

Original Research Article

A STUDY ON THE ROLE OF PAP SMEARS IN THE SCREENING OF CERVICAL CANCERS

S. Chaitanya Vani¹, K. Sunil Kumar², B. Vamsi Krishna³

¹Associate Professor, Department of Surgical Oncology, State Cancer Institute, Kurnool Medical College, Kurnool, Andhra Pradesh, India.

²Associate Professor, Department of Pathology, State Cancer Institute, Kurnool Medical College, Kurnool, Andhra Pradesh, India.

³Assistant Professor, Department of Pathology, State Cancer Institute, Kurnool Medical College, Kurnool, Andhra Pradesh, India.

Received : 07/05/2026
Received in revised form : 26/06/2026
Accepted : 11/07/2026

Corresponding Author:

Dr. B. Vamsi Krishna,
Assistant Professor, Department of
Pathology, State Cancer Institute,
Kurnool Medical College, Kurnool,
Andhra Pradesh, India.
Email: vamsibvnv@gmail.com

DOI: 10.70034/ijmedph.2026.3.545

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (3); 3480-3488

ABSTRACT

Background: Cervical cancer is a major preventable malignancy among women, particularly in developing countries with limited awareness, inadequate screening, and poor access to preventive services. The Pap smear is a simple, cost-effective, and reliable screening test for detecting inflammatory, premalignant, and malignant cervical lesions. **Aim:** To evaluate women for precancerous cervical lesions using the Pap smear test.

Materials and Methods: This retrospective observational study was conducted at State Cancer Institute, Kurnool Medical College, Kurnool, from February 2024 to February 2025. A total of 921 sexually active women aged 30–69 years with satisfactory Pap smears were included. Data on age, socioeconomic status, parity, presenting complaints, per speculum findings, and Pap smear results were analyzed. Categorical variables were expressed as frequencies and percentages, and associations were assessed using the Chi-square test, with $p < 0.05$ considered statistically significant.

Results: The mean age was 41.78 ± 7.16 years, with most women aged 31–40 years (46.1%). White discharge per vaginum (42.0%) was the most common presenting complaint, followed by abdominal pain (36.0%). Non-specific inflammatory smear was the predominant cytological finding 83.8%, while normal smears were seen in 8.9% of women. Epithelial cell abnormalities were detected in 149 women (16.18%), with ASC-US being the most common (8.58%), followed by ASC-H (3.15%), LSIL (2.71%), and HSIL (1.09%). Cytology suspicious for squamous cell carcinoma was identified in 2 cases (0.22%).

Conclusion: Pap smear is a simple, cost-effective, and reliable screening tool for detecting inflammatory, premalignant, and malignant cervical lesions. The detection of epithelial cell abnormalities in 16.18% of women highlights the need for routine cervical screening, awareness programs, and timely follow-up of abnormal results, particularly in resource-limited settings.

Keywords: Pap smear, cervical cancer, cervical screening, epithelial cell abnormalities, ASC-US, LSIL, HSIL, NILM, AGUS, ASC-H.

INTRODUCTION

Cervical cancer is a major global health problem and a leading cause of cancer-related morbidity and mortality among women, particularly in developing countries where limited awareness, poor access to healthcare, and inadequate screening programs contribute to delayed diagnosis and higher mortality. In contrast, organized screening programs have significantly reduced its incidence and mortality in

developed countries.^[1] More than 80% of cervical cancer cases occur in low-resource settings, where barriers such as poor awareness, limited screening coverage, and inadequate healthcare infrastructure hinder early detection.¹ Because cervical cancer has a long preinvasive phase, precancerous lesions can be identified and treated before progression to invasive disease.

The Papanicolaou (Pap) smear is a simple, cost-effective, and reliable screening test for detecting inflammatory, premalignant, and malignant cervical

lesions^[2,3] It enables early detection of cervical epithelial abnormalities, allowing timely evaluation with colposcopy and biopsy when indicated. Although HPV DNA testing improves screening sensitivity, the Pap smear remains the most practical and affordable screening method in resource-limited settings.^[4] Several studies have demonstrated its effectiveness in detecting cervical epithelial abnormalities in both symptomatic and asymptomatic women.^[5]

Despite its proven benefits, Pap smear utilization remains low in many developing countries due to limited awareness, cultural and financial barriers, misconceptions, and poor access to screening services.^[6-8] Consequently, many women present only after developing symptoms, making opportunistic screening in gynecology outpatient departments an important strategy for early detection. Healthcare providers play a vital role in promoting screening, increasing awareness, and ensuring timely follow-up of abnormal results.^[9-11]

Therefore, the present study was undertaken to evaluate the role of Pap smear screening in detecting precancerous and malignant cervical lesions among women attending Government General Hospital, Kurnool.

