

Diagnostic accuracy of pap smear in detection of cervical cancer

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Abstract

Background: Cervical cancer is one of the most preventable and curable of all cancers. More than 85% of the global burden occurs in developing countries, where it accounts for 13% of all female cancers. Cervical cytological screening is designed to detect over 90% of cytological abnormalities. Regular Pap tests every two years, and the appropriate management of any cervical abnormalities detected by the test, can prevent 90% of squamous cell carcinoma. **Aims and objective:** To study the accuracy of pap smear and biopsy in detection of cervical cancer. **Materials and method:** Total 120 women who were attending Out Patients Department (OPD) or being admitted to indoor ward were enrolled in the present study. Among them women who fulfilled one or more of the following selection criteria were randomly selected. A detailed clinical history of each patient was taken. A thorough general and systemic examination was done. The cervix was exposed and visualized for any gross pathological features such as erosion ectropion, hypertrophy, Ulcer or fungating growth, polyp, frank cancer and any abnormal vaginal discharge under adequate light and findings were recorded. Pap smear was taken using Ayre's spatula. The squamo - columnar junction was scraped with the Ayre's spatula by rotating full 360 degree. The scrapings were evenly spread on a glass slide and immediately fixed by dipping in the jar containing equal parts of 95% ethyl alcohol and ether and transported to the cytopathological laboratory. Smears were analyzed by senior pathologist. **Results:** In the present study majority of the cases (34.2%) were in age group of 31-40 years followed by 31-40 years. Majority of the cases in the present study were from lower socio-economic class (63.34%). Majority of cases with abnormal cervical lesion were in the multipara group (parity from 2 to 4) which constituted 73.4% cases out of 120 cases. Whitish discharge (68.3%) was the main complaint of majority of the patients with unhealthy cervix followed by irregular bleeding (51.7%). The pap smear showed sensitivity of 86.4% and specificity 92.18% in detecting cervical neoplasia and malignancy. The overall accuracy was 90%. **Conclusion:** Thus we conclude that Sensitivity of Pap smear was 86.5% and specificity was 92.18% in the present study with the accuracy of 90%. The sensitivity of Pap smear can be increased by eliminating high false negative results by proper technique of slide preparation, fixation and reading. Hence the study concludes that screening programme and awareness regarding cervical cancer should be enhanced and supervised in the grass root level of Western parts of Odisha.

Key Word: Pap smear, unhealthy cervix, Diagnostic accuracy

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INTRODUCTION

Cervical cancer is the third most common cancer in women, and the seventh overall and the leading cause of death by cancer. It is one of the most preventable and curable of all cancers. More than 85% of the global burden occurs in developing countries, where it accounts for 13% of all female cancers.¹ Mortality due to carcinoma of the cervix worldwide is 195,000 numbers of deaths per year. Incidence of the carcinoma cervix in the developed world is 90,000 numbers of the cases and in the developing world is 340,000 numbers of cases.² An age-standardised incidence rate (global) was 16 per

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100,000 women in 2002. In 2004, cervical cancer was the 5th most common cause of cancer death among women in the world, and had 489,000 new cases.¹ Invasive cancer of cervix is considered a preventable disease because it has a long pre- invasive state.³ The concept of pre-invasive disease of the cervix was first introduced by Papanicolaou in 1947 and since then, cervical cytological testing has become the standard screening test for cervical neoplasm.⁴ Cervical cytological screening is designed to detect over 90% of cytological abnormalities.⁵ Regular Pap tests every two years, and the appropriate management of any cervical abnormalities detected by the test, can prevent 90% of squamous cell carcinoma.⁶ It has also been established that most cervical cancers can be diagnosed at the pre- invasive stage with adequate and repetitive cervical cytological screening. Treatment of precancerous lesion is simple, safe, very often non-destructive and usually curative.³ Thus the present study was conducted to study the Diagnostic accuracy of Pap smear in detection of cervical cancer

AIMS AND OBJECTIVE

To study the accuracy of pap smear and biopsy in detection of cervical cancer.

MATERIALS AND METHOD:

The present study was conducted in the department of Obstetrics and Gynaecology of VSS MEDICAL COLLEGE BURLA. The study was conducted in 120 women who were attending Out Patients Department (OPD) or being admitted to indoor ward. Among them women who fulfilled one or more of the following selection criteria were randomly selected.

