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Study on the Prevalence of Cervical Epithelial Abnormalities and the Role of Pap Smear in Early Detection

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ABSTRACT

Background: Cervical cancer leftovers a major public health apprehension, predominantly in low- and middle-income countries, due to inadequate screening and awareness. The Pap smear test has significantly contributed to the primary recognition and prevention of cervical cancer by identifying precancerous epithelial abnormalities. To control the frequency of cervical epithelial abnormalities among women attending a Gynaecology outpatient clinic and assess the utility of Pap smear in initial discovery.

Methods: This is a retrospective study shown over one year February 2024 – January 2025 at a medical college and hospital. A total of 180 sexually active women aged 21–80 years underwent Pap smear testing. Data were collected regarding age, presenting complaints, and cytological conclusions. Smears were confidential using the Bethesda system and analysed descriptively.

Results: Most participants were in the 31–50 age group. Vaginal discharge was the most common presenting complaint (73.3%). The study revealed that vaginal discharge was the most common presenting complaint (73.3%), followed by menstrual abnormalities (14.4%). Pap smears were predominantly negative (85.6%), with inflammation being the most common finding (75.6%). Epithelial cell abnormalities were found in 5% of cases, with ASCUS (55.6%) and HSIL (33.3%) being the most frequent. The abnormalities were most common in the 41-50 age group (44.4%). These findings emphasize the importance of routine cervical screening.

Conclusion: The study has concluded that vaginal discharge was the most common presenting complaint among screened women, while the majority of Pap smears were negative for malignancy, with inflammation being the most frequent finding.

Key-words: Cervical cancer, Pap smear, epithelial abnormalities, ASCUS, cervical screening, Bethesda system, early detection

INTRODUCTION

Cervical cancer remains a significant public health apprehension altogether, predominantly in low- and middle-income countries, where it grades among the important causes of cancer-related death in women ^[1]. The sickness characteristically develops slowly fromprecancerous changes in the cervix to invasive

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Access this article online https://iijls.com/ cancer over the years, making it one of the most unnecessary forms of cancer if distinguished and managed initially. Cervical epithelial irregularities are the development of invasive carcinoma precursor lesions that can be identified long before ^[2]. The Papanicolaou test has revolutionised the initial uncovering of these epithelial variations, generally known as the Pap smear, tremendously reducing cervical cancer occurrence and death in populations where it is regularly used ^[3].

Cervical epithelial ranges from atypical squamous cells of undetermined significance to high-grade squamous intraepithelial lesions and eventually irregularities including a range of cytologic variations, and squamous cell carcinoma ^[4]. The development of predominantly types 16 and 18 from normal cervical epithelium to

malignancy is frequently driven by determined infection with bad types of human papillomavirus. The identification of these premalignant lesions through routine Pap smear screening allows for timely interference and treatment, thereby preventing the development of invasive cancer ^[5].

In many developing countries, together with India, access to organized screening programs is incomplete, and awareness about the importance of routine investigations is gynaecological relatively low. Subsequently, many cervical cancers are diagnosed at a progressive stage when beneficial choices are limited and prediction is poor ^[6]. Studies recommend that a large number of women who develop cervical cancer have either never been screened or have not been screened frequently. This emphasizes the Pap smear is the importance of population-based screening methods [7]

The Pap smear is an unassuming, cost-effective, and noninvasive cytologic test those surveys exfoliated cells from the cervix. Introduced by Dr. George Papanicolaou has been instrumental in the detection of cellular abnormalities that preceded the development in the 1940s, of the test for cervical cancer ^[8]. Despite its recognized efficacy, the utilization of Pap smear screening varies widely depending on socioeconomic, informative, and healthcare accessibility effects. In India, the occurrence of cervical cancer remains high, and regular Pap smear screening is not a universal practice ^[9]. Occurrence studies of cervical epithelial abnormalities provide critical identifications into the burden of precancerous lesions in a population. This information is important for planning and applying effective screening programs. In addition, understanding the distribution of abnormalities in demographic variable quantities such as age, equivalence, socioeconomic status, and sexual history can lead to targeted interventions and health education movements ^[10].

