

Patterns and Frequency of Abnormal Cervical Cytology Findings during Pap Test Screening in a Private Hospital in Bangladesh

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ABSTRACT

Background: Cervical cancer remains a leading preventable malignancy among women in developing countries, where screening coverage and timely follow-up are often limited. Pap smear cytology, reported using the Bethesda System, is a practical screening tool in routine clinical settings, yet contemporary data on the pattern and frequency of abnormal cervical cytology in private hospital-based screening services in Bangladesh are limited. **Methods & Materials:** This cross-sectional descriptive study was conducted in the Gynecology and Obstetrics Outpatient Department at Khalishpur Clinic, Khulna, Bangladesh, including 112 consenting women attending for routine or symptomatic evaluation or cervical cancer screening from January, 2024 to December, 2024. Women with prior hysterectomy, known cervical malignancy, active heavy bleeding, or refusal of consent were excluded. **Results:** Among 112 women screened, most were aged 26-35 years (50.0%), with a mean age of 37±11.5 years; mean age at marriage was 19±12.6 years. Most had parity 1-3 (75.0%), 55.4% reported no contraceptive use, and 73.2% had regular menstruation. Discharge-related symptoms predominated, particularly leucorrhoea (59.8%) and foul-smelling discharge (42.9%); on examination, cervical lesions were noted in 12.5%, lower abdominal pain in 16.1%, and uterine prolapse in 5.4%. Cytology was NILM at 80.4%, ASC-US (17.0%) with rare HSIL (1.8%). In multivariable analysis, age was not associated with abnormal cytology, whereas age at marriage showed a significant positive association (OR 1.176, p=0.027); leucorrhoea and uterine prolapse showed suggestive but non-significant increased odds with wide confidence intervals. **Conclusion:**

Most Pap smears were NILM, with abnormalities mainly ASC-US and rare HSIL. Strengthening standardized triage, follow-up, and documentation, with HPV-based testing where feasible, is essential to maximize the impact of opportunistic screening in this setting.

Keywords: Cervical cytology, Pap smear screening, Abnormal Pap smear, and ASC-US

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INTRODUCTION

Cervical cancer is a largely preventable disease, developing through a prolonged precancerous phase that is amenable to early detection and treatment. Despite the availability of effective preventive strategies, including HPV vaccination and screening, the global burden remains high, particularly in low-resource settings with limited screening coverage and weak follow-up systems. GLOBOCAN 2020 estimated 604,127 new cases and 341,831 deaths worldwide, with persistent inequities and wide variation across countries; similarly high burdens were reported in 2018 where access to screening remains constrained [1-3]. Modelling studies demonstrate that high HPV vaccination coverage combined with effective screening and timely treatment could substantially reduce incidence and mortality and move many countries toward cervical cancer elimination, provided that screening quality, linkage to care, and sustained coverage are achieved [4,5]. However, screening uptake remains suboptimal globally, with significant gaps across populations and age groups [6]. In many clinical settings, cytology-based screening using Pap smears reported under the Bethesda System

continues to be widely used because of its accessibility and role in guiding risk-based triage and follow-up where HPV testing is not universally available [7].

In Bangladesh, cervical cancer screening faces ongoing challenges despite the implementation of national programmes, largely based on visual inspection with acetic acid (VIA) in the public sector. Hospital-based and population-level studies consistently report low screening uptake related to limited awareness, fear, sociocultural barriers, and access constraints [8-10]. Although cytology services are available in selected facilities, evidence highlights the need to improve coverage, quality assurance, and follow-up to minimize attrition along the screening-to-treatment pathway [11]. Previous hospital studies demonstrate that Pap smear cytology detects a spectrum of epithelial abnormalities and inflammatory changes, although the distribution of Bethesda categories varies by setting and patient population, and data from private-sector facilities remain limited [12]. Studies involving symptomatic or clinically “unhealthy cervix” populations further indicate that abnormal or persistent inflammatory cytology often necessitates

colposcopic and histopathological evaluation, increasing demands on referral services [13]. Evaluating cytology findings in private hospital settings may therefore inform clinical workload, triage practices, and patient counselling. This study aimed to describe the patterns and frequency of abnormal cervical cytology findings, reported according to the Bethesda System, among women undergoing Pap smear screening in a private hospital in Bangladesh.

