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Investigation of a woman's pap smear and cervical biopsy results at a tertiary care hospital for a cancerous cervix

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Abstract

Introduction and Background: Among women, cervical cancer is still one of the top causes of death and disability, especially in underdeveloped nations. The purpose of this research is to determine if cytological and histological results in women with a healthy cervix are correlated, and to evaluate the sensitivity and specificity of Pap screening and cervical biopsy in identifying cervical abnormalities.

Materials and Methods: A prospective observational study was conducted at Department of OBG, Fathima Institute of Medical Science, Ramarajupalli, Kadapa, Andhra Pradesh, India between December 2020 to November 2021, including 60 women aged 20-65 years presenting with clinically unhealthy cervix. The Bethesda system was used to classify the outcomes of the Pap smear screenings that all patients had. For histological evaluation, patients who had abnormal Pap tests or ongoing clinical suspicion underwent colposcopy-guided cervical biopsies. Data was statistically examined to determine the specificity, sensitivity, and association of Pap smear results with histopathology.

Results: In the study, out of 50 women, Pap smears detected inflammatory smears in 28%, ASC-US in 12%, LSIL in 16%, HSIL in 10%, SCC in 6%, and NILM in 28%. Histopathology confirmed chronic cervicitis in 40%, CIN (I, II, III) in 24%, invasive carcinoma in 6%, and benign cervical polyp in 10%. The sensitivity of Pap smear for detecting high-grade lesions was 78%, and its specificity was 85%. There was a significant correlation ($p < 0.05$) between Pap smear and histopathology, confirming its role as a primary screening tool.

Conclusion: For the detection of cervical abnormalities, both precancerous and cancerous, pap smears are an invaluable, non-invasive, and cost-effective screening tool. Cases with aberrant cytology or persistent clinical suspicion, however, still require histological confirmation by biopsy. The study highlights the significance of regular cervical cancer screenings and the use of biopsies for final diagnosis in order to improve the outcomes of early detection and treatment.

Keywords: Pap smear, cervical biopsy, unhealthy cervix, cervical intraepithelial neoplasia, cervical cancer screening, bethesda system

Introduction

One of the biggest causes of cancer-related fatalities among women globally is cervical cancer, which is a huge public health concern. Cervical cancer is the fourth most frequent disease in women, and it is most devastating in low- and middle-income nations without widespread access to healthcare and screening programs, says the World Health Organization (WHO). Persistent infection with high-risk strains of the human papillomavirus (HPV) causes cellular alterations and, if left untreated, invasive carcinoma, the main cause of cervical cancer. The key to lowering the disease's mortality and morbidity rates is early diagnosis and prompt treatment^[1-3].

One common and reliable cytological screening method for cervical cancer is the Papanicolaou (Pap) smear, which has been around for a long time and is utilized by many doctors. It has greatly aided in the early detection of cervical anomalies; the test is quick, painless, inexpensive, and requires no incisions. Cervical cancer screening can be standardised using the Bethesda system, which classifies cytological findings into categories like invasive carcinoma, low-grade squamous intraepithelial lesion (LSIL), high-grade squamous intraepithelial lesion (HSIL), and negative for intraepithelial lesion or malignancy (NILM). However, there are certain limits to Pap smear testing alone. For example, the sensitivity of the test can vary, and it can sometimes produce false-negative results.

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In cases where there are aberrant cytological findings or if there is persistent clinical suspicion, a cervical biopsy is necessary for histological confirmation [4-6].

It is common to see a cervix that isn't healthy in clinical practice; symptoms including erosion, hypertrophy, leukoplakia, or suspicious lesions could point to infections, chronic inflammation, dysplasia, or cancer. Cervical health is a major risk factor for pelvic discomfort, abnormal vaginal discharge, postcoital bleeding, and other non-specific symptoms in many women. Therefore, cytological and histological evaluation are crucial for a correct diagnosis and risk assessment [5-7].

Cervical cancer screening is effective, however many women in underdeveloped areas either go undetected or receive a late diagnosis because of factors such as a lack of education, a lack of healthcare facilities, and a lack of coordinated screening programs. Early diagnosis and management of cervical lesions require an integrated approach that includes Pap smear screening and histopathology confirmation in suspected cases [6-8].

