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Correlation of cervical pap smears with histopathological study of cervical biopsies: A hospital-based study

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Abstract

Background: Cervical cancer is the second commonest cancer among women accounting for 17.7% among all cancers in women. The high incidence of disease in developing countries is mainly due to absence of effective screening programs. The Papanicolaou (Pap) smear is widely employed for initial screening of cervical epithelial changes to detect early precancerous lesions.

Objective: To correlate the cervical cytological findings with histopathological diagnosis using PAP and haematoxylin and eosin stains respectively.

Methods: A prospective study conducted in tertiary health care centre over a period of 6 months. Out of 680 PAP smears, 100 cases were selected who were above 21 years and corresponding histopathological samples were received in the form of cervical biopsy. The data was collected and compiled in MS Excel and analysed using SPSS (Version 26.0). The variables were expressed as frequency and percentages and p value <0.05 was considered as statistically significant.

Results: In this study, most common age was between 41-50 years (30%) and were multiparous (77%). The most common presenting complaint was white discharge per vagina (34%) followed by abnormal uterine bleed (29%). On PAP smear maximum cases were reported as NILM(64%), followed by ASCUS(19%), LSIL(11%), HSIL(4%), SCC(1%) and Adenocarcinoma(1%). On histopathology 45% were diagnosed as chronic cervicitis, chronic cervicitis with squamous metaplasia(32%), CIN I(9%), CIN II(4%), CIN III(8%), SCC(2%) and Adenocarcinoma(1%). Overall sensitivity of Pap smear was 86%, specificity 79%, positive predictive value 55%, negative predictive value 95% and accuracy of 81%.

Conclusion: Hence we conclude that, maximum cases diagnosed on PAP smear correlated with histopathological diagnosis from cervical biopsy. Therefore it should be encouraged as effective screening method to reduce incidence and mortality caused by cervical cancer.

Keywords: Cervical cancer; Pap smear; Screening test; histopathological.

1. Introduction

Cervical cancer is the fourth most frequent cancer among women worldwide with 662,301 new cases and 348,874 deaths in 2022, according to the International Agency for Research on Cancer (IARC). Roughly 90% of cervical cancer-related deaths happened in low- and middle-income nations[1]. Cervical cancer is the second most frequent cancer in India among women, after breast cancer, with 127,526 new cases reported in 2022 - a 17.7% increase over all female cancer cases. Eleven percent, or 79,906 women, died in India overall[1].

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The premise behind cervical cancer screening is that early detection may result in early intervention. The high incidence of cervical cancer in underdeveloped countries can be attributed in large part to either a lack of effective screening programs or to their inadequate execution[2-5].

Cervical cancer is associated with specific risk factors, including several sexual partners, early marriage, and early motherhood. The Human Papilloma Virus (HPV) is recognized to have a major impact on the etiology of cervical cancer [6,7].

The Papanicolaou (Pap) smear, which is inexpensive, simple to conduct, and resource-light, has been widely used since its inception in 1941 for the initial screening of cervical epithelial changes to identify precancerous lesions. Cervical cytology smears stained with papanicolaou (Pap) can also identify a variety of genital infections, including herpes simplex virus (HSV), bacterial vaginosis, Candida species, actinomycetes, and bacterial vaginosis. The Pap test's sensitivity has significantly increased as a result of co-testing for HPV DNA[8-10,17].

One of the suggestions made by the European guidelines for quality assurance for the advancement of cytology laboratory performance is the cytohistopathological correlation of Pap smears, specifically to decrease false-negative outcomes[18,19]. In view of the above incidence and mortality, this being an important study was done to correlate the cervical cytological findings with histopathological diagnosis using PAP smear, that may help in the screening, early diagnosis and effective management of cervical abnormalities.

Objective of the study

The objective of this study was to correlate the cervical cytological findings with histopathological diagnosis using PAP and haematoxylin and eosin stains respectively.

2. Methodology

This was a prospective study conducted in tertiary health care centre over a period of 6 months. Out of 680 PAP smears, 100 cases were selected whose were above 21 years and corresponding histopathological samples were received in the form of cervical biopsy. The patients provided pertinent medical history, which was noted on the proforma. Informed consent was taken from all study participants before undergoing the procedure.

The data was collected and compiled in MS Excel. Descriptive statistics has been used to present the data. To analyse the data SPSS (Version 26.0) was used. The variables were expressed as frequency and percentages. p value <0.05 was considered as statistically significant.