METHODS & MATERIALS

This cross-sectional descriptive study was conducted at the Gynecology and Obstetrics Outpatient Department, Khalishpur Clinic, Khulna, Bangladesh. A total of 112 women who attended the hospital’s gynecology outpatient department for routine or symptomatic evaluation or cervical cancer screening and consented to undergo a Pap smear were included during the study period, from January, 2024 to December, 2024. Women with prior hysterectomy, a known diagnosis of cervical malignancy, active heavy vaginal bleeding at the time of sampling, or those who declined consent were excluded.

After obtaining informed verbal consent, a structured case record form was used to collect socio-demographic and reproductive variables, including age, age at marriage, parity, contraceptive method, and menstrual pattern. Presenting gynecological symptoms, including leucorrhea, foul-smelling discharge, itching, and dyspareunia, were recorded. A focused per speculum and bimanual examination was performed by the attending clinician, and key clinical findings such as visible cervical lesions, lower abdominal pain on assessment, and uterine prolapse were documented. Cervical cytology specimens were collected using standard aseptic technique. Cells were obtained from the ectocervix and endocervical canal using an Ayre’s spatula

and/or endocervical brush, smeared evenly on glass slides, immediately fixed in 95% ethanol, and sent to the pathology laboratory. Smears were stained (Papanicolaou stain) and reported by qualified cytopathologists according to the Bethesda System. Cytology outcomes were categorized as negative for intraepithelial lesion or malignancy (NILM), atypical squamous cells of undetermined significance (ASC-US), high-grade squamous intraepithelial lesion (HSIL), and reactive/inflammatory changes. For analytical purposes, abnormal cytology was defined as ASC-US or higher. Data were entered and analyzed using standard statistical software (SPSS, v-26.0). Descriptive statistics were presented as frequency and percentage for categorical

variables, and mean ± standard deviation for continuous variables. Factors associated with abnormal cytology were evaluated using multivariable logistic regression, reporting odds ratios with 95% confidence intervals; a p-value <0.05 was considered statistically significant. Ethical approval was obtained from the hospital’s ethical review committee, and confidentiality was maintained throughout.

RESULTS

A total of 112 women underwent Pap smear screening. The mean age was 37 ± 11.5 years, and half of participants were aged 26–35 years (50.0%) (Table 1).

Table I
Age Distribution and Descriptive Statistics of Women Undergoing Pap smear Screening (n=112).

Age range	Frequency (n)	Percentage (%)
18–25 years	8	7.14
26–35 years	56	50.00
36–45 years	28	25.00
46–55 years	16	14.29
66+ years	4	3.57
Age (years), Mean±SD		37±11.5
Age at Marriage (years), Mean±SD		19±12.6

Most women had low to moderate parity (1–3 births, 75.0%), while 14.3% were nulliparous and 10.7% had high parity (≥4) (Table II).

Table II
Distribution of Participants According to Parity Group (n=112).

Parity Group	Frequency (n)	Percentage (%)
Nulliparous (0)	16	14.29
Low–Moderate (1–3)	84	75.00
High (≥4)	12	10.71

55.4% of participants were not using any contraception. Condoms were the most commonly used contraceptive method (13.4%), followed by combined oral contraceptive pills (8.9%), while 22.3% reported other methods or had missing data (Table III).

Table III
Distribution of Participants by Contraceptive Method Used (n=112).

Contraceptive Method	Frequency (n)	Percentage (%)
No contraception	62	55.4
Condom	15	13.4
COCP (Pill)	10	8.9
Others / Missing	25	22.3

The majority of participants (73.2%) had a regular menstrual pattern, while 26.8% reported irregular menstruation. This indicates that regular menstrual cycles were more common among the study population (Table IV).

Table IV
Distribution of Menstrual Pattern among Study Participants (n=112).

Menstrual Pattern	Frequency (n)	Percentage (%)
Regular	82	73.2
Irregular	30	26.8

Leucorrhea was the most common symptom, reported by 59.8% of participants, followed by foul-smelling discharge (42.9%), itching (36.6%), and dyspareunia (33.9%). This indicates that the predominant clinical complaints among the study population (*Table V*).

Table V
Frequency of Reported Gynecological Symptoms among Participants ($n=112$).

Symptom	Frequency (n)	Percentage (%)
Foul Smelling Discharge	48	42.86
Leucorrhea	67	59.82
Itching	41	36.61
Dyspareunia (Painful Intercourse)	38	33.93

Note: symptoms may be multiple-response, totals can exceed 100%.