Aim

1. To evaluate women for precancerous cervical lesions using the Pap smear test.

Objectives

1. To evaluate the utility of Pap smears in the early detection of Cervical Cancer
2. To examine its correlation with demographic data and presenting complaints in women.

MATERIALS AND METHODS

Study design

This was a retrospective observational study.

Study setting

The study was conducted at State Cancer Institute, Kurnool Medical College, Kurnool.

Study period

The study was conducted from February 2024 to February 2025.

Study population

The study population included women who underwent Pap smear examination at Government General Hospital, Kurnool, during the study period.

Sample size

A total of 921 women were included in the final analysis.

Inclusion criteria

Women were included in the study if they fulfilled the following criteria:

1. Women aged 31–70 years.
2. Sexually active women.
3. Women who underwent Pap smear examination with satisfactory smears during the study period.
4. Women with complete clinical and cytological records.

Exclusion criteria

Women were excluded from the study if they fulfilled any of the following criteria:

1. Age ≤ 30 years or > 70 years.
2. Sexually inactive women.
3. Cases with missing or incomplete data.

Data collection

Data were collected retrospectively from hospital records and Pap smear reports. Information regarding age, socioeconomic status, parity, presenting complaints, per speculum findings, and Pap smear results was recorded using a structured format.

Pap smear assessment

Pap smear samples were collected and processed as per routine cytological procedures. Cytological findings were classified into unsatisfactory smears, NILM findings, and epithelial cell abnormalities.

NILM findings included normal smear, non-specific inflammatory smear, candidiasis, bacterial vaginosis, trichomonas infection, and non-neoplastic changes. Epithelial cell abnormalities included ASC-US, ASC-H, LSIL, HSIL and squamous cell carcinoma.

Outcome variables

The primary outcome was the pattern of Pap smear findings among the study population. Secondary outcomes included the association of Pap smear findings with demographic data and presenting complaints.

Statistical analysis

Data were entered and analysed using appropriate statistical methods. Categorical variables were expressed as frequency and percentage. Mean and standard deviation were used for continuous variables such as age. Association between Pap smear findings and selected variables was assessed using the Chi-square test. A p-value < 0.05 was considered statistically significant.

RESULTS

A total of 921 women were included in the study.

Table 1: Age distribution of the study participants

Age group	Frequency	Percentage
31–40 years	425	46.1
41–50 years	417	45.3
51–60 years	55	6.0
61–70 years	24	2.6
Total	921	100.0

Mean age: 41.78 ± 7.16 years.

Most participants were aged 31–40 years (46.1%), closely followed by those aged 41–50 years (45.3%). Together, women aged 31–50 years

constituted 91.4% of the study population. The mean age of the participants was 41.78 ± 7.16 years.

Table 2: Socioeconomic status of the study participants

Socioeconomic status	Frequency	Percentage
Lower socioeconomic class	765	83.1
Middle socioeconomic class	156	16.9
Total	921	100.0

Most participants belonged to the lower socioeconomic class, accounting for 765 women (83.1%), while 156 women (16.9%) belonged to the middle socioeconomic class.

Table 3: Parity distribution of the study participants

Parity	Frequency	Percentage
Nulliparous	326	35.4
P1L1	128	13.9
P2L2	237	25.7
P3L3	164	17.8
P4L4	55	6.0
P5L5	11	1.2
Total	921	100.0

Nulliparous women constituted the largest parity group, accounting for 326 participants (35.4%). This was followed by women with parity two (25.7%)

and parity three (17.8%). Women with parity five represented the smallest group, accounting for 1.2% of the study population.

Table 4: Presenting complaints among the study participants

Presenting complaint	Frequency	Percentage
White discharge per vaginam	386	41.9
Pain abdomen	332	36.0
Irregular menstrual cycles	150	16.3
Postcoital bleeding	28	3.0
Postmenopausal bleeding	14	1.5
Increased frequency of micturition	11	1.2
Total	921	100.0

White discharge per vaginam was the most common presenting complaint, reported by 386 women (41.9%), followed by pain abdomen in 332 women (36.0%). Irregular menstrual cycles were reported by 150 women (16.3%). Postcoital bleeding,

postmenopausal bleeding and increased frequency of micturition were comparatively uncommon, occurring in 3.0%, 1.5% and 1.2% of participants, respectively.