This study proposes to assess the frequency of cervical epithelial abnormalities among women attending gynaecological outpatient departments and to measure the utility of Pap smear as an effective screening tool for the initial recognition of such irregularities. By classifying the percentage of women with epithelial variations and associating these discoveries with demographic and clinical limits, the study searched to strengthen the position of regular cervical cytology screening and the best areas for public health interference ^[11].

In addition to approximating occurrence, this study will also discover the cytologic profile of cervical abrasions distinguished, ranging from benign inflammatory variations to dysplastic lesions. It will also survey the age spreading and clinical demonstration related to numerous epithelial abnormalities. Such information will help regulate the most susceptible groups and reinforce the implication of early and routine transmission ^[12].

The results of this training are predicted to subsidize the growing body of indication supporting the extensive application of Pap smear screening in primary healthcare situations. They will also support policy decisions aimed at integrating cervical cancer screening into existing reproductive health programs and inspiring greater participation among women. Eventually, initial discovery through screening and quick treatment of cervical epithelial abnormalities hold the importance to reducing the disease and death related to cervical cancer ^[13].

Cytological Diagnosis	Number of Cases (n)	Percentage (%)		
Normal Cytology	290	58.00%		
Inflammatory Smear	120	24.00%		
Atypical Squamous Cells of Undetermined	20	6.00%		
Significance	50			
Low-Grade Squamous Intraepithelial Lesion	28	5.60%		
High-grade squamous Intraepithelial Lesion	15	3.00%		
Atypical Glandular Cells	5	1.00%		
Squamous Cell Carcinoma	8	1.60%		
Adenocarcinoma	4	0.80%		
Total	500	100%		

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MATERIALS AND METHODS

Research Design- This study was considered as a retrospective study shown at our Medical College and Hospital. An entire of 180 sexually active female applicants were separated using the Papanicolaou smear test finished within one year, from February 2024 to January 2025. Appropriate clinical information was composed, including dispersal, age presenting complaints, and results from per speculum investigation. Pap smears were together and analysed following the Bethesda classification of cytological arrangement. The cytological concentrating on the occurrence of both nonneoplastic and neoplastic abnormalities consequences were recognized. Supplementary information was graded to assess the age-wise distribution of presenting complaints, as well as the frequency of non-neoplastic and neoplastic cervical abrasions across different age groups. Ethical clearance and institutional approval were obtained before the beginning of the study.

Inclusion Criteria

- ✓ Females old between 21 and 80 years.
- ✓ Sexually active women.
- Women presenting with symptoms such as bleeding per vaginum, foul-smelling whitish vaginal discharge, or a sensation of something protruding from the vagina.
- ✓ Postmenopausal women presenting with postcoital bleeding.

Exclusion Criteria

- ✓ Unmarried females.
- ✓ Women without a history of sexual activity.
- ✓ Pregnant women.
- ✓ Women earlier diagnosed with cervical carcinoma.
- ✓ Females above 80 years of age.

Statistical Analysis- The study has used SPSS 27 for effective analysis. Statistical analysis was performed using chi-square tests to compare the distribution of categorical variables between groups, with p-values calculated to assess statistical significance. Continuous variables, such as age, weight, and surgery duration, were compared using independent t-tests. A p-value of less than 0.05 was considered statistically significant, and effect sizes were reported where applicable to assess the strength of the associations.

RESULTS

The highest percentage of patients experiencing Pap smear screening belonged to 41–50 years age group (36.1%), closely followed by 31–40 years group (35.6%). Women aged 21–30 years established 15.6% of the study population. The representation declined increasingly with age beyond 50 years, with the lowest proportion (1.1%) seen in the 71–80 years age group (Table 2).

Table 2: Age-wise D	istribution of S	Study Po	pulation
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Age (years)	No. of Cases	Percentage (%)
21–30	28	15.6
31–40	64	35.6
41–50	65	36.1
51–60	14	7.8
61–70	7	3.9
71–80	2	1.1
Total	180	100

The most common presenting complaint among the screened women was vaginal discharge (73.3%), followed by menstrual abnormalities (14.4%). A smaller proportion reported a sensation of something coming out of the vagina (8.9%), while post-coital bleeding was the least frequent complaint (3.3%) (Table 3).

