International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

Spectrum of Cervical Pap Smear According to Bethesda System in Tertiary Care Center of Western Rajasthan

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OPEN ACCESS

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Received: 17-05-2026
Accepted: 08-06-2026
Available online: 30-06-2026

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ABSTRACT

Introduction: Cervical cancer is one of the public health challenges that affect women globally . It is a major cause of cancer-related morbidity and mortality.
AIM: To evaluate the Spectrum of cervical Pap smear according to the Bethesda system in the tertiary care centre of western Rajasthan.
Methodology: This study is a prospective hospital-based study conducted over the period of one and half years, from 1 jan 2025 to dec 2025 in the Cytopathology section Dept of pathology in collaboration with the Department of Obstetrics and Gynecology of the tertiary care centre at government medical college Barmer.
Result: Among the 377 women studied, the majority of cervical smears were Negative for Intraepithelial Lesion or Malignancy (85.41%), while acute inflammatory changes (59.95%) and bacterial vaginosis (11.94%) were the most common cytological findings. Premalignant lesions were detected in a small proportion of women, highlighting the effectiveness of Pap smear screening for early detection of cervical abnormalities.
Conclusion: Conventional Pap smear is a simple, safe, and effective screening tool for the early detection of inflammatory, infectious, premalignant, and malignant cervical lesions. Regular cervical cytology screening and timely follow-up can facilitate early diagnosis, appropriate treatment, and reduce the burden of cervical cancer.

Keywords: Cervical cancer, Pap smear, Cytological findings.

INTRODUCTION

Cervical cancer is one of the public health challenges that affect women globally . It is a major cause of cancer-related morbidity and mortality.[1] Although due to effective screening programs and early intervention strategies, the incidence of cervical cancer has declined in many developed countries. But the burden of disease remains high in developing nations.[2] According to global cancer statistics, more than 80% of cervical cancer cases occur in low- and middle-income countries because of less organized screening programs. Developing countries have limited awareness regarding preventive healthcare[3]. There are More than one-fifth of cervical cancer deaths worldwide[4] . The high mortality associated with cervical cancer is mainly due to delayed diagnosis and inadequate access to screening and treatment facilities. However, early detection and timely management of precancerous lesions can reduce both morbidity and mortality associated with the disease[5].The Papanicolaou test, also known as the Pap smear, is a simple, safe, cost-effective, and widely accepted screening tool used for the detection of premalignant and malignant lesions of the cervix[6]. The Pap smear has changed cervical cancer screening by enabling the identification of cellular abnormalities before the development of invasive cancer. Along with precancerous and cancerous lesions, Pap smear examination also provides information regarding various inflammatory, infectious, and benign conditions affecting the cervix. Regular screening through Pap smear testing has been shown to reduce the incidence and mortality of cervical cancer by facilitating early diagnosis and appropriate treatment.[7,8] Therefore, it is recommended that sexually active women undergo periodic cervical cytological evaluation as part of routine gynecological care. To standardize the reporting of cervical cytology, the Bethesda System was introduced. The Bethesda System gives a framework for reporting cervical cytological findings, including non-neoplastic changes, epithelial cell

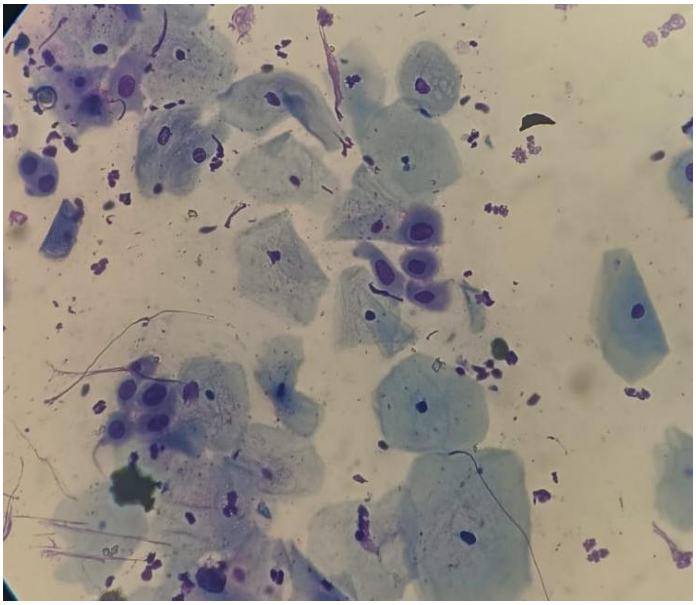
abnormalities, and human papillomavirus (HPV)-related lesions.[9] It categorizes squamous intraepithelial lesions into low-grade squamous intraepithelial lesions (LSIL) and high-grade squamous intraepithelial lesions (HSIL). The present study aims to evaluate cervical cytology findings using the Bethesda System to determine the Spectrum of cervical Pap smear according to Bethesda system in tertiary care centre of western rajasthan