3. Results

In this study, a total of 680 PAP smears were studied, from which 100 cases were selected whose were above 21 years and those corresponding histopathological samples were received in the form of cervical biopsy.

On PAP smear cytology, the maximum cases were reported as Negative for intraepithelial lesion or malignancy (NILM) (64%), followed by Atypical Squamous Cells of Undetermined Significance (ASCUS) (19%), Low-grade squamous intraepithelial lesion (LSIL) (11%), High-grade squamous intraepithelial lesion (HSIL) (4%), Squamous cell carcinoma (SCC) (1%) and Adenocarcinoma (1%) as shown in Table 1.

Table 1 Cytologic diagnosis

Cytologic diagnosis	Total cases	Percentage %
NILM	64	64
ASCUS	19	19
LSIL	11	11
HSIL	04	4
SCC	01	1
ADENOCARCINOMA	01	1

As depicted in Table 2, the most common presenting complaint was white discharge per vagina (34%) followed by abnormal uterine bleeding (29%), pain in lower abdomen (24%). The other clinical presentation seen among the patients were mass per vagina (7%), postmenopausal bleeding (5%) and postcoital bleed (1%).

Table 2 Clinical Presentation

Clinical Presentation	Number of Cases	Percentage %
White Discharge Per Vagina	34	34
AUB	29	29
Pain In Lower Abdomen	24	24
Mass Per Vagina	07	07
Postmenopausal Bleed	05	05
Postcoital Bleed	01	01

The most common age was between 41-50 years (30%) and were multiparous (77%), followed by 51-60 years (24%), 31-40 years (22%), and 21-30 years (16%). Elderly women were reported as 7% and 1% in the age group of 61-70 years and above 70 years of age group respectively. 23% women were nulliparous. The active age of marriage was highest at 10-14 and 15-19 years of 30% each followed by 5-9 years and less than 5 years of 18% and 14% respectively as seen in Table 3.

Table 3 Comparison of demographic Characteristics with Cytologic diagnosis (n=100)

Variables	NILM	ASCUS	LSIL	HSIL	SCC	ADENOCARCINOMA	Total
AGE							
21-30	16	00	00	00	00	00	16
31-40	19	02	01	00	00	00	22
41-50	16	07	06	01	00	00	30
51-60	09	08	04	03	00	00	24
61-70	03	02	00	00	01	01	7
>70	01	00	00	00	00	00	1
PARITY							
Nullipara	19	03	01	00	00	00	23
Multipara	47	14	10	04	01	01	77
ACTIVE AGE OF MARRIAGE							
<5	13	01	00	00	00	00	14
5-9	14	03	01	00	00	00	18
10-14	23	04	03	00	00	00	30
15-19	15	08	05	02	00	00	30
20-24	01	02	01	01	01	01	07
>25	00	01	01	01	00	00	03

On histopathology, 45% were diagnosed as chronic cervicitis, chronic cervicitis with squamous metaplasia(32%), CIN I(9%), CIN II(3%), CIN III(8%), SCC(2%) and Adenocarcinoma(1%) as seen in Table 4.

Table 4 Comparison of Cytologic diagnosis with Cervical abnormalities

	Histopathological diagnosis of cervical biopsy						
Cytologic Diagnosis	Chronic Cervicitis	Chronic Cervicitis Squamous with Metaplasia	CIN I	CIN II	CIN III	Squamous Cell Carcinoma	Adeno-carcinoma
NILM	43	18	3	-	-	-	-
ASCUS	2	11	2	-	4	-	-
LSIL	-	03	4	1	3	-	-
HSIL	-	-	-	2	1	1	-
SCC	-	-	-	-	-	1	-
Adenocarcinoma	-	-	-	-	-	-	1
Total	45	32	9	3	8	2	1

Overall sensitivity of pap smear was 86%, specificity was 79%, positive predictive value was 55%, negative predictive value was 95% and accuracy was 81%.

When a comparison was made between Pap smear and histopathology correlation, the p value was found to be highly significant ($p<0.001$) as shown in Table 5.