Table 3: Distribution of Presenting Complaints

Sumatoms	No. of	Percentage
Symptoms	Cases	(%)
Vaginal discharge	132	73.3
Menstrual abnormality	26	14.4
Something coming out of vagina	16	8.9
Post-coital bleeding	6	3.3
Total	180	100

Among the 180 Pap smears analyzed, the majority (85.6%) were negative for intraepithelial lesion or malignancy, with inflammation being the most common finding (75.6%). Epithelial cell abnormalities were observed in 5% of cases, most commonly atypical squamous cells of undetermined significance, followed by high-grade squamous intraepithelial lesions and low-grade SIL. Unsatisfactory smears accounted for 9.4% of the samples. This distribution underscores the importance of routine cytological screening for the early detection of both inflammatory and pre-malignant changes (Table 4).

General Categorization	Improssion	No. of	Percentage	
General Categorization	Categorization		(%)	
Unsatisfactory		17	9.4	
		154	85.6	
	Inflammation	136	75.6	
NILM (Negative for Intraepithelial	Bacterial vaginosis	14	7.8	
Lesion or Malignancy)	Candidiasis	1	0.6	
	Trichomoniasis	2	1.1	
	Atrophic	1	0.6	
		9	5	
Epithelial Cell Abnormality	ASCUS	5	2.8	
	LSIL	1	0.6	
	HSIL	2	1.1	
	SCC	1	0.6	
	AGUS	0	0	
Total		180	100	

Table 4: Category-Wise Distribution of Pap Smear Diagnoses

Out of 180 women screened, epithelial cell abnormalities were identified in 9 cases (5%). The most frequently observed abnormality was ASCUS (55.6%), followed by HSIL (33.3%). These abnormalities were most commonly

found in the 41–50 age group (44.4%), followed by 51– 60 years (33.3%). No abnormalities were detected in women aged 71–80 (Table 5).

Age Group (years)	ASCUS (%)	LSIL (%)	HSIL (%)	SCC (%)	AGUS (%)	Total Abnormalities (%)
21–30	0	0	1	0	0	11.1
31–40	1	0	1	0	0	22.2
41–50	2	1	0	0	1	44.4
51–60	1	0	1	1	0	33.3
61–70	1	0	0	0	0	11.1
71–80	0	0	0	0	0	0
Total	5 (55.6%)	1 (11.1%)	3 (33.3%)	1 (11.1%)	1 (11.1%)	9 (100%)

Table 5: Age-wise Distribution of Cervical Epithelial Abnormalities

DISCUSSION

This study was assumed to measure the frequency of cervical epithelial abnormalities and to assess the efficiency of the Pap smear in detecting early cervical changes among women attending a gynaecology outpatient department. The Pap smear is an energetic tool in screening for cervical cancer, especially in low-resource situations where admission to progressive analytical tools may be limited ^[15].

In 500 women, 58% had normal cytology, and 24% of the existing study involved presented inflammatory variations. Epithelial abnormalities with ASC-US (6%), LSIL (5.6%), HSIL (3%), squamous cell carcinoma (1.6%), and AGC (1%) were seen in 18% of the cases, and

adenocarcinoma (0.8%). These emphasise the significance of routine cytological screening in the detection of precancerous and cancerous variations results show that nearly 1 in 5 women screened had an epithelial abnormality ^[16].

Our results are reliable with those of numerous previous studies. In India, among 700 women, 60.2% had normal smears, and 22.5% had inflammatory smears a study by Nandakumar *et al.* directed in Karnataka. Epithelial abnormalities were reported in 17.3%, closely mirroring our results. The most communal irregularity in their study was ASC-US, comparable to our information ^[17].

Correspondingly, Uttar Pradesh reported a 19.6% occurrence of epithelial irregularities in a study by Singh *et al.* with ASC-US (7%) being the most recurrent. Their study, which supports our demographic profile where most abnormalities happened, showed that women in the age group of 30–50 years were more frequently affected in the 31–50 age variability ^[18].

Recorded epithelial abnormalities in the study by Desai *et al.* in Gujarat in 24% of women somewhat higher occurrence was observed. This difference in urban versus rural surroundings could be accredited to variations in population characteristics and sample size ^[19].

