesh Medical University, cervical cancer presents with a pattern of delayed diagnosis characterised by low prior screening (7.0%), prolonged symptoms, large tumours, high rates of anaemia, and predominance of locally advanced FIGO 2018 stages (86.0% at stage IIB or higher). Squamous cell carcinoma predominates (76.0%). Most patients receive concurrent chemoradiation (80.0%), consistent with guideline-based care. Stage III+ is independently associated with increased odds of death at follow-up. These findings underscore the critical need for strengthened screening-to-treatment pathways, community awareness, HPV vaccination expansion, and sustained radiotherapy capacity to move Bangladesh towards the WHO's cervical cancer elimination targets.

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