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A Study on Pap Smear Findings in Post Menopausal Women

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ABSTRACT

Background: Cervical cancer remains a significant health burden in developing countries due to inadequate screening, particularly among postmenopausal women. Pap smear is a reliable and cost-effective method for early detection of premalignant and malignant cervical lesions; however, screening in postmenopausal women is often inadequate.
Objective: To evaluate Pap smear findings in postmenopausal women, assess the spectrum of cytological abnormalities, and determine their association with age and clinical presentation.
Materials and Methods: This prospective cross-sectional study was conducted over one year (July 2024–June 2025). A total of 158 Pap smears from postmenopausal women were analyzed. Smears were collected using standard techniques, stained with Papanicolaou and hematoxylin and eosin stains, and reported according to the Bethesda System (2014). Statistical analysis was performed using SPSS, with $p<0.05$ considered significant.
Results: The mean age was 52.04 ± 7.90 years. Majority of smears (85.4%) were negative for intraepithelial lesion or malignancy (NILM), with bacterial vaginosis (46.7%) and inflammatory changes (17.8%) being the commonest findings. Epithelial cell abnormalities were seen in 14.6% cases, with ASC-US (6.3%) being the most frequent, followed by HSIL (4.4%) and LSIL (3.8%). A significant increase in epithelial abnormalities with advancing age was noted ($p = 0.021$).
Conclusion: Pap smear is an effective screening tool in postmenopausal women. Continued screening beyond menopause is essential for early detection and reduction of cervical cancer burden.

Keywords: *Pap smear; Postmenopausal women; Cervical cytology; Epithelial cell abnormalities.*

INTRODUCTION

Cervical cancer is one of the leading malignancies among women, particularly in developing countries like India, where it contributes significantly to morbidity and mortality. Despite being largely preventable, a substantial proportion of cases are diagnosed at advanced stages due to inadequate screening and lack of awareness. [1] The Papanicolaou (Pap) smear is a simple and effective method for detecting premalignant and malignant lesions of the cervix. Its utility lies in identifying precursor lesions during the long latent phase of cervical carcinogenesis. [2] Postmenopausal women form a high-risk group due to declining estrogen levels, altered cervical epithelium, and reduced participation in screening programs. Furthermore, cervical cancer incidence peaks in older age groups, making continued screening in postmenopausal women essential. [3]

Although several studies have evaluated Pap smear findings in the general population, limited data are available specifically focusing on postmenopausal women. Hence, this study was undertaken to evaluate cytological findings and highlight the importance of continued screening in this group.

MATERIALS AND METHODS

Study Design: Prospective cross-sectional study.

Study Setting: Department of Pathology, JLN Medical College, Ajmer, Rajasthan

Study Duration: July 2024 to June 2025.

Study Population: Postmenopausal women undergoing Pap smear examination.

Inclusion Criteria: All postmenopausal women undergoing Pap smear

Exclusion Criteria: Women with surgical menopause; Unsatisfactory smears;

Sample Size: 158 cases were included.

Data Collection: Clinical details were recorded from requisition forms and patient history. Pap smears were collected using standard techniques and stained with Papanicolaou stain.
Reporting System: All smears were reported according to the Bethesda System (2014).

Statistical Analysis: Software: SPSS version 23. Qualitative data was expressed in the form of percentages; while quantitative data as mean ± SD, Significance level $p < 0.05$ was considered as significant.

RESULTS

The majority of the patients, 63 (39.9%), were in the age group of 46 to 50 years, followed by 29 patients (18.4%) in the age group of less than or equal to 45 years, 23 patients (14.6%) in the age group of 51 to 55 years, followed by 22 (13.9%) in the age group of 56 to 60 years, 11 (7.0%) in the age group of more than or equal to 66 years and 10 (6.3%) in the age group of 61 to 65 years. The mean age of the patients was 52.04 ± 7.90 years. Out of 158 cases, 149 (94.3%) were symptomatic, while only 9 (5.7%) were asymptomatic.