AIM

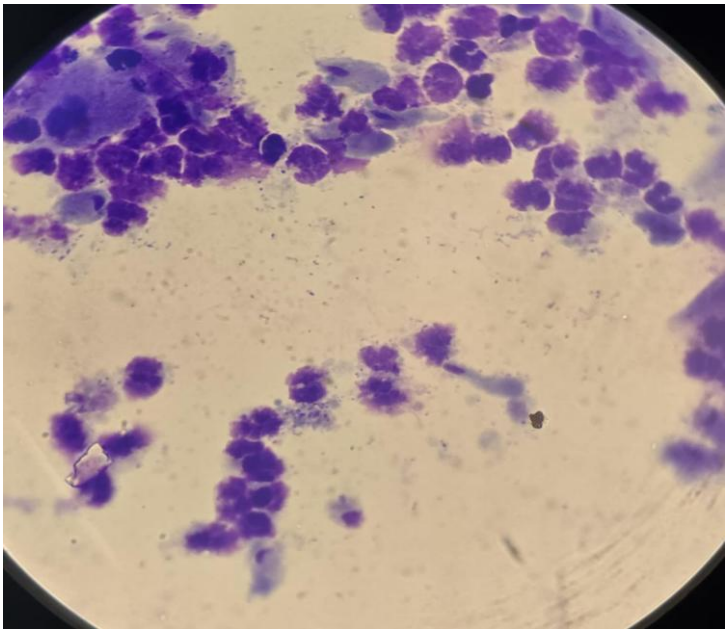
To evaluate the Spectrum of cervical Pap smear according to the Bethesda system in the tertiary care centre of western Rajasthan.

METHODOLOGY

This study is a prospective hospital-based study conducted over the period of one and half years, from 1 jan 2025 to dec 2025 in the Cytopathology section department of pathology in collaboration with the Department of Obstetrics and Gynecology of the tertiary care centre at government medical college Barmer. All Pap smears within this period were included in the present study. Patients with a history of previous hysterectomy and antenatal women were excluded from the study. Patient data, including age, clinical complaints, and per vaginal findings, were collected from the requisition form. For conducting the study, approval was obtained from the Institute Ethics Committee. Pap smear was reported using the Bethesda system. Abnormal cytology correlation was done with histopathological findings in cases where cervical biopsy or total hysterectomy specimens were available.



H- SIL case Picture



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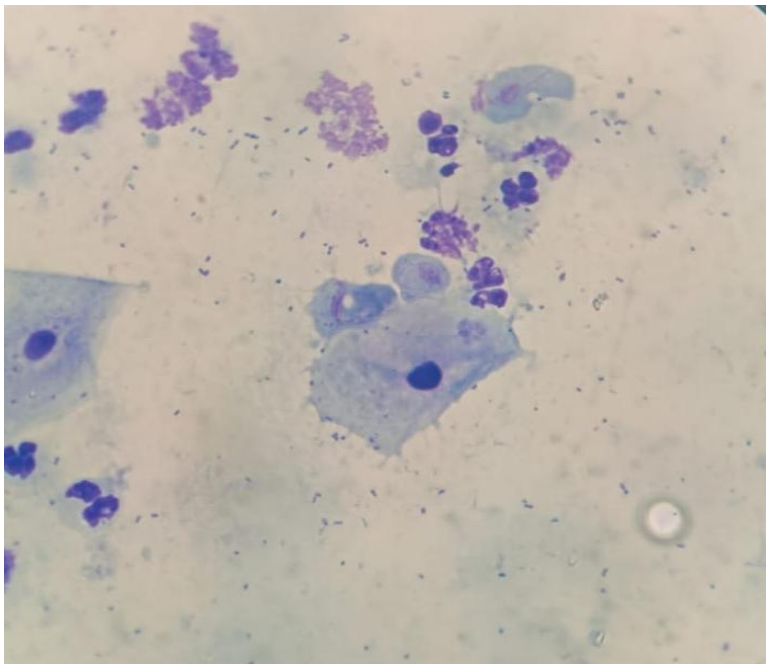

