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RESEARCH ARTICLE

Cytomorphological analysis of cervical Pap smear findings - a hospital based retrospective study

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ABSTRACT

Background: Cervical cancer remains a major cause of cancer related mortality among women, particularly in low resource settings. The Papanicolaou (Pap) smear, interpreted using the Bethesda system, is an effective tool for early detection of precancerous and malignant lesions, enabling timely intervention. **Objective:** To assess and categorize cervical cytological findings using the Bethesda system, determining the prevalence and spectrum of epithelial cell abnormalities in screened women. **Materials and methods:** This retrospective study analyzed Pap smears received at the department of pathology, FAAMCH, Barpeta from January 2023 to December 2024. Relevant clinical data were collected from requisition forms, case sheets, outpatient slips and direct patient interviews wherever necessary. **Results:** Out of 651 Pap smears, the most common category was negative for intraepithelial lesion or malignancy (NILM). Infective pathologies such as bacterial vaginosis, candidiasis and trichomoniasis were also frequently noted. Epithelial abnormalities included ASC-US, LSIL, HSIL and carcinoma. LSIL was found in 52 years old female, while ASCUS, HSIL and carcinoma predominated in women over 55. Presenting symptoms included vaginal discharge, abnormal uterine bleeding and lower abdominal pain, though some cases were asymptomatic. **Conclusion:** Pap smear screening, with standardized Bethesda system reporting, effectively detects both infections and epithelial abnormalities. Its implementation is crucial for early diagnosis and prevention of cervical cancer, particularly in asymptomatic women.

Keywords: Pap smear, Bethesda system, epithelial abnormalities.

Cervical cancer remains a major public health challenge, particularly in low and middle income countries, where it contributes substantially to cancer related morbidity and mortality among women. According to global cancer statistics, over 80% of cervical cancer cases occur in developing and resource limited nations, largely due to limited awareness and challenges in implementing cytology based screening programs. Nearly 87% of cervical cancer deaths are reported from less developed regions [1].

Cervical cancer is the second most common cancer among women in India [2], with an estimated 127,356 new cases reported in 2022 and an incidence rate of 18.3%. The peak incidence occurs between the ages of 45 and 59 years. Human Papilloma virus (HPV) infection is present in approximately 83.2% of women with cervical cancer and in 9.9% - 36.8% of women without cancer or other gynaecological conditions. Notably, half of the women diagnosed with cervical cancer have never undergone cervical cytology testing, and an additional 10% have not been screened in the five years preceding their diagnosis [3].

In India, an unhealthy cervix is a common finding during per speculum examination in gynaecology outpatient departments (OPDs), and cervical cytology is recommended to detect any epithelial cell abnormalities [4]. Early detection through effective screening programs remains a key strategy in reducing the burden of cervical cancer [5].

The Papanicolaou (Pap) smear, introduced in the mid - 20th century, continues to serve as a cornerstone for the early

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detection of precancerous and cancerous cervical lesions. By identifying cellular abnormalities, Pap smear screening enables timely intervention and management, thereby significantly improving patient outcomes. Over time, the interpretation and classification of cervical cytological findings have been refined, with standardized systems such as the Bethesda system ensuring clarity, consistency, and clinical relevance in reporting.

This study aims to evaluate the spectrum of cervical cytological findings identified through Pap smear screening and to correlate these with demographic and clinical factors, thereby assessing patterns, prevalence, and their implications for early intervention strategies.

Materials and method

This retrospective study was conducted from January 2023 - December 2024 out over a period of two years on all the Pap smears received in the department of pathology, FAAMCH, Barpeta. The patient details were obtained from the requisition forms, case sheets, out-patient slips and enquiry with the patient wherever necessary.

Inclusion criteria: All Pap smears deemed satisfactory for evaluation, as per the 2014 Bethesda system for cervical cytology, were included in the study.

Exclusion criteria:

- Women unwilling to participate in the study.
- Previously diagnosed cases of cervical cancer.
- Patients who had received treatment for cervical cancer.
- Pregnant women.

Reporting format: Reporting was carried out as per the 2014 Bethesda system for cervical cytology [6,7]. In cases with suspected epithelial abnormalities, findings were correlated with clinical details and, where available, histopathological results.

Results

A total of 651 Pap smear samples were collected during the calendar year 2023 - 2024 from women presenting with various complaints. The patients' ages ranged from 18 to 75 years, with the majority falling in the 31- 40 years age group (figure 1). The mean age for non-neoplastic lesions was 35.5 years, while for suspected neoplastic lesions (ASCUS and beyond) it was 56.6 years. The most common presenting complaint was white discharge per vagina (WDPV), reported in 29.03% of cases, and followed by abnormal uterine bleeding (AUB) and abdominal pain (table 1). Seventeen women were asymptomatic and underwent Pap smear as part of routine screening. Less common symptoms included low back pain, dyspareunia, and perineal itching.

