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Original Research Article

Comparison of conventional pap smear with liquid based cytology, and assessment of the effectiveness and feasibility of liquid-based cytology over conventional pap smear in rural tertiary care centre

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ABSTRACT

Background: Cervical cancer is the second most common cancer in women in India. So, detection of its premalignant lesions is of utmost importance, which can be easily done by screening methods. Screening programmes for cervical cancer using the conventional pap smear (CPS) technique have been in place since decades. However, CPS technique has many limitations. To overcome these limitations liquid-based cytology (LBC) was introduced in the mid 1990 as a better tool for processing cervical samples. The aim of present study is to compare CPS with LBC and to assess the diagnostic accuracy and cost effectiveness of LBC in rural tertiary care centre.

Methods: The study was conducted over a period of 2 years at Rama medical college, Mandhana, Kanpur. All women presenting to gynaecological OPD with symptoms and signs suspicious of cervical malignancy were selected for paired samples of conventional pap and LBC. Colposcopy and biopsy were sought which correlated with cytologic findings.

Results: A maximum number of cases were in the reproductive age group, most common age of presentation being 40-49 years (27.3%) followed by 30-39 years (25.3%). A majority of patients were presented with a complaint of discharge per vagina 176 (58.7%), followed by pelvic pain 154 (51.3%). Only 4 patients were found to have unsatisfactory smear in LBC (1.33%) while 22 patients had unsatisfactory smear in conventional PAP (7.33%). LBC showed presence of endocervical cells in almost all patients 290 (97.97%). Candida bodies were not evident in LBC smears while the CPS showed presence candida bodies in 4 cases.

Conclusions: Both the screening methods are very effective and sensitive in the detection of premalignant lesions with slight discordance of grade on histology. Thus, we conclude that cervical cytology is very effective in the detection of premalignant lesions with the sensitivity of almost 100%. In developing countries such as India, where finances pose a major problem, conventional method is as good as LBC.

Keywords: Conventional papnicolaou smear, High-risk females, Liquid-based cytology, Cervical cancer

INTRODUCTION

Cervical cancer is the second most common cancer in women in India.¹ So detection of its premalignant lesion is of utmost importance, which can be easily done by screening methods. Campaign for cervical cancer screening has been carried out in India since last 30 years but it still ranks fourth in the world with respect to morbidity and mortality associated with cervical cancer.

Morbidity and mortality from cervical cancers have been shown to decrease substantially by the proper implementation of screening methods.²

Sexually transmitted human papilloma virus infection is the most important risk factor for morphologic continuum of squamous alterations.³ Other factors include the age group of 30-40 years, coitus before 18, first delivery before 20 and multiple sexual partners.

LBC has been approved by the US Food and Drug administration to enhance the yield of a CPS for cervical samples processing.⁴ The advantages of LBC are less number of unsatisfactory smears, clear background, an even distribution of cellular material, HPV testing by using residual cellular material and decreased screening time.⁵ Extra slides prepared from the left over material have been shown to increase the detection of HSIL significantly.

The aim of this study was to study the effectiveness of CP and LBC as a screening method in symptomatic female and to determine if any one method is superior to the other.

METHODS

The present study was a prospective study conducted at the department of obstetrics and gynaecology, at rural tertiary care centre from December 2020 to September 2022.

The study was conducted on 300 women of age group ranging from 20 years to 80 years who attended gynaecology OPD with symptoms and signs suspicious for cervical malignancy.

Inclusion criteria

Women presenting with symptoms of vaginal bleeding after intercourse, douching or a pelvic examination, bleeding between periods or after menopause. Watery, bloody vaginal discharge that may be heavy and have a foul odour, unexplained persistent pelvic pain or pain during intercourse were included in the study.

Exclusion criteria

Females less than 20 years, pregnancy, postpartum, sexually inactive female, history of hysterectomy, history of diagnosis and treatment of CIN or cancer, menstruating women, women with frank growth over cervix

Methodology

After obtaining proper consent, the study subjects who fulfilled the inclusion and exclusion criteria were recruited for the study. Clinical data were collected from every women's including age, menstrual status, age at marriage, parity, BMI any contraception method and symptoms. Each case was then subjected to cuscos speculum examination, and any detectable cervical gross abnormality was noted. Pap smear specimen was collected by an Ayers spatula. Ayers spatula was introduced into the external cervical OS and scraped to collect cells from ectocervix and endocervix. The material on Ayers spatula was smeared on two glass slides and immediately fixed in 95% ethyl alcohol for preparation of conventional smears for microscopic examination.