The objectives of this research are to find out how well Pap smears can detect cervical lesions, how well they match up with histopathological findings, and how sensitive and specific they are for detecting high-grade lesions and invasive cancer. The results of this study will help us understand cervical pathology better and highlight how important it is to test for cervical cancer regularly in order to catch it early, intervene quickly, and improve patient outcomes [7-9].

Materials and Methods

A prospective observational study was conducted at Department of OBG, Fathima Institute of Medical Science, Ramarajupalli, Kadapa, Andhra Pradesh, India between December 2020 to

November 2021, including 60 women aged 20-65 years presenting with clinically unhealthy cervix. Pap smear screening was performed on all individuals, and the results were classified using the Bethesda approach. Histopathological evaluation of abnormal Pap smears or persistent clinical suspicions was conducted on patients using colposcopy-guided cervical biopsies. Statistical analysis was performed on the sensitivity, specificity, and association of the Pap smear results with histopathology.

Inclusion Criteria

- Women aged 20 to 65 years presenting with an unhealthy cervix on clinical examination.
- Women who have not undergone Pap smear screening in the past one year.
- Patients with suspicious cervical lesions requiring further evaluation.

Exclusion Criteria

- Pregnant women.
- Patients with a history of cervical malignancy or prior cervical surgery.
- Patients who had undergone hysterectomy.
- Patients who refused consent to participate in the study.

Results

The study comprised 60 women who had a cervix that was not healthy. Patients whose Pap smears were classified using the Bethesda criteria had their abnormal smears confirmed histopathologically through cervical biopsies.

Table 1: Distribution of pap smear findings

Pap Smear Findings	Number of Cases	Percentage (%)
Inflammatory Smears	18	30%
ASC-US	7	12%
LSIL	11	18%
HSIL	8	13%
Squamous Cell Carcinoma (SCC)	6	10%
NILM (Negative for Intraepithelial Lesion or Malignancy)	10	17%

Inflammatory alterations were detected in 30% (18/60) of cases, whereas atypical squamous cells of uncertain significance (ASC-US) were seen in 12% (7/60). 18% (11/60) of cases had low-grade squamous intraepithelial lesions (LSIL), while 13% (8/60) of cases had high-grade squamous intraepithelial lesions (HSIL). Ten percent (6 out of 60) of patients were found to have squamous cell carcinoma (SCC), and seventeen percent (10 out of 60) were found to have non-invasive lymph node metastasis (NILM).

Table 2: Histopathological Findings in Cervical Biopsy

Histopathological Findings	Number of Cases	Percentage (%)
Chronic Cervicitis	16	40%
Cervical Intraepithelial Neoplasia (CIN I, II, III)	12	30%
Invasive Squamous Cell Carcinoma	5	12%
Benign Cervical Polyp	3	8%
Normal Histology	4	10%

Out of the 60 patients who had cervical biopsies, 30% (12/40) were found to have cervical intraepithelial neoplasia (CIN I, II, or III), and 40% (16/40) were found to have chronic cervicitis.

Twelve percent (5/40) of cases were found to have invasive squamous cell carcinoma, while eight percent (3/40) were found to have benign cervical polyps. Overdiagnosis may have occurred in some Pap smear instances since 10% (4/40) of biopsies showed normal histology.

Table 3: Correlation between pap smear and histopathology

Pap Smear Category	Confirmed by Biopsy	Percentage (%)
NILM	4	10%
Inflammatory Smears	12	30%
ASC-US	4	10%
LSIL	8	20%
HSIL	6	15%
SCC	6	15%

In 60 cases, the results of the Pap smear and the histopathology report were connected. Thirty percent of cases had verified inflammatory alterations, and 35 percent had definite CIN lesions (LSIL and HSIL). Pap smear had a high degree of specificity in detecting squamous cell carcinoma in 15% of instances. The limits of Pap smear alone were highlighted when 10% of cases initially classified as NILM were later found to

have chronic cervicitis or low-grade neoplasia. Pap smear has an 80% sensitivity and an 87% specificity for identifying HSIL and SCC, two types of high-grade lesions. Both the positive and negative predictive values were 75% and 90%, respectively. The Pap smear's importance as a primary screening tool was further supported by the observation of a statistically significant correlation ($p < 0.05$) between its results and those of histopathology.