Table 5 Comparison of Pap smear results with Histopathology correlation

PAP Smear	**Histopathology Correlation**		
	POSITIVE	NEGATIVE	Total
Positive PAP	20 (55.5%)	16 (44.4%)	36 (100%)
Negative PAP	03 (4.7%)	61 (95.3%)	64 (100%)
Total	23 (23%)	77 (77%)	100 (100%)
p value =0.001			

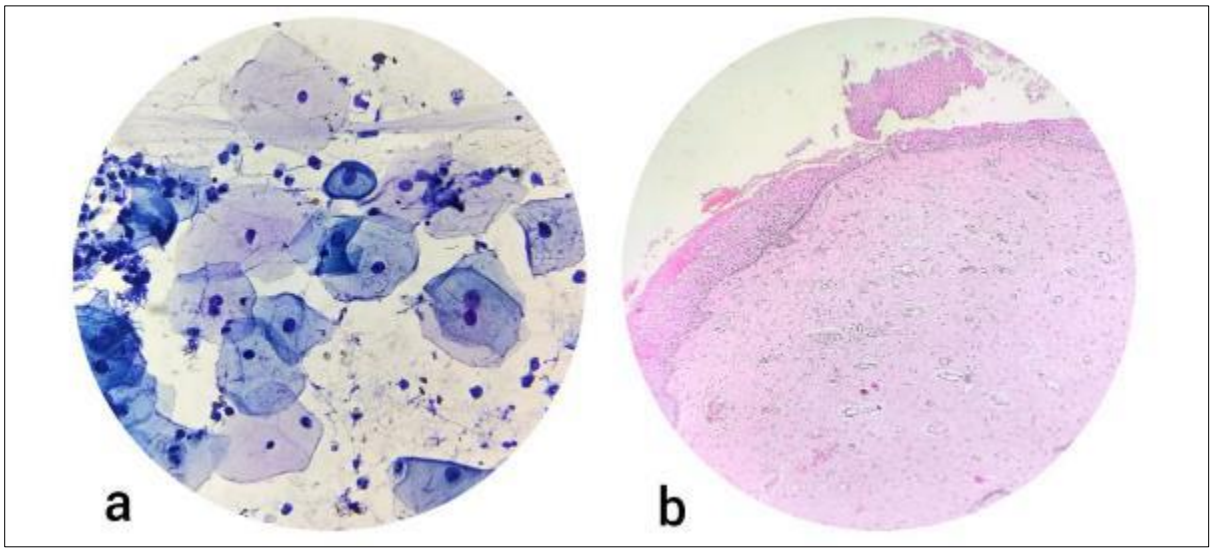

Figure 1 a- NILM, inflammatory smear (PAP smear); b- Chronic cervicitis (H&E)

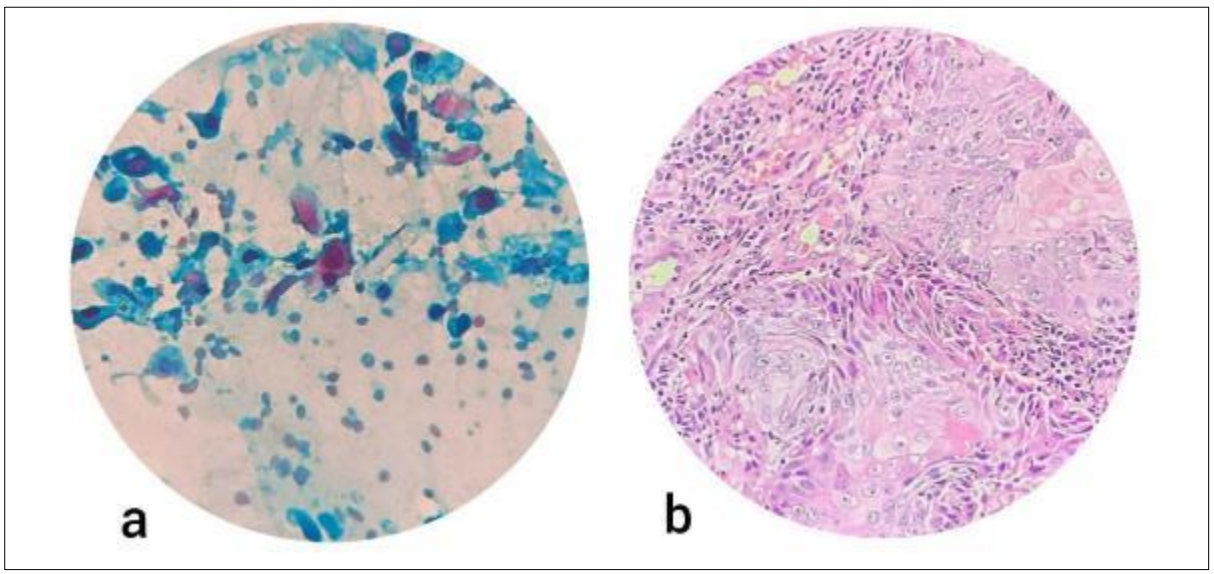

Figure 2 a- Squamous cell carcinoma (PAP smear); b- Squamous cell carcinoma (H&E)

4. Discussion

Cervical cancer is the second most frequent cancer in women, accounting for 17.7% of all malignancies in women, and causes 11.2% of cancer-related deaths, according to the IARC[1]. The most accessible and efficient screening technique for the major disease that affects many women and ultimately prevents them from leading productive lives is the Pap smear[8-10].