Table 5: Per-speculum examination findings

Per-speculum finding	Frequency	Percentage
Healthy-looking cervix	258	28.0
White discharge per vaginam	311	33.8
Cervical erosion	178	19.3
Hypertrophied cervix	99	10.7
Cervix bleeding on touch	44	4.8
Uterovaginal prolapse/cystocele	31	3.4
Total	921	100.0

White discharge per vaginam was the most frequent per-speculum finding, observed in 311 women (33.8%). A healthy-looking cervix was documented in 258 women (28.0%), while cervical erosion was

identified in 178 women (19.3%). Hypertrophy of the cervix, bleeding on touch and uterovaginal prolapse or cystocele were observed in 10.7%, 4.8% and 3.4% of participants, respectively.

Table 6: Distribution of Pap-smear findings

Cytological category	Pap-smear finding	n (%)
NILM	Total NILM	772 (83.8)
NILM	Non-specific inflammatory smear	644 (69.9)
NILM	Normal smear	82 (8.9)
NILM	Non-neoplastic changes	20 (2.2)
NILM	Candidiasis	11 (1.2)

NILM	Bacterial vaginosis	9 (1.0)
NILM	Trichomonas infection	6 (0.7)
Epithelial cell abnormality	Total epithelial cell abnormalities	149 (16.2)
Epithelial cell abnormality	ASC-US	79 (8.6)
Epithelial cell abnormality	ASC-H	29 (3.1)
Epithelial cell abnormality	LSIL	25 (2.7)
Epithelial cell abnormality	HSIL	10 (1.1)
Epithelial cell abnormality	AGUS/AGC	4 (0.4)
Epithelial cell abnormality	Suspicious for squamous cell carcinoma	2 (0.2)
Total		921 (100.0)

Of the 921 Pap smears examined, 772 (83.8%) were negative for intraepithelial lesion or malignancy. A non-specific inflammatory smear was the most common cytological finding, observed in 644 women (69.9%), followed by normal cytology in 82 women (8.9%). Other NILM findings included non-neoplastic changes in 20 women (2.2%), candidiasis in 11 (1.2%), bacterial vaginosis in nine (1.0%) and Trichomonas infection in six (0.7%).

Epithelial cell abnormalities were detected in 149 women (16.2%). ASC-US was the most common epithelial abnormality, occurring in 79 women (8.6%), followed by ASC-H in 29 (3.1%), LSIL in 25 (2.7%) and HSIL in 10 (1.1%). AGUS/AGC was detected in four women (0.4%), while cytological findings suspicious for squamous cell carcinoma were identified in two women (0.2%).

Table 7: Distribution of Pap-smear findings according to age group

Age group	NILM	AGUS/AGC	ASC-US	ASC-H	LSIL	HSIL	Suspicious for SCC	Total	Any epithelial abnormality, n (%)
31–40 years	386	1	25	6	4	3	0	425	39 (9.2)
41–50 years	363	1	22	10	16	4	1	417	54 (12.9)
51–60 years	18	2	23	6	3	2	1	55	37 (67.3)
61–70 years	5	0	9	7	2	1	0	24	19 (79.2)
Total	772	4	79	29	25	10	2	921	149 (16.2)

NILM was the predominant cytological finding in the 31–40-year and 41–50-year age groups. In terms of absolute numbers, the greatest number of epithelial cell abnormalities was observed among women aged 41–50 years, with 54 abnormal smears, followed by women aged 31–40 years with 39 abnormal smears.

However, the proportion of women with abnormal cytology increased markedly with age. Epithelial abnormalities were present in 9.2% of women aged

31–40 years, 12.9% of those aged 41–50 years, 67.3% of those aged 51–60 years and 79.2% of those aged 61–70 years.

ASC-US was the most common epithelial abnormality across the age groups. LSIL was most frequently detected in women aged 41–50 years, whereas ASC-H was proportionately more prominent in the older age groups. The two smears suspicious for squamous cell carcinoma were detected in women aged 41–50 and 51–60 years.

Table 8: Distribution of Pap-smear findings according to parity

Parity	NILM	AGUS/AGC	ASC-US	ASC-H	LSIL	HSIL	Suspicious for SCC	Total	Any epithelial abnormality, n (%)
Nulliparous	296	0	19	5	5	1	0	326	30 (9.2)
P1L1	93	0	17	9	6	3	0	128	35 (27.3)
P2L2	196	2	22	6	8	2	1	237	41 (17.3)
P3L3	143	2	10	4	3	2	0	164	21 (12.8)
P4L4	35	0	10	4	3	2	1	55	20 (36.4)
P5L5	9	0	1	1	0	0	0	11	2 (18.2)
Total	772	4	79	29	25	10	2	921	149 (16.2)

NILM was the most common cytological finding in every parity group. The greatest absolute number of epithelial abnormalities was observed among women with parity two, with 41 abnormal smears, followed by women with parity one, with 35 abnormal smears, and nulliparous women, with 30 abnormal smears.