Inclusion criteria

- Married women with abnormal symptoms like profuse white discharge, post coital bleeding, irregular bleeding or post menopausal bleeding.
- Patients with clinically unhealthy cervix diagnosed by speculum examination like cervical erosion, congestion, hypertrophy, ectropion, cervical polyp and growth.
- Patients with pap smears showing dysplasia

Exclusion criteria

- Unmarried women or Pregnant women
- Patients with bleeding at the time of examination.
- Women who underwent total hysterectomy

Procedure: Written and informed consent were obtained from all the participants after brief explanation of the procedure. A detailed clinical history of each patient was taken with special stress to chief complaints with duration, menstrual history, obstetric history particularly age of marriage, age of first pregnancy, number of pregnancies and their outcome and personal history with socioeconomic status and literacy level. Some leading questions may be asked like post coital bleeding, family history of cancers was taken in relation to the presenting complaints. History of any previous surgery on cervix was noted. A thorough general and systemic examination was done. The patient was placed in dorsal position, the labia separated and a double-bladed sim's speculum gently inserted without the use of lubricant or jelly. The cervix was exposed and visualized for any gross pathological features such as erosion ectropion, hypertrophy, Ulcer or fungating growth, polyp, frank cancer and any abnormal vaginal discharge under adequate light and findings were recorded.

Pap smear: After preliminary inspection of the cervix, a Pap smear was taken using Ayre's spatula. The squamo - columnar junction was scraped with the Ayre's spatula by rotating full 360 degree. The scrapings were evenly spread on a glass slide and immediately fixed by dipping in the jar containing equal parts of 95% ethyl alcohol and ether and transported to the cytopathological laboratory. Smears were analyzed by senior pathologist. The Richart's classification was used for describing Pap smear results.

Cervical biopsy: Biopsy was taken from abnormal area, in the form of either a cervical punch or wedge or cone biopsy in operation theatre under anaesthesia. The specimen was sent for histopathological examination in 10% formalin solution. Slides were analyzed by senior consultant pathologist.

Biopsy results were categorized as

- Cervicitis/ metaplasia
- CIN-1 (mild dysplasia/ correlating with LSIL)
- CIN-2/3 (moderate to severe dysplasia/ correlating with HSIL)
- Squamous cell carcinoma

The collected information was entered in excel sheet and was analysed and presented with appropriate graphs and tables. The sensitivity and specificity was calculated.

RESULTS

Table 1: Distribution of cases according to baseline information

		No of cases	Percentage
Age group	21- 30	20	16.7%
	31 – 40	41	34.2%
	41– 50	36	30%
	51 – 60	20	16.7%
	>60	3	2.4%
Socio economic status	Low	76	63.4%
	Middle	40	33.3%
	High	4	3.3%
Parity	Nullipara (P ₀)	1	0.8%
	Primipara (P ₁)	10	8.3%
	Multipara (P ₂ -P ₄)	88	73.4%
	Grand multipara (≥P ₅)	21	17.5%
	Whitish discharge	82	68.3%
Symptoms*	Irregular bleeding	62	51.7%
	Post menopausal bleeding	17	14.2%
	Post coital bleeding	10	8.3%
	Blood stained discharge	6	5%
	Menorrhagia	12	10%
	Low backache	17	14.2%
	Others	6	5%

It was seen that majority of the cases (34.2%) were in age group of 31-40 years followed by 31-40 years (30%) and 21-30 and 51-6- years of age (16.7% each). It was observed that majority of the cases in the present study were from lower socio-economic class (63.34%). It was observed that majority of cases with abnormal cervical lesion were in the multipara group (parity from 2 to 4) which constituted 73.4% cases out of 120 cases. Whitish discharge (68.3%) was the main complaint of majority of the patients with unhealthy cervix followed by irregular bleeding (51.7%). Among 120 cases 14.2% presented with post menopausal bleeding, 8.3% with post coital bleeding, 10% menorrhagia and low backache in 14.2% cases.

Table 2: Distribution of cases according to gross appearance of cervix

Appearance of cervix	No of cases	Percentage
Erosion	46	38.3%
Congestion	12	10%
Hypertrophy + erosion	16	13.4%
Hypertrophy + congestion	7	5.8%
Hypertrophy + ectropion	1	0.8%
Mucus Polyp	5	4.2%
Growth	33	27.5%
Total	120	100%

In the present study maximum number of cases showed erosion 51.7% which was followed by growth in 27.5% cases. Hypertrophy with erosion was seen in 13.4% Of cases, hypertrophy with congestion in 5.84%, congestion in 10% and mucus polyp was seen in 4.16% of cases.