Table 1: Presenting Complaints

Presenting complaints	Number of patients	Percentage (%)
Lower abdominal pain	53	33.5
Postmenopausal bleeding	42	26.6
White discharge	25	15.8
Something coming out per vaginum	17	10.8
Burning micturition	12	7.6
Asymptomatic	9	5.7
Total	158	100

Table 2: Negative For Intraepithelial Lesion Or Malignancy Findings

Negative for Intraepithelial Lesion or Malignancy Findings			Number of patients	Percentage (%)
No specific abnormality			21	15.6
Non-Neoplastic Cellular changes	Squamous metaplasia		9	6.7
	Atrophy		7	5.2
	Reactive cellular changes	With Inflammation	24	17.8
		Without Inflammation	2	1.5
Organisms	Bacterial vaginosis (Shift in flora)		63	46.7
	Fungal organisms		9	6.7
Total			135	100

Table 3: Epithelial Cell Abnormalities Findings

Epithelial Cell Abnormalities Findings	Number of patients	Percentage (%)
Atypical squamous cells of undetermined significance (ASC-US)	10	6.3
Low-grade squamous intraepithelial lesion (LSIL)	6	3.8
High-grade squamous intraepithelial lesion (HSIL)	7	4.4
Total	23	14.6

Adequate sampling of the transformation zone was achieved in the majority of smears, with endocervical/ transformation zone components identified in 131 cases (82.9%) of cases. Negative for Intraepithelial Lesion or Malignancy- Non neoplastic cellular findings/ organisms were detected in 114 (72.1%) cases, Epithelial cell abnormalities in 23 (14.6%) and Negative for Intraepithelial Lesion or Malignancy (no specific abnormality reported) was reported in 21 (13.3%) cases.

Overall, the absolute proportion of Epithelial abnormalities increased from 3.4% in the youngest band (≤45 years) to 36.4% in the oldest (≥66 years). The mean age of women with ASC-US was 53.0 ± 9.7 years, LSIL 50.7 ± 4.4 years, and HSIL 65.4 ± 13.2 years, indicating a trend toward higher age with increasing grade of epithelial abnormality. A Cochran–Armitage test for linear trend across the ordered age bands demonstrated a statistically significant increasing trend in ECA with advancing age ($Z = 2.306$; two-sided $p = 0.021$). These findings support a positive age-related gradient in the occurrence of epithelial cell abnormalities in postmenopausal women within this cohort.