When the different sizes of the parity groups were considered, the highest proportion of epithelial abnormalities was observed among women with parity four (36.4%), followed by women with parity one (27.3%). The abnormality rates among women with parity two, parity three, parity five and nulliparous women were 17.3%, 12.8%, 18.2% and 9.2%, respectively.

ASC-US was the most common epithelial abnormality and occurred most frequently in women with parity two. HSIL was most frequent among

women with parity one, while the two smears suspicious for squamous cell carcinoma occurred among women with parity two and parity four.

Table 9: Distribution of Pap-smear findings according to presenting complaint

Presenting complaint	NILM	AGUS/AGC	ASC-US	ASC-H	LSIL	HSIL	Suspicious for SCC	Total	Any epithelial abnormality, n (%)
White discharge per vaginam	348	1	24	5	5	3	0	386	38 (9.8)
Pain abdomen	316	0	10	4	2	0	0	332	16 (4.8)
Irregular menstrual cycles	97	3	30	9	8	3	0	150	53 (35.3)
Postmenopausal bleeding	0	0	1	6	5	2	0	14	14 (100.0)
Postcoital bleeding	0	0	14	5	5	2	2	28	28 (100.0)
Increased frequency of micturition	11	0	0	0	0	0	0	11	0 (0.0)
Total	772	4	79	29	25	10	2	921	149 (16.2)

NILM was most frequently observed among women presenting with white discharge per vaginam and pain abdomen. Among women with white discharge per vaginam, 348 of 386 smears were NILM, while 38 women (9.8%) had epithelial abnormalities. Among women presenting with pain abdomen, 316 of 332 smears were NILM, and 16 women (4.8%) had epithelial abnormalities.

ASC-US was the most common epithelial abnormality. It was observed most frequently among women with irregular menstrual cycles, with 30 cases, followed by women with white discharge per vaginam, with 24 cases. ASC-H and LSIL were also relatively frequent among women with irregular menstrual cycles.

All 14 women presenting with postmenopausal bleeding and all 28 women presenting with postcoital bleeding had an epithelial cell abnormality in the supplied dataset. Both smears suspicious for squamous cell carcinoma occurred among women presenting with postcoital bleeding. Women presenting with increased frequency of micturition had only NILM findings.

These results indicate that epithelial abnormalities were proportionately more frequent among women presenting with postcoital bleeding, postmenopausal bleeding and irregular menstrual cycles than among women presenting with white discharge or pain abdomen.

