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## Correlation of Cervical Pap Smear with Histopathological diagnosis in patients with intraepithelial lesions

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### Abstract

**Aim:** The purpose of the study was to determine the accuracy of Pap smears and the correlation between Pap smear diagnoses and histopathology in order to evaluate the diagnostic efficacy of Pap smears for intraepithelial lesions.

**Material and methods:** This retrospective study, which included 100 Pap smears for which histopathological diagnosis was also performed, was conducted in the Department of Pathology at a tertiary care center. In addition to Pap smears, comprehensive clinical histories of patients were extracted from requisition forms received by the cytology department. Additionally, hysterectomies or cervical specimens obtained from the same patients were analyzed and subsequently correlated with the Pap smear diagnosis.

**Results:** A total of one hundred Pap smear-bearing patients (41 percent) were multipara and aged 45 years or older. The most frequently reported cases were NILM (59%), followed by ASCUS (15%), LSIL (14%), HSIL (7%), squamous cell carcinoma (3%) and adenocarcinoma (2%). Histopathological examination revealed the following diagnoses: chronic cervicitis (37% of cases), chronic cervicitis with squamous metaplasia (28% of cases), CIN I (25%), CIN II (3.0%), CIN III (2.0%), squamous cell carcinoma (2%), and adenocarcinoma (3% of cases). The diagnostic accuracy, positive predictive value, specificity, and sensitivity were as follows: 87%, 92.44%, 83.34%, 93.43% and 70% respectively.

**Conclusion:** The data suggests that Pap smears play a significant role in the diagnosis of cervical lesions, as the highest number of cases diagnosed on Pap smears exhibited correlation with histopathology.

**Keywords:** cervical pap smear, histopathological diagnosis, intraepithelial lesions

### Introduction

Uterine cervix cancer is a significant public health concern that affects women in India and other developing nations. In 2012, cervical cancer accounted for approximately 266,000 deaths and an estimated 528,000 cases globally, representing 7.5% of all female cancer-related fatalities. Approximately 20% of cervical cancer cases reported globally are attributed to India. Annually, 122,844 women are diagnosed with cervical cancer in India, with the disease claiming the lives of 67,477 individuals<sup>[1]</sup>. It ranks as the second most prevalent form of cancer among women aged 15–44. In South Asia, India also has the greatest age-standardized incidence of cervical cancer<sup>[2]</sup>.

Preventable cervical cancer exists because of its protracted preinvasive phase<sup>[3]</sup>. The 10–20 year average from the initial preinvasive lesion to the development of highly malignant cancer justifies cervical cancer prevention, early detection, and treatment. A cervical cancer screening program has decreased the disease's incidence by 80% and mortality by 60%. With the publication of his article "A new diagnosis of cancer" in 1928, Papanicolaou in New York entered the era of modern diagnostic cytology. Although initially met with doubt during the cytopathological era, the "Pap" test has since gained widespread acceptance as the most suitable screening method for uterine cancer early detection and precancerous stages<sup>[4]</sup>.

The Pap smear is the primary method of cervical cancer<sup>[5, 6]</sup>. Despite the fact that the Pap test is universally recognized as the most effective cervical cancer screening method, women continue to succumb to cervical carcinoma due to public ignorance<sup>[7]</sup>. An outdoor Pap examination is a simple, risk-free, non-invasive, and efficacious technique utilized to identify lesions of the cervix. In contrast, cervical biopsy is the gold standard despite being an invasive procedure<sup>[8]</sup>.

The purpose of this research was to assess the cytology pattern of cervical pap smears performed at a tertiary care hospital, ascertain their accuracy, and establish a correlation with histopathological diagnosis. Cytological and histopathological correlation of cervical smears is

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the most effective method for ensuring internal quality and, in some instances, can be used to identify the causes of divergent cases. The purpose of the research was to determine the accuracy of Pap smears and the correlation between Pap smear diagnoses and histopathology in order to evaluate the diagnostic utility of Pap smears in the detection of cervical lesions.