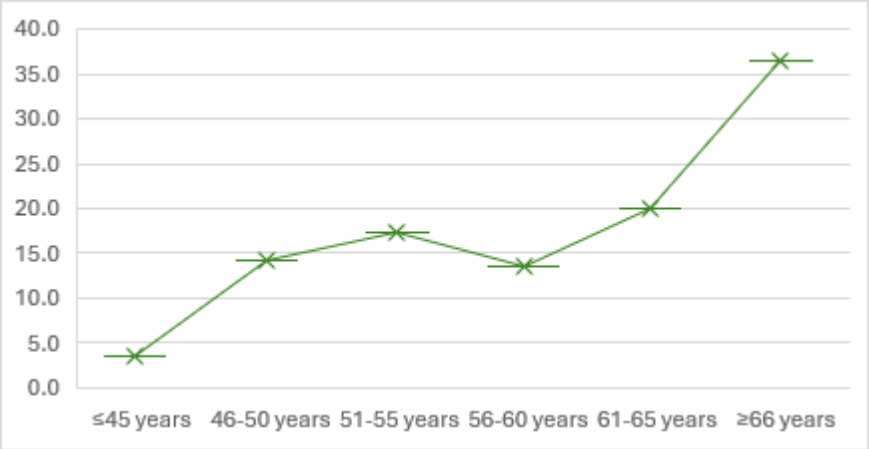


Figure 1: Relation Between Epithelial Abnormalities And Age

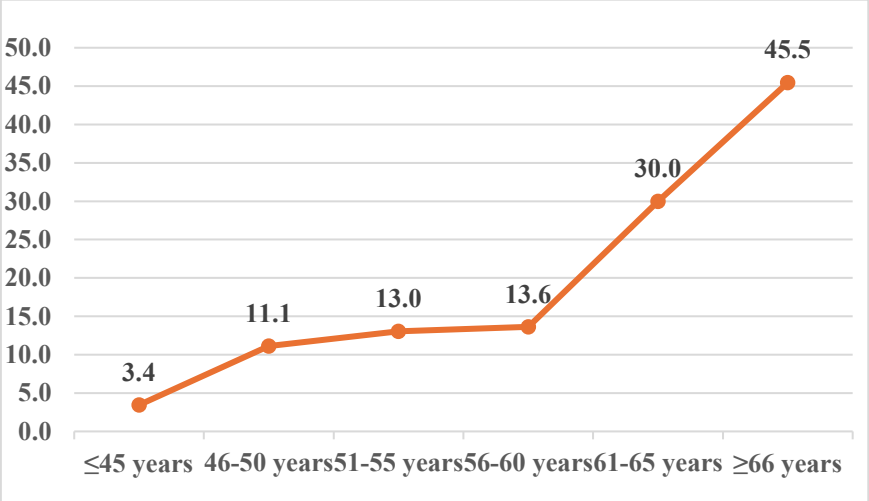
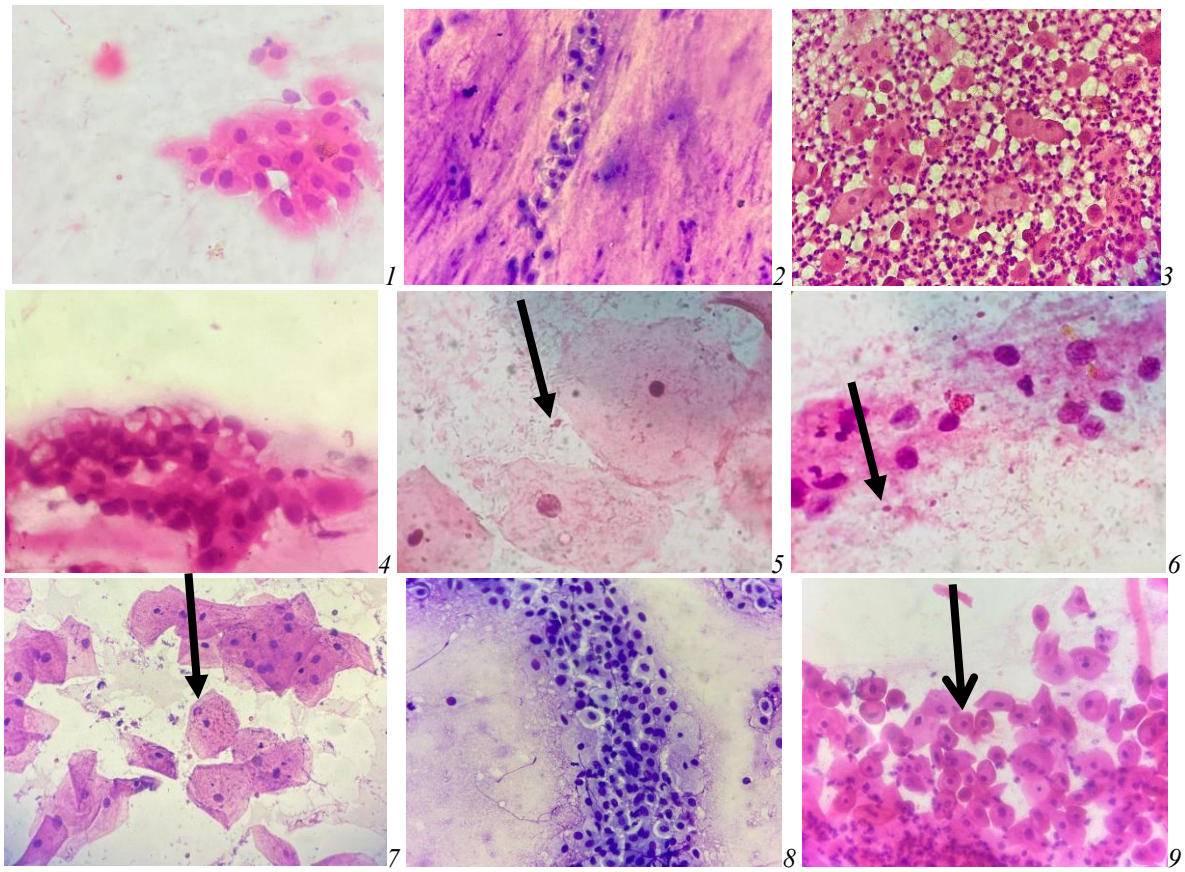