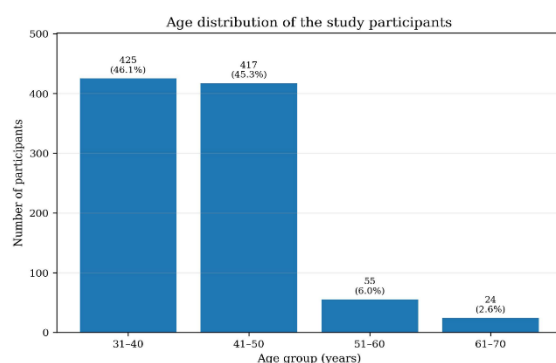


Figure 1: Age distribution of the study participants

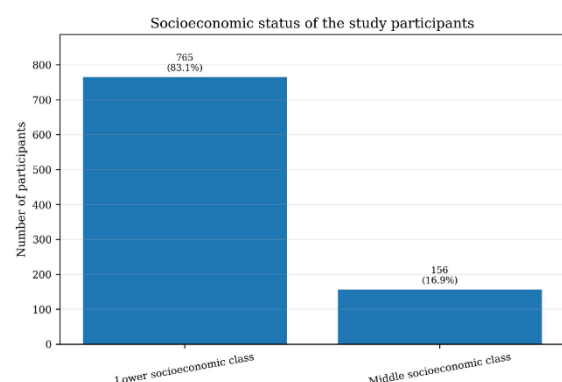


Figure 2: Socioeconomic status of the study participants

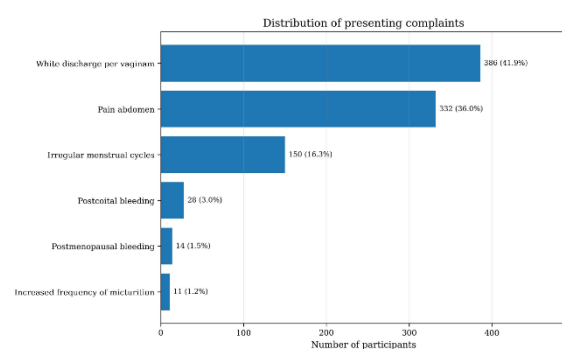


Figure 3: Distribution of presenting complaints among the study participants

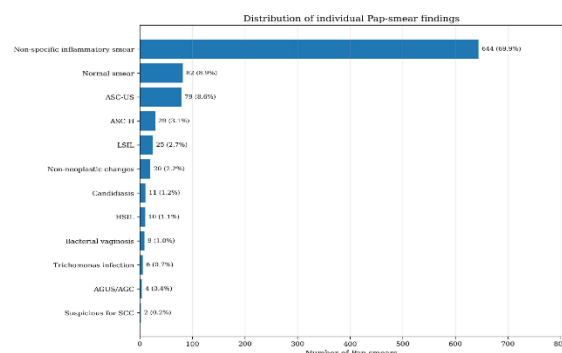


Figure 4: Distribution of individual Pap-smear findings

DISCUSSION

The present retrospective study evaluated the cervical cytology findings of 921 women attending a tertiary-care hospital. The mean age of the participants was 41.78 ± 7.16 years, and 91.4% were aged between 31 and 50 years. This age distribution is clinically relevant because cervical epithelial abnormalities are frequently detected during the middle reproductive and perimenopausal years, when screening provides an opportunity to identify precursor lesions before progression to invasive disease.

White discharge per vaginam was the most common presenting complaint, reported by 386 women (41.9%), followed by pain abdomen in 332 (36.0%) and irregular menstrual cycles in 150 (16.3%). Postcoital and postmenopausal bleeding were comparatively uncommon, accounting for 3.0% and 1.5% of presentations, respectively. Sachan et al.^[12] in a study of 1,650 women attending a gynaecology outpatient department, similarly reported white vaginal discharge as the most frequent complaint, followed by abdominal pain and irregular menstrual cycles. Their findings support the observation that women undergoing hospital-based Pap-smear evaluation commonly present with discharge, pain and menstrual disturbances rather than with symptoms specifically suggestive of cervical neoplasia.

On per-speculum examination, white discharge per vaginam was the most frequent finding, observed in 311 women (33.8%). A healthy-looking cervix was documented in 258 women (28.0%), cervical erosion in 178 (19.3%), cervical hypertrophy in 99 (10.7%), bleeding on touch in 44 (4.8%), and uterovaginal prolapse or cystocele in 31 (3.4%). These findings demonstrate that a substantial proportion of women undergoing cytological screening have inflammatory or clinically abnormal cervical findings. Nevertheless, per-speculum appearance alone cannot reliably distinguish benign inflammatory changes from epithelial abnormalities, and cytological evaluation remains necessary even when overtly malignant features are absent.

Of the 921 Pap smears examined, 772 (83.8%) were negative for intraepithelial lesion or malignancy. Non-specific inflammatory smears constituted the predominant cytological pattern, occurring in 644 women (69.9%). Normal smears accounted for 8.9%, while smaller proportions showed non-neoplastic cellular changes, candidiasis, bacterial vaginosis or *Trichomonas* infection. The inflammatory-smear rate in the present study was higher than the 42.66% reported by Sachan et al.^[12] and the 32.5% reported by Verma et al.^[18] Differences in inflammatory-smear prevalence may be related to variations in patient selection, genital-tract infection burden, hygiene and socioeconomic conditions, referral patterns, sampling practices and cytological interpretation.

Inflammatory smears are classified under NILM and should not be considered premalignant lesions. However, marked inflammation may obscure epithelial morphology and reduce cytological interpretability. Women with persistent symptoms or severe inflammation therefore require appropriate clinical evaluation, treatment of identifiable infection and repeat cytology when clinically indicated. The predominance of inflammatory smears in the present series also suggests that Pap-smear screening in symptomatic hospital populations has an additional role in identifying infectious and reactive cervical changes.

Epithelial cell abnormalities were detected in 149 women, corresponding to an overall prevalence of 16.2%. ASC-US was the most common epithelial abnormality, observed in 79 women (8.6%), followed by ASC-H in 29 (3.1%), LSIL in 25 (2.7%), HSIL in 10 (1.1%), AGUS/AGC in four (0.4%), and cytological findings suspicious for squamous cell carcinoma in two women (0.2%). The two cases should be described as “suspicious for squamous cell carcinoma” unless invasive malignancy was subsequently confirmed histopathologically.