Table 1: Presenting symptoms of women undergoing cervical Pap smear examination

Symptoms	Number(n=651)	Percentage
Whitish discharge per vagina	189	29.03
Abnormal uterine bleeding	135	20.75
Pain abdomen	95	14.59
Utero-vaginal prolapse	80	12.28
Cervicitis	67	10.29
Urinary complaints	31	4.77
Asymptomatic (Screening)	17	2.62
Others	11	1.69
Cervical mass	09	1.38
Amenorrhea	09	1.38
Post coital bleeding	08	1.22
Total	651	100

Table 2: Adequacy of Pap smear samples

Parameters	Cases (n=651)	Percentage
Satisfactory for evaluation	598	91.86
Unsatisfactory	53	8.14
• Low cellularity	41	6.29
• Obscuration by blood	12	1.84

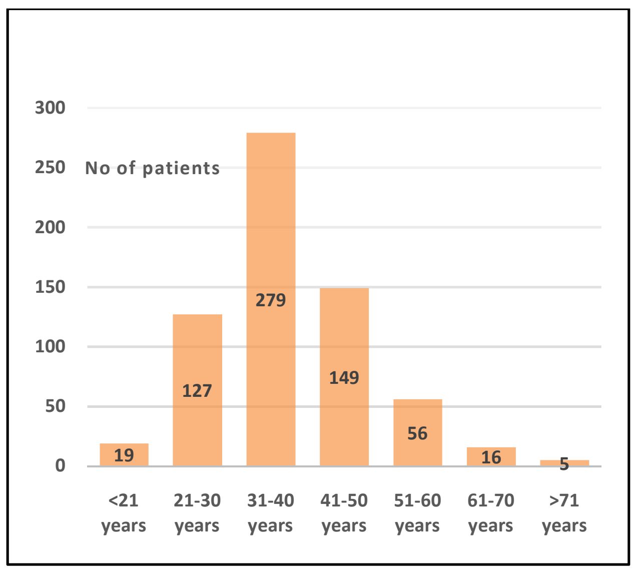

Figure 1: The age distribution of patients (N = 651)

Table 3: Pap smear findings – NILM vs epithelial cell abnormality

Pap smear report	Number (n=598)	Percentage
NILM	586	97.99
Inflammatory	336	56.19
Bacterial vaginosis	20	3.35
Candidiasis	02	0.34
Trichomonas vaginitis	01	0.17
Squamous metaplasia	29	4.85
Atrophy	43	7.19
Endometrial cells	01	0.17
Epithelial cell abnormality	13	2.17

Of the 598 satisfactory Pap smears, 585 were reported as negative for intraepithelial lesion or malignancy (NILM), representing non-neoplastic cases, while the remaining were diagnosed with epithelial cell abnormalities (table 3). Inflammatory smears formed the largest subset of non-neoplastic findings, accounting for 336 cases. Among non-neoplastic cellular changes, atrophic changes were the most frequent, observed in 7.19% of smears, followed by reactive squamous metaplasia in 4.85% of cases.

Table 4: Distribution of epithelial cell abnormalities cases

Pap smear report	Number (n=13)	Percentage	Overall percentage (n=598)	Age range (years)	Mean age (years)
ASCUS	03	23.07	0.50	50-70	60
LSIL	01	7.69	0.17	-	52
HSIL	05	38.46	0.83	46-68	57
ASC-H	02	15.38	0.33	25-60	42.5
SCC	01	7.69	0.17	-	68
AGC - NOS	01	7.69	0.17	-	60

ASCUS - Atypical squamous cells of undetermined significance; ASC-H - Atypical squamous cells cannot rule out HSIL; LSIL - Low grade squamous intraepithelial lesion; HSIL - High grade squamous intraepithelial lesion; SCC - Squamous cell carcinoma; AGC - NOS - Atypical glandular cells - not otherwise specified.

Regarding infectious conditions, bacterial vaginosis was identified in 20 cases (3.35%) and Candidiasis in 2 cases (0.34%), while Trichomonas infection was noted in a single case (0.17%). No cases of Actinomycosis or viral infections such as Herpes simplex virus or Cytomegalovirus were detected. Incidental endometrial cells were observed in one 25-year-old female presenting with abnormal uterine bleeding (AUB).