### Material and Methods

This retrospective investigation was carried out within the Department of Pathology. From a sample of 150 Pap smears, one hundred patients who had undergone cervical biopsy or hysterectomy in addition to Pap smear were selected for the study. In addition to the samples sent by the gynecology department, the requisition forms contained the patient's comprehensive clinical history, which included parity and complaints such as vaginal discharge, post-coital bleeding, postmenopausal bleeding, lower abdominal pain, and intermenstrual bleeding. Pap smears were obtained on a clean glass slide using the Ayer's spatula and were promptly fixed in an equal volume of 95% ether and ethanol. The staining process utilized for the samples was the conventional Pap staining method. The documentation of Pap specimens adhered to the Bethesda System 2001 classification. Hysterectomy or cervical biopsies obtained from the same patients were fixed in 10% neutral buffered formalin solution and subjected to standard processing procedures, including final embedding in paraffin blocks and haematoxylin and eosin (H&E) staining. Histopathological diagnosis of specimens served as the gold standard for correlating histopathological and Pap smear findings.

### Inclusion criteria

- Sexually active married women.
- Vaginal discharge, abdominal pain, postmenopausal bleeding, postcoital bleeding, and irregular menstrual bleeding

### Exclusion criteria

- Unmarried women
- Women without sexual exposure

- Pregnant women
- Unsatisfactory smears

### Statistical Analysis

The cytohistopathological diagnoses of patients whose information was extracted from requisition forms were tabulated and statistically analyzed. Accuracy, positive predictive value, specificity, and sensitivity were computed with histopathological diagnosis of cervical biopsy serving as the reference point.

### Results

A total of 100 patients were taken in study.

**Table 1:** Baseline characteristics of study patients

Parameters		n	%
Age	30-34	9	9
	35-39	20	20
	40-44	31	31
	≥45	41	41
Parity	Nullipara	4	4
	Para1	10	10
	Para2	50	50
	Para3	21	21
	≥para4	15	15
Chief complaints	Whitish discharge per vaginum	46	46
	Pain lower abdomen	21	21
	Intermenstrual bleeding	13	13
	menorrhagia	11	11
	postcoital bleeding	8	8
	postmenopausal bleeding	1	1

A majority of the patients (41%), aged 45 years or older, were enrolled. The majority of women were multipara, with 50% having parity of two. White discharge per vaginum constituted the prevailing chief complaint among patients, affecting 46 individuals (46%). Lower abdominal pain afflicted 21 patients (21%), intermenstrual bleeding affected 13 patients (13%), menorrhagia affected 11 patients (11%), postcoital bleeding affected 8 patients (8%), and postmenopausal bleeding affected 1 patient (1%).

**Table 2:** Cyto-histopathological correlation of Pap smears and cervical biopsies/ hysterectomies

Cytological diagnosis	No. of cases on Pap smear (%)	Chronic cervicitis	Chronic cervicitis with squamous metaplasia	CIN I	CIN II	CIN III	Adeno Carcinoma	SCC
NILM	59	35	20	4	-	-	-	-
ASCUS	15	2	5	8	-	-	-	-
LSIL	14	-	2	12	-	-	-	-
HSIL	7	-	1	1	3	2	-	-
SCC	3	-	-	-	-	-	-	3
Adeno Carcinoma	2	-	-	-	-	-	2	-
Total	100	37(37%)	28(28%)	25(25%)	3(3%)	2(2%)	2(2%)	3(3%)

Based on the results of the Pap examination, a maximum of 59 (or 59%) cases out of 100 were classified as Negative for Intraepithelial Lesion or Malignancy (NILM). In forty cases (40 percent), epithelial cell abnormalities (ECA) were detected. Atypical squamous cells of undetermined significance (ASCUS) constituted the prevailing epithelial cell abnormality, manifesting in 15 cases (15 percent). This was closely followed by low grade squamous intraepithelial lesion (LSIL) and high grade squamous intraepithelial lesion (HSIL). A total of five malignant cases were documented, of which two (2%) were adenocarcinomas and three (3%) were squamous cell carcinomas. 37% of 100 cases were identified as chronic cervicitis histopathologically, as determined by hysterectomies

or biopsies; this was followed by 28% for chronic cervicitis with squamous metaplasia, 25% for CIN I, 3.0% for CIN II, and 2% for CIN III. Five patients were identified as having malignancy, with two (2%) instances of adenocarcinoma and three (3%) cases of squamous cell carcinoma.