The overall epithelial-abnormality rate of 16.2% was higher than the 5.0% reported by Bal et al.^[13] 3.23% reported by Gupta et al.^[14] and 11.95% reported by Sarma et al.^[17] Bal et al. documented ASC-US, LSIL and HSIL in 0.3%, 2.7% and 0.7% of 300 women, respectively, while Gupta et al. identified epithelial abnormalities in 3.23% of 4,703 smears. Sarma et al. reported epithelial cell abnormalities in 11.95% of 242 women attending a tertiary hospital. The higher prevalence in the present study may reflect the predominantly symptomatic and hospital-referred population rather than a community-based screening cohort. Differences in age structure, clinical selection, infection burden, cytological thresholds and screening coverage may also contribute to inter-study variation.

ASC-US was the predominant epithelial abnormality in the present study, with a prevalence of 8.6%. This was higher than the 2.9% reported by Sachan et al.^[12] 0.3% reported by Bal et al.^[13] and 1.0% reported by Verma et al.^[18] The high ASC-US rate may partly reflect the substantial inflammatory background in the smears, because reactive and inflammatory cellular changes can produce morphological atypia that does not fulfil the criteria for a definitive squamous intraepithelial lesion. Nevertheless, ASC-US is not a benign endpoint and requires appropriate risk-based evaluation, commonly incorporating high-risk HPV testing, repeat cytology or colposcopy depending on the patient's age, clinical context and available facilities.

ASC-H constituted 3.1% of all smears and represented the second most frequent atypical squamous-cell category after ASC-US. This is a clinically important finding because ASC-H

indicates cytological atypia in which a high-grade squamous intraepithelial lesion cannot be excluded. The relatively high ASC-H frequency in the present series requires careful cytological review and timely colposcopic assessment. It would also be valuable to report histopathological correlation for these cases, where available, to determine the proportion associated with CIN2 or more severe lesions.

The LSIL prevalence in the present study was 2.7%. This was identical to the rate reported by Bal et al.^[13] but lower than the 5.09% reported by Sachan et al.^[12] 5.5% reported by Verma et al.^[18] and 12.4% reported by Vaghela et al.^[15] The HSIL prevalence was 1.1%, which was higher than the 0.48% reported by Sachan et al. and 0.7% reported by Bal et al., but lower than the 2.5% reported by Verma et al. Variability in LSIL and HSIL rates across studies may reflect differences in HPV prevalence, screening history, age distribution, referral patterns, cytological techniques and diagnostic thresholds.

This age-related gradient is consistent with the biological persistence of high-risk HPV infection and the cumulative development of cervical epithelial abnormalities with advancing age. Patel et al.^[16] in a study of 995 women, identified 55 premalignant or malignant lesions and observed that such lesions were concentrated mainly among women aged 30–50 years. The present findings further emphasise that screening should not be discontinued merely because a woman has entered the perimenopausal or postmenopausal period, particularly when she has never been adequately screened.

The distribution according to parity also demonstrated clinically relevant differences. In absolute terms, epithelial abnormalities were most frequent among P2L2 women, with 41 cases, followed by P1L1 women with 35 cases and nulliparous women with 30 cases. However, when group size was considered, the highest proportion of epithelial abnormalities occurred among P4L4 women at 36.4%, followed by P1L1 women at 27.3%. The corresponding proportions were 17.3% among P2L2, 12.8% among P3L3 and 9.2% among nulliparous women. These findings do not demonstrate a simple linear relationship between increasing parity and epithelial abnormality. The small number of women in the highest-parity groups and the possibility of confounding by age, socioeconomic status, age at marriage and screening history should be considered when interpreting these results.

Presenting complaint showed an especially marked relationship with cytological outcome. Epithelial abnormalities were found in 35.3% of women with irregular menstrual cycles, compared with 9.8% of those presenting with white discharge and 4.8% of those presenting with abdominal pain. All 14 women with postmenopausal bleeding and all 28 women with postcoital bleeding had an epithelial abnormality in the supplied dataset. Both smears suspicious for squamous cell carcinoma occurred among women presenting with postcoital bleeding. These findings identify postcoital and postmenopausal bleeding as important warning symptoms that require prompt cervical evaluation.

Sachan et al. reported an unsatisfactory rate of 6.42%, while Vaghela et al. reported approximately 4.8%, primarily related to sampling, fixation, obscuring blood or inflammation and other technical factors.

The study is strengthened by its relatively large sample size and detailed evaluation of cytological findings according to age, parity and presenting complaint.