Lower abdominal pain was the most common clinical finding (16.1%), followed by cervical lesions (12.5%), while uterine prolapse was least common (5.4%) among the participants (*Table VI*).

Table VI
Clinical Examination Findings of the Study Population ($n=112$).

Clinical Finding	Frequency (n)	Percentage (%)
Cervical Lesion Present	14	12.5
Lower Abdominal Pain (LAP)	18	16.1
Uterine Prolapse	6	5.4

Most participants (80.4%) had a cytology result of Negative for Intraepithelial Lesion or Malignancy (NILM). Atypical Squamous Cells of Undetermined Significance (ASC-US) were found in 17% of cases, while High-Grade Squamous Intraepithelial Lesion (HSIL) was rare (1.8%). Only 0.9% showed contact bleeding with reactive or inflammatory changes (*Table VII*).

Table VII
Distribution of Pap smear Cytology Results among Participants ($n=112$).

Cytology Classification (Bethesda System)	Frequency (n)	Percentage (%)
Negative for Intraepithelial Lesion or Malignancy (NILM)	90	80.4
Atypical Squamous Cells of Undetermined Significance (ASC-US)	19	17
High-Grade Squamous Intraepithelial Lesion (HSIL)	2	1.8
Contact Bleeding (Reactive/Inflammatory changes)	1	0.9
Total	112	100

This table shows that only age at marriage was statistically significant (OR = 1.176, $p = 0.027$). All other variables, including age, parity, contraceptive use, and clinical symptoms, were not significantly associated with the outcome ($p > 0.05$). However, uterine prolapse and leucorrhea showed relatively higher odds ratios but without statistical significance (*Table VIII*).

Table VIII
Multivariable Logistic Regression Analysis of Risk Factors Associated with Abnormal Cervical Cytology.

Variable	Odds Ratio (OR)	95% CI (Lower–Upper)	p-Value
Age (years)	1.007	0.859 – 1.180	0.93
Age at Marriage (years)	1.176	1.018 – 1.358	0.027
Parity (number of births)	0.677	0.355 – 1.290	0.236
Contraceptive Use	1.895	0.482 – 7.461	0.36
Foul-Smelling Discharge	0.406	0.096 – 1.720	0.221
Leucorrhea	7.899	0.682 – 91.552	0.098
Itching	1.284	0.293 – 5.620	0.74
Dyspareunia (Painful Intercourse)	0.599	0.138 – 2.608	0.495
Cervical Lesion on Exam	1.068	0.264 – 4.311	0.927
Lower Abdominal Pain (LAP)	2.049	0.484 – 8.674	0.33
Uterine Prolapse	5.252	0.688 – 40.109	0.11

DISCUSSION

This hospital-based Pap test screening series from a private facility in Bangladesh shows a largely benign cytology profile, with NILM in 80.4% and epithelial abnormality driven mainly by ASC-US (17.0%), while HSIL was uncommon (1.8%). The age distribution, concentrated in reproductive

years (50.0% aged 26–35, mean age 37 years), is consistent with other facility-based Bangladeshi reports where screening uptake tends to peak in the late 20s to 40s, often reflecting care-seeking for gynecologic concerns rather than organized population screening. Similar age clustering has been reported in Chattogram tertiary-

care Pap smear series and other Bangladeshi hospital cohorts, supporting that opportunistic screening in Bangladesh typically captures women during active reproductive life rather than post-menopause^[12,14,15]. Symptom patterns in the present study further indicate a predominantly