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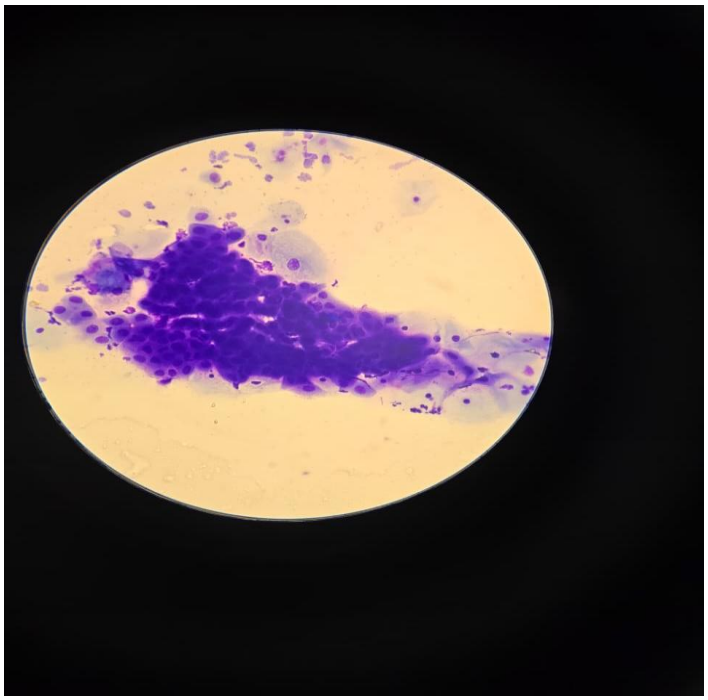

HSIL Case

RESULT

Table 1:Age distribution

Age	Number	Percentage
18-27	103	27.32%
28-37	170	45.09%
38-47	75	19.89%
48-57	14	3.71%
58-67	13	3.45%

68-77	1	0.27%
78-87	1	0.27%
Total	377	100%

The majority of participants belonged to the 28–37 years age group (45.09%), followed by 18–27 years (27.32%) and 38–47 years (19.89%). Only a small proportion of participants were aged 48 years and above (7.70%), while participants aged 68 years and above constituted only 0.54% of the study population.

Table 2: Distribution of Transformation Zone Visibility on Pap Smear (n = 352)

Transformation Zone Visibility	Number	Percentage
Seen	204	54.11%
Not seen	173	45.89%

The transformation zone was seen in 204 (54.11%) women and not seen in 173 (45.89%) women.

Table 3: Distribution of Presenting Complaints among Study Participants (n = 377)

Presenting Complaint	Number	Percentage
white discharge	369	97.88%
abdomen pain	3	0.80%
white discharge with pain abdomen	2	0.53%
absent bleeding in period	1	0.27%
constant bleeding	1	0.27%
dirty discharge and infertility	1	0.27%

The most common presenting complaint was white discharge, reported by 369 (97.88%) women. Abdominal pain was present in 3 (0.80%) cases, while 2 (0.53%) women presented with both white discharge and abdominal pain. Other complaints such as absent menstrual bleeding, constant bleeding, and dirty discharge associated with infertility were observed in 0.27% of cases each.

Table4: Distribution of Acute Inflammatory Changes on Pap Smear

Acute Inflammation	Number	Percentage
Seen	226	59.95%
Not Seen	151	40.05%

Acute inflammatory changes were observed in 226 (59.95%) Pap smears. Acute inflammation was not seen in 151(40.05%) of pap smear.

Table 5: Distribution of Cervical Cytology Findings According to Bethesda System

Cytological Diagnosis	Number	Percentage
NILM	324	85.94%
ASC-US	12	3.18%
ASC-H	1	0.27%
HSIL	1	0.27%
unsatisfactory smear	39	10.34%

The majority of cervical smears were reported as NILM, comprising 324 (85.94%) cases. ASCUS was observed in 12 (3.18%) cases, while ASC-H, HSIL were identified in 1 (0.27%), and 1 (0.27%) cases, respectively. Unsatisfactory smears accounted for 39 (10.40%) cases.