In the present study, a total of 100 women participated, where majority of them (30%) belonged to the age group of 41-50 years of age. This was consistent with a research conducted by Bal et al. (45.3% cases in the fourth decade)[5] and Farooq R et al[20] reporting more than 45 years (40.8%) as commonest in their study[5]. However, in contrary to our study, Garg et al (mean age of 35 years)[7], Dasari P et al.(with a mean age of 37 years)[11], Sachan PL et al. (mean age was 35 years)[10] reported a slightly lesser age group in their studies.

In our study, the majority of the female participants (77%) were multiparous. Similar to our study, in the studies by Garg et al.[7], Sachan PL et al.[10], and Ashmita D et al.[12], the majority of the female participants were multiparous. White discharge per vagina was reported to be the most common presenting symptom (34%) in our study, which was consistent with other studies where Garg et al, Sachan PL et al[10], Joshi C et al[13], Farooq R et al[20] and Thobbi VA et al.[14]

reported 40.4%, 29.69%, 40%, 48.5% and 52.6% respectively. The second most common symptom reported in our study was abnormal uterine bleeding reported among 29% followed by low abdominal pain (24%). However, in contrary to our study, studies by Sachan PL et al[10] and Farooq R et al[20] reported abdominal pain as the 2nd most common symptom.

All the study participants underwent Pap smears and the maximum cases were reported as Negative for intraepithelial lesion or malignancy (NILM) (64%), followed by Atypical Squamous Cells of Undetermined Significance (ASCUS) (19%), Low-grade squamous intraepithelial lesion (LSIL) (11%), High-grade squamous intraepithelial lesion (HSIL) (4%), Squamous cell carcinoma (SCC) (1%) and Adenocarcinoma(1%). A comparable study by Farooq R et al[20] found that 56.9% of patients had NILM, whereas another study by Joshi et al.[13] found that 64% of cases had NILM. In a similar manner, 53% and 55%, respectively, of Atla et al.[21] and Alokananda et al.[22] reported NILM. Malpani et al.[23], in contrast, discovered NILM in 97.96% of cases, which they ascribe to a disparity in sample size. However, the research done by Sachan PL et al[10] showed only 2.9% with ASCUS and 0.48% in HSIL respectively. Saha et al reported ASCUS among 5.92% in their study[15]. In contrast to our study, Meghana BP et al reported Bacterial vaginosis as the predominant infectious condition[16].

On histopathology, 45% were diagnosed as chronic cervicitis followed by chronic cervicitis with squamous metaplasia(32%), CIN I(9%), CIN II(3%), CIN III(8%), SCC(2%) and Adenocarcinoma(1%). This was similar to the Joshi C et al study, where they reported 48% having cervicitis followed by CIN I, CIN II and CIN III among 28%, 15% and 2% of their cases respectively[13].

In the present study, the sensitivity of pap smear was 86%, specificity was 79%, positive predictive value was 55%, negative predictive value was 95% and accuracy was 81%. Our findings were equivalent to those of Farooq R et al[20] and Ashmita et al.[12] pap test's sensitivity of 91.1% and 90.24% respectively and Farooq R et al[20] and Mallur et al's[24] specificity of 82.4% and 80% respectively. The overall accuracy of our analysis was similar to that of Farooq R et al. (85.4%)[20] Joshi et al. (80%)[13], Patil (82.1%)[19] and Atla et al. (83.33%)[21].

Our study demonstrates a strong relationship between cervical histology and pap smear.

5. Conclusion

As per our study, maximum cases diagnosed on PAP smear correlated with histopathological diagnosis from cervical biopsy. Therefore it should be encouraged as effective screening method to reduce incidence and mortality caused by cervical cancer. A very helpful, easy, affordable, and secure method for identifying precancerous cervical epithelial lesions is the Pap smear test. It ought to be made a regular screening process in order to lower the cost of care, sickness, and death. Routine cervical cancer screening should be performed on all women over 30 years of age.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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