Cervex brush (broom) was used to collect the samples from the cervix for sure path liquid-based collection media. The brush head was detached and dropped in the

vial of preservative fluid. Cervical smears prepared were stained with the Papanicolaou stain and were studied for adequacy and cytological abnormality.

Cytologic reporting was done based on the New Bethesda System 2021 for both conventional and LBC. Histology of premalignant lesions was sought which correlated with cytological findings. Sensitivity of both the screening methods was calculated. In calculation of sensitivity, any positive finding on histology (whether LSIL, HSIL, or carcinoma) was considered true positive, even if the grade of premalignant lesion on histology was discordant with that reported on cytology.

RESULTS

The 300 patients who presented with symptoms and signs suspicious of cervical malignancy included in our study.

Patient's age ranges from 20-80 years. Most patients 27.3% were in age group ranged from 40-49 years (Table 1).

Table 1: Demographic profile of study subjects.

Age (In years)	N	Percentage (%)
20-29	60	20
30-39	76	25.3
40-49	82	27.3
50-59	64	21.3
60-69	16	5.3
70-80	2	0.66

The presence of discharge was the most common complaint 176 (58.7%) similarly the most common sign on examination of the cervix was the presence of mucopurulent discharge, in 162 (54%) of cases (Table 2).

Table 2: Presenting complaints and findings on examination.

Variables	N	Percentage (%)*
Symptoms		
Discharge	176	58.67
Post coital bleeding	28	9.33
Intermenstrual bleeding	32	10.67
Post menopausal bleeding	40	13.33
Pain on coitus	84	28
Pelvic pain	154	51.33
Examination		
Cervical erosion	26	8.67
Polyp	10	3.33
Mucopurulent discharge	162	54
Bleeding on touch	32	10.67
Genital warts	15	5
Normal	55	18.33

*Multiple response

Of the 300 cases in our study 22 (7.33%) cases were unsatisfactory for evaluation with conventional PAP. On the contrary, only four (1.33%) cases were unsatisfactory using liquid based technique, which was owing to low cellularity. The conventional PAP can detect the 128 (42.67%) cases without epithelial abnormality, on the

contrary LBC 136 (45.33%) cases were negative for intraepithelial lesions. Regarding the presence of endocervical cells, they were detected in satisfactory cases 126/ 278 (45.3257%) of the conventional PAP and in the 290/296 (97.97%) cases of the LBC showing satisfactory smear (Table 3).

Table 3: Cytologic finding among study subjects.

Microscopic finding	Conventional PAP, n (%)	LBC, n (%)
Unsatisfactory smear	22 (7.33)	04 (1.33)
Negative for intraepithelial lesion-malignancy	128 (42.67)	136 (45.33)
Atrophic smear	14 (4.67)	14 (4.67)
Candida	04 (1.33)	00
Trichomonas	02 (0.67)	00
Cervicitis	58 (19.33)	47 (15.67)
Inflammatory smear	59 (19.67)	71 (23.6)
ASCUS	06 (2)	04 (1.33)
ASCUS-H	02 (0.67)	02 (0.67)
LSIL	07 (2.33)	07 (2.33)
HSIL	03 (1)	03 (1)
SCC	01 (0.33)	01 (0.33)
Adenocarcinoma	00	00
Presence of endocervical cells	126 (45.32)	290 (97.97)

Table 4: Cytological correlation and sensitivity of LBC.

Category	No. of cases	No. of cases received	Normal/ inflammatory	LSIL	HSIL	Carcinoma	Sensitivity for detection positive cases (%)
NILM	140	5	5	-	-	-	100
ASCUS	4	4	-	4	-	-	100
LSIL	7	7	-	6	1	-	100
HSIL	3	3	-	2	1	-	100

Table 5: cytohistological correlation and sensitivity of conventional PAP.

Category	No. of cases	No. of cases received	Normal/ inflammatory	LSIL	HSIL	Carcinoma	Sensitivity for detecting positive cases (%)
NILM	128	4	4	-	-	-	100
ASCUS	06	1	-	-	-	-	100
LSIL	07	5	-	7	-	-	100
HSIL	03	2	-	1	2	1	100

DISCUSSION

A pap smear is useful and important method for cervical cancer screening. Worldwide, there have been efforts to prevent cervical cancer by screening women using PAP smears and thereby detecting and treating the precancerous lesions.⁶ Cervical cancer incidence can be reduced by as much as 90% in a population undergoing regular screening and having high quality and coverage.⁷ However, in developing countries, due to lack of education and awareness, many women have never had a PAP smear.