Figure 2: Relation Between Atrophic Smears (Including Smears With Negative For Intraepithelial Lesion Or Malignancy And Epithelial Cell Abnormalities) And Age

Across 158 postmenopausal women, the proportion of epithelial abnormalities did not differ significantly by presenting complaint (p-value = 0.852). Atrophic changes were observed in 13.9% of postmenopausal women overall, with the frequency rising from 3.4% in women ≤45 years to 45.5% in women aged ≥66 years. Logistic regression analysis demonstrated that age was a significant predictor of atrophic smears ($p = 0.008$). With each additional year of age, the odds of having an atrophic smear increased by approximately 7%, and women with a 10-year increase in age had nearly two-fold higher odds of exhibiting atrophic changes (Odds Ratio = 1.98). These findings indicate a significant positive association between advancing age and postmenopausal atrophic cervical cytology.



Picture 1: Photomicrograph of cervical smear showing NILM - non neoplastic cellular variation with squamous metaplasia (H&E,40x); Picture 2:Photomicrograph of cervical smear showing NILM - Non neoplastic finding with Atrophy (H&E, 40x); Picture 3: Photomicrograph of cervical smear showing NILM with Inflammation- Squamous epithelial cells in the background of dense polymorphs (H&E,40x); Picture 4 : Photomicrograph of cervical smear showing NILM - Reactive cellular changes in endocervical cells (H&E, 40x); Picture 5: Photomicrograph of cervical smear showing Budding Yeast forms (marked with black arrow), morphologically consistent with Candida species (H&E,100x); Picture 6: Photomicrograph of cervical smear showing Non-Budding Yeast forms (marked with black arrow), morphologically consistent with Candida species (H&E,100x); Picture 7: Photomicrograph of cervical smear showing Clue cells (marked with black arrow) in Bacterial Vaginosis (H&E,40x); Picture 8: Photomicrograph of cervical smear showing Epithelial cell abnormality - ASCUS (H&E,40x); Picture 9 : :Photomicrograph of cervical smear showing Epithelial cell abnormality with squamous epithelium exhibiting koilocytic atypia (marked with black arrow)- Low grade squamous intra-epithelial lesion (LSIL)(H&E,40x)

DISCUSSION

Cervical cancer continues to pose a substantial health burden in India, particularly due to delayed diagnosis and poor screening uptake, especially among postmenopausal women. The present study evaluates cytological findings in this high-risk group and provides important insights into age-related trends and diagnostic patterns.

Age Distribution and Clinical Profile: The mean age of 52.04 ± 7.90 years observed in the present study is comparable with other Indian studies such as Mahadik et al. (52.1 years), Sutariya et al. (51.49 years), and Bansal et al. (52.6 years), indicating that the majority of women seek healthcare in early postmenopausal years.[4–6] The predominance of symptomatic women (94.3%) reflects the ongoing reliance on symptom-based healthcare utilisation, which remains a significant limitation in cervical screening programmes in India. Studies by Bansal et al. and Dhanalakshmi et al. have similarly reported that symptoms such as vaginal discharge and postmenopausal bleeding are major triggers for seeking medical care.[6,7]

NILM and Non-Neoplastic Findings: The majority of cases in the present study were classified as NILM (85.4%), consistent with findings reported by Dhanalakshmi et al. (85.5%) and Nandakumar et al. (88.3%).[7,8] Within this group, bacterial vaginosis (46.7%) was the most common finding, followed by inflammatory changes (17.8%). These observations can be attributed to estrogen deficiency in postmenopausal women leading to altered vaginal microflora and increased susceptibility to infections. Similar patterns have been reported in Indian studies, where inflammatory and infective conditions dominate NILM findings, emphasising the need for careful interpretation as these conditions may obscure epithelial abnormalities.[7,9]