Table 6: Distribution of Metaplastic Changes in Cervical Smears

Type of Metaplasia	Number	Percentage
squamous metaplasia	16	4.24%
tubal metaplasia	14	3.71%
sq and tubal metaplasia	4	1.06%

Metaplastic changes were seen in 34 (9.02%).Out of which Squamous metaplasia was the most commonly observed in 16 (4.24%) cases. Tubal metaplasia was detected in 14 (3.71%) cases. Combined squamous and tubal metaplasia was present in 4 (1.06%) cases.

Table 7: Distribution of Other Cytological Findings in Cervical Smears

Cytological Findings	Number	Percentage
Bacterial Vaginosis (Clue Cells)	45	11.94%
Candida Infection	38	10.08%
Trichomonas Infection	25	6.63%
clue cell and candida	6	1.59%
trichomoniasis and clue cells	6	1.59%
trichomonas and candida	2	0.53%
Hyperkeratosis	1	0.27%

Among the 377 cervical smears examined, bacterial vaginosis (clue cells) was the most common cytological finding, observed in 45 (11.94%) cases, followed by Candida infection in 38 (10.08%) cases and Trichomonas infection in 25 (6.63%) cases. Mixed infections of clue cells with Candida and Trichomoniasis with clue cells were each identified in 6 (1.59%) cases, while Trichomonas with Candida was found in 2 (0.53%) cases. Less frequent findings included hyperkeratosis (0.27%).

DISCUSSION

377 women were included in our study. 170, 45.09% participants belonged to the 28–37 years age group which is then followed by the 18–27 years age group (103, 27.32%) and the 38–47 years age group (75, 19.89%). Participants aged 48–57 years and 58–67 years constituted 3.71% and 3.45%, respectively. Only one participant (0.27%) each belonged to the 68–77 years and 78–87 years age groups. Similar to our study Nayak et al.[10] reported the maximum number of cases were in the age group of 31 – 40 years comprising 381(36.42%) followed by 32(30.87%) cases in 41-50 years out of 1046 cases. In our study the transformation zone was visualized in 204 (54.11%) women, while it was not seen in 173 (45.89%) women. The proportion of women with a visible transformation zone was slightly higher than those in whom it was not seen. Proper visualization of the transformation zone is important for accurate cervical cytology interpretation and early detection of precancerous lesions.

Among the 377 study participants, white discharge was the most common presenting complaint, reported by 369 (97.88%) women. Abdominal pain alone was present in 3 (0.80%) cases, while white discharge associated with abdominal pain was noted in 2 (0.53%) cases. Absent menstrual bleeding, constant bleeding, and dirty discharge with infertility were each reported by 1 (0.27%) participants. Thus, white discharge was the predominant symptom among women undergoing Pap smear examination in the present study ,which is in agreement with Gothwal M et al[11] with study having almost 60% of cases were symptomatic and the commonest symptom was the white discharge, followed by vagina, pain in the lower abdomen, intermenstrual bleeding and dyspareunia

In our study Acute inflammatory changes were the most common cytological finding, observed in 226 (59.95%) of the 377 Pap smears examined. Acute inflammation was not seen in 151 (40.05%) cases. These findings indicate that inflammatory changes are common among women undergoing cervical cytology and emphasize the importance of Pap smear in

identifying cervical inflammatory conditions in addition to screening for premalignant lesions.Rawat, K., et al[12] Out of 1768 smears 1039 (58.7%) were abnormal Pap smears, 445 (25.1%) were normal Pap smears while 284 (16.1%) smears had inadequate sample material to be examined. Out of 1039 abnormal smears, 956 (92.01%) smears reported to have inflammatory/reactive changes whereas 26 (2.50%) had atrophic changes in Pap smear and abnormality in epithelial cells was reported in 57(5.49%) smears.