Thereby, proper implementation of screening program is the need of the hour.

According to American cancer society, women between 30 and the 65 years of age should have a Pap test and HPV test every percentage year. Women at a high risk for cervical cancer should be screened more often. A pap smear is the cytological test designed to detect abnormal cervical cells. The low sensitivity of a single pap test makes it necessary to the screen women relatively frequently, every 3-5 years.

LBC is an alternative technique for screening and detection of precancerous lesions. In this method, the cells are washed into a vial of liquid and filtered, and the sample is prepared as a thin layer on glass slide. These slides are either screened by a skilled person or are subjected to automated imaging. Although these approaches appear promising but they are expensive and rely heavily on technology.

LBC is considered superior to CP, even though its sensitivity and specificity is almost similar to CP as observed by many studies. This could be due to the fact that it produces consistently reduced rates of unsatisfactory smears, has improved sample processing, and better clarity on microscopy with an additional advantage of being able to perform HPV testing on residual sample.

In our study total of 300 women with symptoms and signs suspicious for cervical malignancy were studied to compare the sensitivity of LBC and CP as screening tool to detect abnormal cases. The age of patient ranges from 20-80 years, most of them were aged 40-49 (27.3%), closely followed by 30-39 years (25.3%), similar to studies done by Pankal et al.⁶

Of 300 cases who underwent screening, 128 (42.67%) were diagnosed as negative for NILM on CP and 136 (45.33%) on LBC. A total of 264 (88%) cases were diagnosed as NILM by both methods. 1 NILM case reported on CP and LBC each was received for histology which was reported as normal. Thereby, the sensitivity came out to be 100% for both tests.

ASCUS was diagnosed in 6 (2%) on CP and in 4 (1.33%) by LBC that means pap diagnosed 2 supplementary cases of ASCUS. Two cases reported as ASCUS on both tests were sent for histology and reported as LSIL, therefore sensitivity for the tests came out to be 100%. PAP smear diagnosed more cases of ASCUS, same was observed in study of Lerma et al and Seibers et al.^{8,9}

LSIL was diagnosed in 7 (2.33%) cases by CP and in 7 (2.33%) cases by LBC and there was same no. of cases diagnosed as LSIL by both methods. Histology of the 5 cases reported as LSIL on CP revealed LSIL on biopsy as well, giving the sensitivity as 100%. Among the five cases reported as LSIL on LBC, one was reported as chronic cervicitis with reparative changes and four were reported as LSIL on histology, giving a sensitivity of 80%, which was less than that of CP. Our result was concordant with Ilter et al, who also observed more LSIL cases on CP than LBC. However, Monsonego et al, Cheung et al, Sherwani et al, Zheng et al and Filho et al, diagnosed more LSIL on LBC than CP.^{10,11}

HSIL was diagnosed in 3 (1%) cases by CP and in 3 (1%) cases by LBC, among 2 cases of HSIL on CP, 1 was reported as LSIL and the other was reported as carcinoma on histology, giving a sensitivity of 100%. Similarly, among 3 cases of HSIL on LBC, 2 were reported as LSIL,

1 was reported as HSIL and 1 as carcinoma, giving the sensitivity as 100%. Thus, LBC detected more cases of HSIL in comparison to CP but the sensitivity of both these methods remained the same, similar to the observations of Monsonego et al, Cheung et al., Zheng et al, and Filho et al and Davey et al.¹¹

In our study, most of the epithelial abnormalities were equally detected by both the screening methods, with LBC being superior in detecting more ASCUS and HSIL cases when compared to CP; however, the sensitivities of both these techniques were almost similar. Taylor et al, Arbyn et al, Pankaj et al also showed similar observations with almost no significant disparity between LBC and CP as a screening technique in detecting premalignant lesions in high-risk females.^{6,12} Thus, our study was concordant with them.

CONCLUSION

Both the screening methods are very effective and sensitive in the detection of premalignant lesions with slight discordance of grade on histology. Thus, we conclude that cervical cytology is very effective in the detection of premalignant lesions with the sensitivity of almost 100%. Thereby, all the high-risk females should undergo cervical cancer screening irrespective of the method used. The present study showed that LBC is better in detecting cervical lesions when compared to conventional PAP, it increases the number of satisfactory smears. However, the cost of LBC is still a hindrance in the widespread use. So, in developing countries such as India, where finances pose a major problem, conventional method is as good as LBC.

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