Discussion

Cervical cancer remains one of the most preventable malignancies through effective screening programs, yet it continues to pose a significant global health burden, particularly in low-resource settings. The Pap smear has long been the cornerstone of cervical cancer screening due to its ease of use, cost-effectiveness, and ability to detect pre-malignant and malignant changes at an early stage. However, its diagnostic accuracy varies, necessitating histopathological confirmation through cervical biopsy in cases with abnormal cytology findings. This study aimed to evaluate the diagnostic efficacy of Pap smear, its correlation with histopathology, and its role in detecting cervical intraepithelial neoplasia (CIN) and invasive carcinoma in women presenting with an unhealthy cervix [9-11].

The Pap smear results in this study revealed that 30% of cases had inflammatory smears, while 12% were classified as ASC-US, 18% as LSIL, 13% as HSIL, and 10% as squamous cell carcinoma (SCC). These findings are consistent with previous studies, such as Badiie *et al.*, 2011, which reported that inflammatory smears are one of the most common findings in women undergoing cervical screening. The presence of low- and high-grade squamous intraepithelial lesions underscores the need for early detection and follow-up to prevent progression to invasive carcinoma [12-14].

The histopathological findings from cervical biopsy confirmed chronic cervicitis in 40% of cases, CIN (I, II, III) in 30%, and invasive carcinoma in 12%. This aligns with studies like Gupta *et al.*, 2014, which found that a significant proportion of cases with abnormal Pap smears had underlying CIN on biopsy. The sensitivity of Pap smear in detecting high-grade lesions (HSIL and SCC) in this study was 80%, with a specificity of 87%, demonstrating its efficacy as a primary screening tool, although it requires confirmatory testing in suspected cases [15-17].

One important observation was that 10% of cases categorized as NILM on Pap smear were later found to have chronic cervicitis or CIN lesions on biopsy, indicating that Pap smear alone may not be sufficient for definitive diagnosis. Similar findings were reported by Misra *et al.*, 2015, who emphasized that biopsy is essential in cases with persistent symptoms or abnormal colposcopic findings despite a normal Pap smear result. The false-negative results observed in our study could be attributed to sampling errors, obscuration by inflammatory cells, or inadequate smear preparation, as noted in studies like Zeeshan *et al.*, 2016 [17-19].

We also found a substantial association ($p < 0.05$) between the results of Pap smear and histopathology, which further supports the idea that combining cytology and histopathology can increase diagnostic accuracy. Akinfolarin *et al.* (2017) also noted that histopathological examination is still the best way to diagnose cervical cancer and CIN, even though Pap smears are a great screening tool. Pap smear screening is effective, but many underdeveloped nations still don't do it because people don't know about it, it's stigmatized, and they don't have enough access to healthcare. Research conducted by Basu *et al.* (2013) and Sankaranarayanan *et al.* (2016) highlighted the potential for

cervical cancer screening programs to enhance early detection rates and decrease the burden of the disease by combining Pap smear, HPV testing, and biopsy [20-22].

This study's results lend credence to the idea that Pap smears should be the gold standard for detecting cervical abnormalities in the first place. Colposcopy and biopsy should be part of a multimodal strategy due to the constraints of false negatives and interobserver variability. Also, by revealing at-risk groups that need to be closely monitored, HPV testing has the potential to increase screening programs' predictive value. Healthcare practitioners should make it a top priority to raise awareness in order to encourage more women, especially those in high-risk age groups, to participate in screenings. In order to guarantee that precancerous and cancerous lesions are diagnosed and treated promptly, it is crucial to enhance follow-up procedures for patients with abnormal smears [23-26].

Conclusion

While this study does show that histological confirmation is necessary in patients with cytological abnormalities, it also shows that Pap smears are useful for detecting cervical lesions. Pap smears are beneficial as primary screening tools because of the strong association between them and biopsy results ($p < 0.05$), but a biopsy is still the best way to get a definitive diagnosis. Further strengthening of cervical cancer prevention efforts and reduction of disease burden could be achieved by the integration of HPV testing, improved patient awareness, and enhanced screening programs.

Funding

None

Conflict of Interest

None

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