The majority of cervical cytology smears were Negative for Intraepithelial Lesion or Malignancy (NILM), consisting of 324 (85.94%) cases. ASC-US was seen in 12 (3.18%) women, while ASC-H and HSIL were in 1 (0.27%) and 1 (0.27%) cases, respectively. Unsatisfactory smears constituted 39 (10.34%) cases. This highlights the importance of routine Pap smear screening for early detection of premalignant cervical lesions.Gothwal M et al[11] reported In total, 1982 (86.51%) smears were negative for intraepithelial lesion and malignancy (NILM). Out of 61 abnormal smears, atypical squamous cells of undetermined significance (ASC-US) were seen in 26 (42.62%) cases, atypical squamous cells-cannot exclude high-grade squamous intraepithelial lesion (ASC-H) in nine (14.75%) cases, low-grade squamous intraepithelial lesion (LSIL) in four (6.56%) cases, while nine (14.75%) cases were positive for high-grade squamous intraepithelial lesion (HSIL). Invasive squamous cell carcinoma was seen in seven (11.48%) cases and two (3.28%) cases were positive for adenocarcinoma. Atypical glandular cells of undetermined significance (AGUS) were diagnosed in four (6.56%) cases. In our institutional study, specificity was 81.58% and sensitivity 83.33%. The cytohistopathological correlation was 68.18%, with HSIL (88.89%) having the highest correlation.

Metaplastic changes were seen in 34 (9.02%).Out of which Squamous metaplasia was the most commonly observed in 16 (4.24%) cases. Tubal metaplasia was detected in 14 (3.71%) cases. Combined squamous and tubal metaplasia was present in 4 (1.06%) cases. Overall, squamous metaplasia constituted the predominant metaplastic change in the study population, with no evidence of malignant transformation in these lesions.Gidwani RK et al[13] Prevalence of altered cervical cytological pattern was 75.59% amongst females visiting hospital. A total of 574 cervical pap smears were studied, out of which 66 were inadequate. Out of 508 cases, the epithelial lesions prevalence rate was ASCUS (5.7%), LSIL (1.4%) and HSIL (1.4%), AGUS (0.78%), SCC (0.6%) and endometrial carcinoma (0.2%). Sinchana KM et al[14] The most common lesion was NILM with 175 cases (87.5%) followed by 7(3.5%) SCC, 4(2%)HSIL, 2(1%) cases each of ASCUS, AGC-NOS, LSIL and 1(0.5%) case of ASC-H. Among 200, 7(3.5%)cases were unsatisfactory for evaluation.

In our study out of the 377 cervical smears examined, bacterial vaginosis (clue cells) was most commonly found , which was observed in 45 (11.94%) cases. Candida infection was identified in 38 (10.08%) cases, while Trichomonas infection was seen in 25 (6.63%) cases. Mixed infections comprising clue cells with Candida and Trichomoniasis with clue cells were each observed in 6 (1.59%) cases, whereas Trichomonas with Candida was found in 2 (0.53%) cases. Other less frequent findings included hyperkeratosis 1 (0.27%). Overall, bacterial vaginosis was the predominant cytological finding among the study participants.Nayak et al.[10] reported Bacterial vaginosis has highest number of cases 88(8.41%) followed by Candidiasis with 74 cases (7.70%) Trichomonas Vaginalis 20(1.91%) cases with lowest number of cases 02 (0.19%) in Herpes simplex which is inconsistent with our study.Khandelwal, S et al[15] Out of 187 women, cytological evaluation revealed Bacterial vaginitis was found in 11 cases(5.85%), while normal cytology was observed in 4 cases(2.13%). Altered bacterial flora in 3 cases(1.60%)and HSIL were identified in 3 cases (1.60%), with atrophic inflammatory smears in 1 case(0.53%).

CONCLUSION

The present study evaluated cervical cytological findings in 377 women using the Bethesda System . The majority of participants were in the age group of 28–37 years. white vaginal discharge being the most common presenting complaint. Acute inflammatory changes was the main cytological finding that represents the high cases of cervical inflammation among women attending the tertiary care centre. Bacterial vaginosis was the most frequently found infectious organism, followed by Candida and Trichomonas infections.Most cervical smears were Negative for Intraepithelial Lesion or Malignancy (NILM). Only a small proportion of women demonstrated epithelial cell abnormalities, including ASC-US, ASC-H and HSIL, which showed the importance of routine cervical cytology for early identification and timely management of precancerous lesions. Our study showed that the conventional Pap smear is a simple, safe, inexpensive, and effective screening tool for detecting inflammatory, benign, and premalignant cervical lesions. This, in conclusion, regular cervical cancer screening, increased public awareness, and proper follow-up of abnormal cytological findings are essential to reduce the burden of cervical cancer and improve women's reproductive health outcomes.

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