The symptomatic referral population may have increased the observed prevalence of epithelial abnormalities. Additional limitations include the absence of high-risk HPV results, incomplete histopathological correlation, possible interobserver variation in cytological reporting and small numbers within several older-age, higher-parity and bleeding-symptom subgroups.

Overall, the present study demonstrates that Pap-smear cytology remains a practical and valuable method for detecting inflammatory, infectious, premalignant and suspicious malignant cervical changes in hospital-based practice.

Although most smears were classified as NILM, epithelial abnormalities were detected in approximately one-sixth of the study population. The predominance of ASC-US, together with the detection of ASC-H, LSIL, HSIL, AGC and smears suspicious for squamous cell carcinoma, highlights the importance of structured follow-up.

Women with abnormal cytology should undergo appropriate risk-based evaluation through HPV testing where available, repeat cytology, colposcopy and histopathological examination as clinically indicated. Particular attention should be given to older women and those presenting with postcoital or postmenopausal bleeding.

Table 10: Comparison of the present study with previous studies

Study	Sample size/setting	Principal cytological findings	Comparison with the present study
Present study	921 women; tertiary-care hospital	NILM 83.8%; inflammatory smear 69.9%; ECA 16.2%; ASC-US 8.6%; ASC-H 3.1%; LSIL 2.7%; HSIL 1.1%; suspicious for SCC 0.2%	High inflammatory burden and relatively high overall ECA and ASC-US rates
Sachan et al. [12]	1,650 women; KGMU, Lucknow	Inflammatory/infectious smears 42.66%; ASC-US 2.90%; LSIL 5.09%; HSIL 0.48%; unsatisfactory 6.42%	Present study had higher inflammation, ECA and ASC-US, but lower LSIL
Bal et al. [13]	300 hospital attendees	ECA 5.0%; ASC-US 0.3%; LSIL 2.7%; HSIL 0.7%	Present study had higher ECA,

			ASC-US and HSIL; LSIL rates were identical
Gupta et al. [14]	4,703 smears; western Uttar Pradesh	ECA 3.23%	ECA prevalence was substantially higher in the present symptomatic hospital population
Vaghela et al. [15]	Retrospective tertiary-care study	LSIL 12.4%; HSIL 5.0%; unsatisfactory smears 4.8%	Present study had markedly lower LSIL and HSIL rates
Patel et al. [16]	995 women	940 benign/inflammatory findings; 55 premalignant or malignant lesions, mainly among women aged 30–50 years	Supports the importance of screening from the fourth decade onward
Sarma et al. [17]	242 women; tertiary hospital	ECA 11.95%; 88.05% without ECA/malignancy	Present study demonstrated a moderately higher ECA rate
Verma et al. [18]	200 symptomatic women	NILM 56%; inflammatory smears 32.5%; ASC-US 1%; LSIL 5.5%; HSIL 2.5%	Present study had higher inflammation and ASC-US but lower LSIL and HSIL

CONCLUSION

Pap smear is a simple, safe, cost-effective, and reliable screening tool for detecting inflammatory, premalignant, and malignant cervical lesions. As cervical cytological abnormalities can occur across diverse demographic and clinical groups, screening should not be limited to symptomatic women or those with an abnormal-looking cervix. Routine screening, awareness programs, and timely follow-up of abnormal results are essential for the prevention and early detection of cervical cancer.

Limitations

This study has some limitations. It was a retrospective, hospital-based study, limiting the generalizability of the findings and introducing potential selection bias. HPV DNA testing and histopathological confirmation were not available for all cases, and long-term follow-up data on lesion progression, regression, or treatment outcomes were lacking.

Future Recommendations

Routine Pap smear screening should be strengthened at all healthcare levels, with women aged >30 years encouraged to undergo regular screening, even if asymptomatic. Health education should improve awareness of cervical cancer, HPV infection, Pap smear testing, and the importance of follow-up after abnormal results. Women with abnormal cytology should receive timely colposcopy, biopsy, HPV testing where available, and appropriate treatment. Future studies should include larger sample sizes, HPV DNA testing, histopathological correlation, and long-term follow-up to further evaluate the effectiveness of Pap smear screening.

Declarations

Funding: No external funding was received.

Conflict of interest: The authors declare no conflict of interest.

Ethical approval: Institutional ethical approval should be obtained as per hospital protocol for retrospective record-based studies.

Informed consent: As this was a retrospective study based on hospital records, individual informed consent may be waived subject to Institutional Ethics Committee approval.