Epithelial Cell Abnormalities: The prevalence of epithelial abnormalities (14.6%) in the present study is comparable to Dhanalakshmi et al. (14.5%) and Bansal et al. (17.9%), suggesting a consistent burden of premalignant lesions among postmenopausal women.[6,7] ASC-US was the most frequent abnormality (6.3%), which aligns with several studies reporting ASC-US as the most common cytological abnormality in screening populations. HSIL accounted for 4.4%, which is clinically significant as it indicates the presence of high-grade lesions with malignant potential. Comparable HSIL prevalence (~3–5%) has been observed in studies from other parts of India.[4,6]

Table 4: Comparison of cytological findings between present study and other studies

S.No.	Study	Normal %	Inflammatory and other benign %	Epithelial abnormalities %
1	Sood R et al.[10]	41.6	55.1	3.3
2	Bansal S et al.[6]	26.2	55.9	17.9
3	Dhanalakshmi et al.[7]	7.24	78.26	14.5
4	Present study	13.3	72.1	14.6

Age and Epithelial Abnormalities: A key finding of this study is the statistically significant increase in epithelial abnormalities with advancing age ($p = 0.021$). This observation supports the well-established concept that cervical carcinogenesis is a cumulative process associated with persistent HPV infection. Similar age-related trends have been reported by Mahadik et al. and Bansal et al., where higher-grade lesions were predominantly seen in older women.[4,6] Furthermore, HSIL lesions in the present study were absent in younger age groups and increased markedly in women ≥66 years, reinforcing the importance of continued screening beyond menopause.

Asymptomatic Women and Silent Disease: Although only 5.7% of women were asymptomatic, epithelial abnormalities were still detected in this group (11.1%), highlighting the presence of subclinical disease. Previous studies (Mahadik et al.) have also reported detection of premalignant lesions in asymptomatic women, indicating that reliance on symptoms alone can result in missed opportunities for early diagnosis.[4]

Transformation Zone Sampling: Adequate transformation zone sampling was achieved in 82.9% of cases, indicating good quality of specimen collection despite challenges associated with postmenopausal cervical atrophy and upward migration of the squamocolumnar junction. Comparable adequacy rates have been reported by Dhanalakshmi et al. (94.5%) and Harikrishanan et al. (95.4%), reinforcing that proper technique can overcome anatomical limitations in older women.[7,9]

Atrophic Smears and Diagnostic Challenges: Atrophic changes were observed in 13.9% of cases, with a significant increase in older age groups ($p = 0.008$). Atrophic smears can mimic high-grade lesions due to nuclear enlargement and hyperchromasia, as noted by Dastranj Tabrizi (2017). This highlights the importance of cautious interpretation and, when necessary, the use of estrogen therapy followed by repeat cytology.[11] Studies by Sutariya et al. and Damor et al. have similarly documented increased atrophy with advancing age and its impact on cytological interpretation.[5,12]

Table 5: Comparison of overall incidence of each epithelial abnormality with other studies

S.No.	Study	ASC-US %	LSIL %	HSIL %	SCC %
1	Mahadik et al.[4]	1.84	0.16	1	0.33
2	Sood R et al.[10]	0.8	1.7	0.8	0
3	Bansal S et al.[6]	5.6	6.7	4.8	0.8
4	Dhanalakshmi et al.[7]	7.27	2.89	2.17	2.17
5	Present	6.3	3.8	4.4	0

CONCLUSION

Pap smear is a simple, cost-effective, and reliable screening tool for early detection of cervical lesions in postmenopausal women. The study highlights high prevalence of benign inflammatory conditions; significant occurrence of epithelial abnormalities; and strong association between advancing age and cytological changes. Routine screening should be continued beyond menopause, even in asymptomatic women, to reduce cervical cancer-related morbidity and mortality.

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