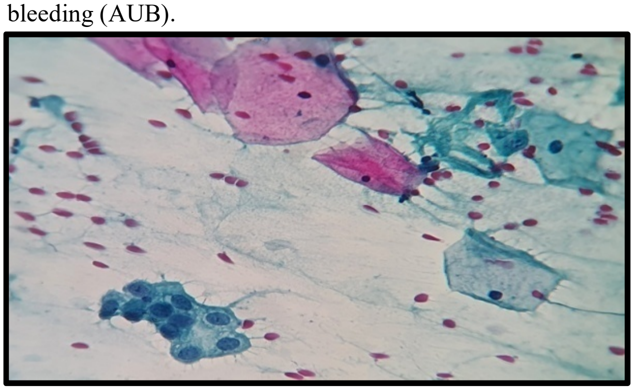

Figure 2: High grade squamous intraepithelial lesion (HSIL)

Among the cases with epithelial cell abnormalities, high grade squamous intraepithelial lesion (HSIL) (figure 2) was the most common finding, accounting for 5 of the 13 cases, followed by ASCUS in 3 of the 13 cases (table 4). There was 1 case of low grade squamous intraepithelial lesion (LSIL) and 1 case of squamous cell carcinoma (SCC). Atypical glandular cells – not otherwise specified (AGC-NOS) were identified in 1 of the 13 cases. No instances of endocervical adenocarcinoma in situ or invasive adenocarcinoma were detected during the study period. The mean age of patients diagnosed with ASCUS was 60 years, while for those with HSIL it was 57 years (table 4).

Discussion

Cervical cancer remains a major public health concern in India, ranking as the second most common cancer among women [2]. While age standardized incidence and mortality rates have shown a gradual decline over the past three decades, the absolute number of cases continues to be high, largely due to population growth and increased life expectancy. A significant proportion of cases in India are diagnosed at advanced stages, which adversely impacts survival rates. The primary reason for late stage diagnosis is the lack of awareness regarding cervical cancer screening and preventive measures. Effective screening can help evaluate women who have no obvious symptoms and detect pre-malignant cervical lesions while they are still amenable to curative treatment. Pap smears, when interpreted using standardized reporting criteria such as the Bethesda system (2014), play a crucial role in identifying precursor lesions at an early stage and guiding timely, appropriate management [6, 7].

The mean age of women in the study was 35.5 years, with the majority falling within the 31- 40 years age group. The mean age of women with epithelial abnormalities detected on Pap smear was 56.6 years, compared to 38 years for those without such abnormalities. These findings are consistent with the observations reported by Verma et al and Sachan et al [8, 9].

The most common presenting complaint in this study was WDPV (29.03%), followed by AUB (20.75%) and abdominal pain (14.59%). Among the smears collected, 91.86% were satisfactory for evaluation, while 8.14% were unsatisfactory due to various reasons outlined in table 2. These findings are comparable to those reported by Pudasaini et al [10]. A higher proportion of unsatisfactory smears were noted in the study by Ninder Kumar et al (12.1%) [11]. The slightly lower rate in our study may be attributed to better coordination between the obstetrics & gynaecology and cytopathology departments, along with the policy of mandatory screening of all Pap smears by a pathologist rather than solely by technologists.

The distribution of negative for intraepithelial lesion or malignancy (NILM) was the most common, accounting for

97.83% of cases. This finding is consistent with most previous studies, except that of Sachan et al [9], who classified cases separately as NILM and inflammatory, whereas other studies included inflammatory smears as a subcategory under NILM. Microorganisms such as Trichomonas, Candida and Gardnerella were detected in 3.85% of Pap smears in the present study, a finding that correlates well with the results reported by Bal et al [5]. Higher incidences were noted in studies by Verma et al (4.8%) [8] and Nandwani et al (6.9%)[12].

In the present study, atrophic features on Pap smears, characterized by a predominance of parabasal cells, were observed in 7.19% of cases - a higher proportion compared to other reported studies [8, 12, 13]. Squamous metaplasia was noted as an additional finding in 4.85% of cases. However, this feature has not been consistently reported in many previous studies, as it is considered an optional non-neoplastic finding [7].

In previous studies, the reported occurrence of epithelial cell abnormalities ranged from 4% to 17.3% [10,12,13]. In the present study, the occurrence was lower, at 2.17%. These variations may be attributed to differences in geographical location, ethnicity, and population characteristics, as the referenced studies were conducted in different parts of India and across the world. Among the epithelial abnormalities in our study, HSIL was the most common lesion, accounting for 0.83% of cases, followed by ASCUS at 0.50%, which aligns with the findings of Bukhari et al [4] and Bal et al [5]. In our study, ASC-H was detected in two cases, representing only 0.33% of cases - a much lower proportion compared to studies with larger sample sizes [14-16].

The mean age for non-neoplastic lesions in our study was 38 years, whereas for epithelial cell abnormalities (ASCUS and beyond) it was 58 years, closely aligning with the findings of Selvi et al [17]. Within the epithelial abnormalities, the mean age for the HSIL category (54.6 years) was approximately two years higher than that for the LSIL category.