Acknowledgement: The authors acknowledge the support of the Department of Obstetrics and

Gynaecology and the cytology/pathology reporting team involved in Pap smear evaluation.

REFERENCES

- Fontham ETH, Wolf AMD, Church TR, Etzioni R, Flowers CR, Herzig A, Guerra CE, Oeffinger KC, Shih YT, Walter LC, Kim JJ, Andrews KS, DeSantis CE, Fedewa SA, Manassaram-Baptiste D, Saslow D, Wender RC, Smith RA. Cervical cancer screening for individuals at average risk: 2020 guideline update from the American Cancer Society. *CA Cancer J Clin.* 2020;70(5):321-346.
- Jain S, Hiriyur P, Goswami SS. Study on role of Pap smear in cervical cancer screening. *J Cancer Res Ther.* 2020;7(8):21-25.
- Mishra R, Bisht D, Gupta M. Primary screening of cervical cancer by Pap smear in women of reproductive age group. *J Family Med Prim Care.* 2022;11(9):5327-5331.
- Mremi A, Mchome B, Mlay J, Schledermand D, Blaakær J, Rasch V. Performance of HPV testing, Pap smear and VIA in women attending cervical cancer screening in Kilimanjaro region, Northern Tanzania: a cross-sectional study nested in a cohort. *BMJ Open.* 2022;12(10):e064321.
- Perkins RB, Guido RL, Saraiya M, Sawaya GF, Wentzensen N, Schiffman M, Feldman S. Summary of current guidelines for cervical cancer screening and management of abnormal test results: 2016–2020. *J Womens Health.* 2021;30(1):5-13.
- Ahmed NU, Rojas P, Degarege A. Knowledge of cervical cancer and adherence to Pap smear screening test among female university students in a multiethnic institution, USA. *J Natl Med Assoc.* 2020;112(3):300-307.
- Sadia H, Shahwani IM, Bana KFM. Risk factors of cervical cancer and role of primary healthcare providers regarding PAP smears counseling: case control study. *Pak J Med Sci.* 2022;38(4 Part-II):998.
- Arrivillaga M, Bermúdez PC, García-Cifuentes JP, Rodríguez-López M, Neira D, Vargas-Cardona HD. Women's critical experiences with the Pap smear for the development of cervical cancer screening devices. *Heliyon.* 2023;9(3).
- Kumari P, Kumari S, Pankaj S. Pap smear: a cost-effective method of screening of cervical cancer in a tertiary care centre. *Int J Clin Obstet Gynaecol.* 2020;4:204-207.
- Goel S, Chauhan S, Tevatia MS, Gupta I, Gupta K. Study of cervical cancer screening in symptomatic women, using Pap smear as recommended in a hospital in rural area of Haryana. *Int J Acad Med Pharm.* 2023;5(2):1637-1641.
- Karra V, Ramulu PS, Rajanikar SB. Cervical Pap smear study and its utility in cervical cancer detection and prevention. *Indian J Obstet Gynecol Res.* 2021;8(4):470-475.
- 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):337-341.
- Bal MS, Goyal R, Suri AK, Mohi MK. Detection of abnormal cervical cytology in Papanicolaou smears. *J Cytol.* 2012;29(1):45-47.

14. Gupta K, Malik NP, Sharma VK, Verma N, Gupta A. Prevalence of cervical dysplasia in western Uttar Pradesh. *J Cytol.* 2013;30(4):257-262.
15. Vaghela BK, Vaghela VK, Santwani PM. Analysis of abnormal cervical cytology in Papanicolaou smears at tertiary care center: a retrospective study. *Int J Biomed Adv Res.* 2014;5(1):47-49.
16. Patel MM, Pandya AN, Modi J. Cervical Pap smear study and its utility in cancer screening, to specify the strategy for cervical cancer control. *Natl J Community Med.* 2011;2(1):49-51.
17. Sarma U, Mahanta J, Talukdar K. Pattern of abnormal cervical cytology in women attending a tertiary hospital. *Int J Sci Res Publ.* 2012;2(12):1-4.
18. 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 area of Himachal Pradesh, India. *Middle East Fertil Soc J.* 2017;22(1):39-42.
19. Padmini CP, Indira N, Chaitra R, Das P, Girish BC, Nanda KM. Cytological and colposcopic evaluation of unhealthy cervix. *J Evid Based Med Healthc.* 2015;2(40):6783-6790.
20. Saha D, Ghosh S, Nath S, Islam H. Utility of Pap smear screening for prevention of cervical cancer: a 3 years study from rural Tripura, a northeastern state of India. *Int J Med Dent Sci.* 2017;6(2):1456-1461.