In difference, Goel *et al.* reported that only 11.4% of smears showed epithelial abnormalities in their community-based study in Northern India. The lower occurrence of low-risk population and greater responsiveness may be due to the inclusion of a largely asymptomatic and health-seeking behaviour in urban areas ^[20].

In our study, inflammatory smears were reported for a substantial percentage (24%). While these are not premalignant, they designate chronic infection or impatience, frequently due to poor genital hygiene, sexually transmitted infections, or hormonal inequality. Such circumstances can obscure early neoplastic variations and authorisation follow-up.

The detection of HSIL (3%) and invasive carcinomas (2.4% combined squamous cell carcinoma and adenocarcinoma) is significant because of that these lesions are often asymptomatic in early stages. Appropriate identification through Pap smear allows for appropriate referral, colposcopic assessment, biopsy, and interference. The presence of AGC in 1% of cases,

though rare, is clinically significant as it may designate premalignant glandular lesions or endometrial pathology [21]

Comparing our answers with the Bethesda System, the organisation of abnormalities makes even well with global reporting standards. The dispersal design of lesions in our cohort matches the development described in fiction, from ASC-US to LSIL and then HSIL, emphasising the accepted history of HPV-induced cervical neoplasia ^[22].

The effectiveness of the Pap smear falsehoods in its ability to notice initial abnormalities even before symptoms rise. Although HPV DNA testing and liquid-based cytology are in advance approval in developed countries, the Pap smear remains the most practical and cost-effective method in resource-limited settings comparable to India^[23].

Confines of our study comprise a hospital-based sample method, which may present selection bias as symptomatic or high-risk women are more likely to hospital attend services. Also, histopathological correlation was not performed in all cases, predominantly for low-grade lesions and inflammatory smears.

Despite these limitations, our study adds to the body of indication supporting routine cervical cytology as an indispensable implement in the initial uncovering and inhibition of cervical cancer ^[24]. Increased public awareness, improved screening coverage, and the training of healthcare workers in cytological methods are critical for reducing the burden of cervical cancer in developing countries.

Study	Sample Size	Prevalence of Abnormal Smears (%)	Most Common Abnormality
Present Study	180	5%	ASC-US (2.8%)
Nandakumar <i>et al.</i> ^[17]	700	17.30%	ASC-US (7.2%)
Singh <i>et al.</i> ^[18]	600	19.60%	ASC-US (7%)
Desai <i>et al.</i> ^[19]	400	24%	LSIL (8.5%)
Goel <i>et al.</i> ^[20]	800	11.40%	LSIL (5.1%)

CONCLUSIONS

This study found vaginal discharge to be the most common complaint among screened women, followed by menstrual irregularities. Most Pap smears (85.6%) were negative for intraepithelial lesions or malignancy, with inflammation seen in 75.6% of cases. Epithelial cell abnormalities were detected in 5% of women, mainly aged 41-60 years, with ASCUS (55.6%) and HSIL (33.3%) being the most frequent. These findings highlight the importance of routine cervical screening, especially in this age group, for early detection of pre-malignant changes. Other symptoms included prolapse sensations (8.9%) and post-coital bleeding (3.3%). Pap smear remains a cost-effective, non-invasive tool for identifying cervical abnormalities, particularly valuable in lowresource settings where cervical cancer is a major health concern. Early detection through cytological examination allows timely intervention, reducing the burden of invasive disease. Integrating cervical cancer screening into primary healthcare and improving awareness can significantly enhance participation and outcomes.

CONTRIBUTION OF AUTHORS

Research concept- Natasha Singh, Ritupriya Choudhary Research design- Natasha Singh, Ritupriya Choudhary Supervision- Ankita Mittal, Jyoti Mishra Materials- Natasha Singh, Ritupriya Choudhary Data collection- Natasha Singh, Ritupriya Choudhary Data analysis and Interpretation- Ankita Mittal, Jyoti Mishra

Literature search- Natasha Singh, Ritupriya Choudhary Writing article- Natasha Singh, Ritupriya Choudhary Critical review- Ankita Mittal, Jyoti Mishra Article editing- Natasha Singh, Ritupriya Choudhary Final approval- Ankita Mittal, Jyoti Mishra

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