**Table 3:** Correlation between Pap smear and histopathological diagnosis

Histopathology Pap smear	Positive	Negative	Total
Positive	24	14	38
Negative	2	60	62
Total	26	74	100

Histopathology correlated with a maximum of 87 out of 100 (87%) cases diagnosed on Pap smears; therefore, Pap smears play an essential role in the detection of various types of cervical lesions.

**Table 4:** Sensitivity and Specificity of Pap smear

Sensitivity	70%
Specificity	93.43%
Positive predictive value (PPV)	92.44%
Negative predictive value (NPV)	83.34%
Accuracy	87%

Sensitivity, specificity, positive predictive value, negative predictive value and accuracy of pap smear was 70%, 93.43%, 92.44%, 83.34% and 87% respectively.

## Discussion

Preceding the onset of the invasive disease, malignant lesions of the cervix possess a protracted premalignant latent phase that is treatable and detectable via cytological examination. The current retrospective study examined the correlation between histopathological diagnosis and cervical cytology in one hundred cases. The results were summarized and contrasted to those of additional research.

The study revealed that a significant proportion of patients (41%), analogous to previous research conducted by Joshi *et al.*<sup>[9]</sup> (50%) and Parija *et al.*<sup>[11]</sup> (37.15%) and Bamanikar *et al.*<sup>[10]</sup> (28.46%), were aged 45 years or older. Similarly, 50% of the patients in our study belonged to para 2 (50%) which is similar to the study done by Atla *et al.*<sup>[12]</sup>. Similar to the findings of Joshi *et al.*<sup>[9]</sup> (40%), Atla *et al.*<sup>[12]</sup> (41%), Dhakal *et al.*<sup>[13]</sup> (40%) and Alakananda *et al.*<sup>[14]</sup> (51%) the most frequent complaint was whitish discharge per vaginum (46%). In contrast to Malpani *et al.*<sup>[15]</sup> (97.96%), NILM (59%) was comparable to research conducted by Alakananda *et al.*<sup>[14]</sup> (55%), Atla *et al.*<sup>[12]</sup> (53%), and Joshi *et al.*<sup>[9]</sup> (64%).

The current study observed an incidence of epithelial cell abnormality (ECA) in 40% of cases, which was greater than the incidences reported in the works of Malpani *et al.*<sup>[11]</sup> and Sachan *et al.*<sup>[5]</sup>. However, this incidence was comparable to that of Alakananda *et al.*<sup>[14]</sup>. It is worth noting that our small sample size and inclusion of patients with specific complaints contributed to this discrepancy.

Comparable to the findings of Alakananda *et al.*<sup>[14]</sup> (45%), 15% of the cases of ASCUS in our study exhibited histopathology that confirmed CIN I on biopsy, whereas 33.3% of the cases demonstrated cervicitis with or without metaplasia. The inconsistency between cytology and histopathology was attributed to the presence of cervical erosions or ulceration in those cases, which resulted in inflammatory atypia. Consequently, the cells observed on Pap smears were classified as atypical squamous cells.

A similar percentage (91.8%) of LSIL cases in our study correlated with histopathological diagnosis as in other studies. Twelve cases of LSIL were characterized by CIN I, whereas two cases presented with chronic cervicitis with metaplasia. A correlation of every case of HSIL was observed between the cervical biopsy diagnosis and the one established by Atla *et al.*<sup>[12]</sup>, which was comparable.

Two cases were identified as adenocarcinoma and three cases were identified as squamous cell carcinoma based on Pap smears; histopathology confirmed a perfect correlation of one hundred percent. The overall accuracy of our research was similar to that of Atla *et al.*<sup>[12]</sup> (83.33%), Patil *et al.*<sup>[16]</sup> (82.1%),

and Joshi *et al.*<sup>[9]</sup> (80%) prior to our investigation. The correlation between Pap smear and cervical histology is strong, according to this study.

## Conclusion

A Pap smear is a cost-effective and sensitive method for detecting both premalignant and malignant cervix lesions. Histopathological observations correlate substantially with cytological characteristics. Therefore, early screening procedures for sexually active females should be implemented in order to detect lesions at an early stage and enable appropriate management. Widespread media and educational initiatives should be employed to inform the public about the Pap smear test, its purpose, and the recommended frequency of screening. This will aid in the prevention of cervical cancer-related mortality and morbidity.

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