Table 3: Distribution of cases according to Pap smear and Histopathology findings

Findings	Pap smear		Histopathology findings	
	No of cases	Percentage	No of cases	Percentage
Normal	0	0	6	5%
Cervicitis / metaplasia	66	55%	53	44.16%
CIN I	7	5.8%	4	3.34%
CIN II	11	9.2%	7	5.84%
CIN III	9	7.5%	9	7.5%
Invasive carcinoma	27	22.5%	36	30%
Mucus polyp	0	00	5	4.16%
Total	120	100	120	100%

Pap smear revealed that 55% had an inflammatory/metaplasia and 22.5% showed invasive carcinoma. Among 27 positive cases for cervical neoplasia, 5.8% had CIN I changes, 9.2% had CIN II changes and 7.5% had CIN III changes. Out of all 120 cases were subjected to either punch, wedge or cone cervical biopsy or endometrial curettage. Majority of cases, 44.16% had chronic cervicitis, 4.16% had mucus polyp, 3.34% had mild dysplasia, 5.84% had moderate dysplasia and 7.5% had severe dysplasia. In 30% cases HPE revealed invasive carcinoma.

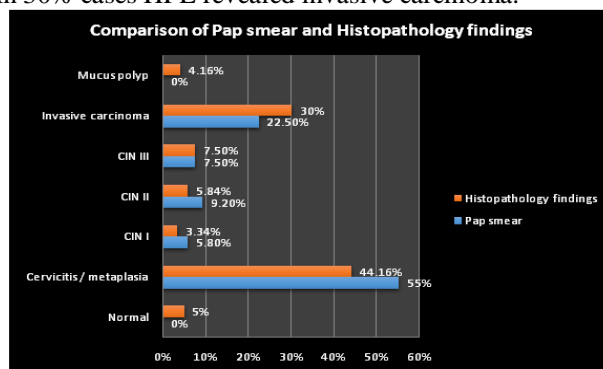


Table 4: Distribution of cases according to relation between gross appearance of cervix and cervical neoplasia

Gross Appearance	No. of cases	CIN				Invasive Carcinoma	
		I	II	III	Total	Percentage	Number
Erosion	46	2	4	4	10	50%	-
Congestion	12	2	1	-	3	15%	-
Hypertrophy + erosion	16	-	1	3	4	20%	3
Hypertrophy + congestion	7	-	1	2	3	15%	-
Hypertrophy + ectropion	1	-	-	-	-	-	-
Ulcerative Growth	33	-	-	-	-	-	33
Polyp	5	-	-	-	-	-	-

In the present study it was shown that out of 20 CIN cases, 70% showed erosion in the gross appearance of cervix. Out of 35 invasive carcinomas 91.67% of cases showed growth in the cervix.

Table 5: Distribution of cases according to cytohistological correlation

Pap Smear finding	Biopsy finding			
	Normal/Polyp	Inflammatory	CIN	Invasive Ca.
Inflammatory	11	48	7	-
CIN	-	5	12	10
Invasive Ca.	-	-	1	26

True positive = 49; False positive = 05; True Negative = 59; False Negative = 07

Table 6: Diagnostic efficacy of Pap smear

Sensitivity	86.5 %
Specificity	92.18%
Positive Predictive Value	90.7 %
Negative Predictive Value	89.4 %
Accuracy	90%

In the present study the pap smear showed sensitivity of 86.4% and specificity 92.18% in detecting cervical neoplasia and malignancy. The overall accuracy was 90%.

DISCUSSION

The present study was conducted in the department of OBGY of the tertiary care institute where total 120 women with unhealthy cervix were examined with pap smear, cytology followed by biopsy for histopathological

examination. The results of Pap smear were correlated with the results of biopsy to determine the sensitivity, specificity and accuracy of pap smear in detecting CIN and invasive carcinoma. The majority of unhealthy cervical cases were found in the 31-40 age group (41%)