opportunistic, symptom-prompted screening context, with discharge-related complaints dominating (leucorrhoea 59.8%, foul-smelling discharge 42.9%, itching 36.6%, dyspareunia 33.9%). This aligns closely with Bangladeshi work focusing on women presenting with leucorrhoea, where Pap testing is frequently used to evaluate cervicitis, vaginitis, and coexisting epithelial change, even though symptoms themselves are not specific for premalignancy [15]. Comparable symptom-led sampling is also common in South Asian hospital series, where inflammatory and infectious morbidity drives attendance and influences case-mix, often increasing borderline interpretations such as ASC-US when background inflammation or reparative atypia is prominent [16,17]. In the current dataset, overt cervical lesions on examination were recorded in only 12.5%, suggesting that many screened women had no grossly visible pathology, an important reminder that cytologic abnormalities can be present despite a clinically unremarkable cervix, and conversely, visible ectopy or inflammation is frequently benign [12,14,15]. The relatively high proportion of ASC-US (17.0%) merits careful interpretation. In many hospital-based studies, ASC-US typically constitutes the largest fraction of abnormalities, but the absolute rate varies widely by laboratory thresholds, specimen adequacy, underlying STI and cervicitis burden, and the rigor of Bethesda application [16-18]. Population-based cytology work from Thailand reported a substantially lower overall abnormal cytology prevalence (4.1%), with ASC-US 2.4% and HSIL 0.5%, illustrating how organized community sampling among asymptomatic women yields lower abnormality rates than facility-based samples enriched with symptomatic attendees [19]. Similarly, African hospital screening series often show ASC-US as the most frequent abnormal category, while HSIL remains comparatively uncommon, especially when screening is early and follow-up pathways are variable [18,20]. The low HSIL frequency in this study is reassuring in one sense, yet it also highlights the practical public-health challenge, most women will have NILM or borderline results, so program impact depends on high-quality triage and reliable recall for the smaller group who need repeat testing, HPV triage, or colposcopy [18,21,22]. Methodological and workflow differences also shape comparability. Bangladeshi evidence comparing conventional Pap with liquid-based cytology suggests that LBC may modestly improve sample quality and reduce obscuring factors, although sensitivity remains limited without systematic colposcopy and histopathologic verification, especially in real-world settings [21,23]. The present study's very low frequency of "reactive or inflammatory

changes" (0.9%) is atypical for symptomatic outpatient populations reported in Bangladesh and India, where inflammatory or reactive NILM interpretations are commonly recorded; this may reflect reporting conventions, documentation practices, or classification choices, and it may partially explain the high ASC-US fraction if borderline reactive atypia was preferentially labeled as ASC-US [16,17]. From a quality-assurance perspective, periodic cytology-histology correlation (where biopsies exist), double reading of ASC-US, and monitoring of ASC-US:SIL ratios are pragmatic steps to reduce overcalling and to standardize thresholds [21,22].

In multivariable analysis, chronological age was not independently associated with abnormal cytology, which is not unusual in small cohorts when age ranges are narrow and when HPV exposure variables are unmeasured [18,20,24]. The statistically significant positive association between age at marriage and abnormal cytology (OR 1.176, $p = 0.027$) is directionally counterintuitive to much of the cervical neoplasia literature, where earlier sexual debut and earlier marriage tend to correlate with higher lifetime HPV exposure. A likely explanation is residual confounding, selection bias in who presents for screening at a private hospital, or measurement and data-quality issues, especially given the unusually large standard deviation reported for age at marriage. In this setting, the finding should be treated as hypothesis-generating rather than causal, and future studies should collect more proximal exposure markers, age at first intercourse, partner factors, HPV status, and smoking, with improved data validation [20,24,25]. Other predictors showed suggestive but imprecise effects, leucorrhoea (OR 7.899, $p = 0.098$) and uterine prolapse (OR 5.252, $p = 0.11$) had wide confidence intervals, consistent with limited events and potential model instability. While chronic discharge and cervicitis can coexist with HPV infection and cytologic atypia, symptoms alone remain poor discriminators of precancer, reinforcing that triage should be test-based rather than symptom-based [26,27]. Likewise, parity and contraceptive use were not significant here, which is compatible with mixed findings in the broader literature where associations can depend on duration of exposure (for example, long-term hormonal contraception), HPV persistence, and socioeconomic context [25-28].

LIMITATIONS

This was a single-center, private-hospital study with purposive sampling and a small sample, so generalizability is limited. Cytology was not routinely validated with HPV testing, colposcopy, or histopathology. Age at marriage data showed wide variability and may have been affected by

recall or recording bias, which could have influenced observed associations. Several variables had missing or incomplete documentation, resulting in imprecise regression estimates.

CONCLUSION

In this Pap screening cohort, most smears were negative for intraepithelial lesion or malignancy, while a small but clinically important proportion showed epithelial abnormalities, predominantly ASC-US and rare HSIL. Symptoms were common but did not reliably predict cytologic abnormality after adjustment, and most demographic and reproductive factors were not independently associated with abnormal results. These findings support the value of opportunistic screening and emphasize the need for standardized ASC-US triage, reliable follow-up, and improved documentation, ideally supported by HPV testing where available.

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CONFLICT OF INTEREST

None declared.

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