A single case of squamous cell carcinoma (SCC) was identified in our study, accounting for 0.17%, which is in agreement with findings reported by other authors [13,15,16]. Higher proportions of SCC observed in other studies [4, 12] could be attributed to larger sample sizes and the fact that their study centers served as referral hubs for malignancies. No cases of adenocarcinoma were detected in our study, which is consistent with the findings of other studies [13-16]. This may be explained by the smaller sample size and the relatively lower incidence of cervical adenocarcinoma compared to SCC.

In our study, atypical glandular cells were observed in a smaller proportion of cases (approximately 0.17%), which is consistent with the findings reported by Maleki et al [14]. However, studies by Elhakeem et al [15] and Altaf et al [16] reported a much higher prevalence of atypical glandular cells. This variation may be attributed to their larger sample sizes and a potentially higher prevalence of endocervical lesions in those regions, as both studies were conducted in different provinces of Saudi Arabia.

Conclusion

Our observations indicate that the Pap smear is a cost effective, simple, and reliable method for screening women attending the OBG department with genitourinary complaints. The majority of cases (97.83%) were reported as negative for intraepithelial lesion or malignancy (NILM). The remaining cases required further evaluation and were advised regular follow up with repeat Pap smears or colposcopic biopsy. Nearly 1% of the screened women were found to have squamous intraepithelial lesions (either LSIL or HSIL), necessitating histopathological confirmation through biopsy.

Conflict of interest: None. **Disclaimer:** Nil.

References

1. Ferlay J, Ervik M, Lam F, et al. Global Cancer Observatory: Cancer Today. Lyon: International Agency for Research on Cancer; 2020
2. Arbyn M, Weiderpass E, Bruni L, et al. Estimates of incidence and mortality of cervical cancer in 2018: a worldwide analysis. Lancet Glob Health. 2020; 8(2): e191- e203.
3. Zubair AA, Kulkarni S, Preethi M. Cytomorphological patterns of cervical Papanicolaou smear abnormalities based on 2014 Bethesda System in North Karnataka region. Trop J Path Micro. 2019; 5(5): 251-59.
4. Bukhari MH, Saba K, Qamar S, et al. Clinico-pathological importance of Papanicolaou smears for the diagnosis of premalignant and malignant lesions of the cervix. Pak J Med Sci. 2012; 28(4): 646 - 51.
5. Bal MS, Goyal R, Suri AK, Mohi MK. Detection of abnormal cervical cytology in Papanicolaou smears. J Cytol. 2012; 29(1): 45 - 7.

6. Solomon D, Nayar R. The Bethesda System for Reporting Cervical Cytology: Definitions, Criteria, and Explanatory Notes. 3rd ed. New Delhi: Springer; 2015.
7. Nayar R, Wilbur DC. The Bethesda System for Reporting Cervical Cytology: A Historical Perspective. New Delhi: Springer; 2017.
8. Verma A, Verma S, Vashist S, Attri S, Singhal A. A study on cervical cancer screening in symptomatic women using Pap smear in a tertiary care hospital in rural Haryana. Int J Adv Med. 2016; 3(2): 245 - 49.
9. Sachan PL, Singh M, Patel ML, Sachan R. A study on cervical cancer screening using Pap smear test and clinical correlation. Asia Pac J Oncol Nurs. 2018; 5(3): 337 - 41.
10. Pudasaini S, Joshi MR. Cervical Pap smear: a hospital-based retrospective study. J Pathol Nepal. 2011; 1: 242 - 45.
11. Ninder Kumar N, Kalhan S, Kumar M, et al. Cytomorphological study of cervical smears and correlation with histopathological findings. J Cytol. 2019; 36(3): 157 - 61.
12. Nandwani A, Dawar R, Choudhary S. Spectrum of cervical cytological changes using the Bethesda system in Papanicolaou smears in a tertiary care hospital. Indian J Pathol Oncol. 2019; 6(2): 246 - 51.
13. Kulkarni PR, Rani H, Vimalambike MG, et al. Opportunistic screening for cervical cancer in a tertiary hospital in Karnataka, India. Asian Pac J Cancer Prev. 2013; 14(9): 5101-5.
14. Maleki A, Ghafourian M, Miri-Moghaddam E. Cervical cytology findings in a population-based screening program: a cross-sectional study from Iran. Asian Pac J Cancer Prev. 2016; 17(9): 4301 - 6.
15. Elhakeem HA, Elhassan MM, Alsubaie AM, Alharthi MH. Patterns of abnormal Pap smear in Saudi women. Saudi Med J. 2019; 40(6): 585 - 91.
16. Altaf FJ, Mufti ST, Shafi M, Al-Sheikh HM. Cervical cytology in Saudi Arabia: a five-year review. Ann Saudi Med. 2005; 25(5): 367 - 71.
17. Selvi R, Uma Devi P, Vani BR. Role of Pap smear in screening for cervical cancer: a hospital-based study. J Dent Med Sci. 2015; 14(4): 67 - 72.

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