and the mean age was 44.18 years. This confirms the established fact that the unhealthy cervix is more common in sexually active women of childbearing age. Sandhya, Ashfan and Bhojani KR *et al*⁹ showed that the majority of poor cervical cases were between 31-40 years of age, which was consistent with this study. Socioeconomic status has always played an epidemiological role in the genesis of dysplasia. It was observed that the majority of the cases in this study belonged to a lower socioeconomic class (63.34%). Vaidya *et al*¹⁰ had shown that low socio-economic status plays a decisive role in the development of dyscaryosis. The present study was also supported by studies by Bukhari MH *et al*¹¹ who concluded that the maximum number of cases did not correspond to a low ES status. Poor personal hygiene, poor living conditions, unstable marriages and early sexual intercourse are factors observed in poor socioeconomic conditions, which are known risk factors for cervical cancer. It was observed that the majority of cases of abnormal cervical lesions belonged to the multi-para group (parity 2 to 4), representing 73.4% of the 120 cases. Kushtagi P *et al*¹² and Vaidya *et al*¹⁰ also found similar results in their study. In the present study, the majority of women complained of excessive white discharge from the vagina (68.3%). Bhojani *et al*⁹ showed in their study that 40.6% of the cases had vaginal discharge and in the Sandhya study, most women (56%) complained of excessive white discharge per vaginum, which are almost consistent with the present study. Excessive vaginal discharge, which plays a role in contributing to the development of CIN, was also a risk factor in the study conducted by Vaidya *et al*¹⁰. In their study, 24% of cases of CIN with vaginal discharge were reported. Sandhya showed that in women who had white vaginal discharge, CIN was found at 21.4% (12/56). In the present study, 13.12% (16/82) of the women who complaining of white discharged had CIN. In the present study, among patients with irregular bleeding were 51.7% and postmenopausal bleeding were 14.2%. It was observed that 8.3% of cases were of post coital bleeding. Shalini R *et al*¹³ in their study showed the relationship between of post coital bleeding and CIN. In the present study the gross appearances of cervix revealed cervical erosion in 51.7% of cases, rest of the cases showed growth in 27.5%, congestion in 10%, Hypertrophy with congestion seen in 5.8%, Hypertrophy with erosion was seen in 13.4% and mucus polyp was found in 4.2% of cases. Padhy also showed that cervical erosion is the most common clinical finding in the unhealthy cervix as well as in neoplasia of the cervix and in invasive carcinoma. MS Bal¹⁴ also showed erosion as the most common finding in its study. In the present study pap test revealed inflammatory smears in 55% of cases,

mild dysplasia in 5.8%, moderate dysplasia in 9.2%, severe dysplasia in 7.5% and invasive carcinoma was seen in 22.5% of cases. The overall incidence of CIN reported by pap smear was 22.5%. The overall incidence of CIN on cytology by various authors are 6.78% by Sholapurkee *et al*, 3.5% by Sarangi *et al*, 7.75% by Bhojani KR *et al*⁹ and 8.2% by Bukhari *et al*¹¹. In the present study the overall incidence of invasive carcinoma was 22.5%. Incidence of invasive cancer detected on cytology by various studies are 1.75% by Pattnaik & Pati¹⁵, 0.5% by Sarangi *et al*, 0.75% by Bhojani KR *et al*⁹, 2% by Bukhari *et al*¹¹. Sensitivity of Pap smear was 86.5% and specificity was 92.18% in the present study. The positive predictive value was 90.7% and the negative predictive value 89.4 %. The accuracy of Pap smear was found to be 90%. Sankarnarayanan *et al*¹⁶ and Divya Hegde *et al*¹⁷ also observed 86% and 83% sensitivity and 91% and 98% specificity in their study respectively. While SO Albert *et al*¹⁸ and Bukhari MH *et al*¹¹ observed 60% and 66% sensitivity respectively which was lower as compared to present study. This data suggests that the Pap smear is less sensitive as a screening tool because it is associated with high false negative results. But in the present study the sensitivity is higher than other studies because the study population in this area present more with invasive disease rather than pre invasive state. Pap smear has higher sensitivity in invasive carcinoma compared to dysplasias. The sensitivity of pap smear can be increased by eliminating high false negative results by proper technique of slide preparation, fixation and reading and when used of pap smear in adjunct to other screening tools like VIA or colposcopy.

CONCLUSION

Thus we conclude that Sensitivity of Pap smear was 86.5% and specificity was 92.18% in the present study with the accuracy of 90%. The sensitivity of pap smear can be increased by eliminating high false negative results by proper technique of slide preparation, fixation and reading. Hence the study concludes that screening programme and awareness regarding cervical cancer should be enhanced and supervised in the grass root level of Western parts of Odisha.

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