

## Comparison of conventional pap smear versus liquid based cytology in a diagnostic centre of central Madhya Pradesh

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### Abstract

**Introduction:** Cervical cancer is the second leading cause of cancer related deaths, next only to breast cancer worldwide, but is easily preventable if detected early. However conventional paps smear technique has many limitations. To overcome these limitations liquid based cytology was introduced in the mid 1990 as a better tool for processing cervical samples the present study was undertaken to compare conventional paps smear with liquid based methods and to assess the diagnostic accuracy of LBC in our setting.

**Materials and Methods:** The present study was a prospective study conducted on the first 300 patients visiting our diagnostic centre for pap smear tests from May to October 2015. The samples were collected with Rovers Cervex brush and a conventional slide was prepared and the brush head was detached and suspended in the preservative fluid. Split samples of CPS and LBC were analysed and reported using the Bethesda system 2001 and results were compared

**Results:** While only 5 patients were found to have unsatisfactory smear in LBC (1.67%), 20 patients had unsatisfactory smear in conventional smear (6.67%). Endocervical cells were not seen in conventional pap smears while LBC showed presence of endocervical cells in all patients. Candida bodies were not evident in LBC smears while the CPS showed presence of candida bodies in 5 cases. ASCUS was reported in 10 (3.31%) patients by CPS while it was found to be present in only 6(2%) patients by LBC technique.

**Conclusion:** The introduction of liquid based cytology technique has brought about a revolution in the field of cervical screening programmes because of its advantages like reduced rate of unsatisfactory smears, increased number of satisfactory smears with adequate endocervical cells, optimal preservation and staining of cellular material, small area on the slide for screening hence lesser time for reporting and non interference by blood, mucus and other cell debris, air drying artefacts which hampers the proper detection of cellular abnormalities by the conventional method and may replace the conventional smear slowly but steadily.

**Key words:** LBC, CPS, Pap smear, Cervical cancer

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### Introduction

Cervical cancer is the second leading cause of cancer related deaths, next only to breast cancer worldwide, but is easily preventable if detected early. It accounts for more than 270000 deaths annually and developing countries bear the burden of almost 85% of these cases. 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. Women between 40-55 years are mostly affected, specially from the lower socioeconomic strata, as they fail to turn up for routine health checkups due to financial constraints. Cervical cancer can often be found early and can be prevented by having regular pap smear examinations. If

detected early, cervical cancer is one of the most successfully treated cancers. Screening programmes for cervical cancer using the conventional paps smear technique have been in place since decades and have been successful in detecting cancers of the cervix significantly. However conventional paps smear technique has many limitations. To overcome these limitations liquid based cytology was introduced in the mid 1990 as a better tool for processing cervical samples.

Now a days, LBC has been the method of choice in many laboratories across the globe and may replace the conventional smear slowly but steadily. There have been many studies highlighting the benefits of LBC over CPS and some have contradicted it. Benefits of LBC include less number of unsatisfactory smears, large number of representative cells that can be transferred from the collection brush even distribution of cell on the slide, a relatively smaller area on the slide for screening and the added advantage of using the residual material in the collection vial for Human Papilloma Virus screening and for review.<sup>(1,2)</sup> Extra slides prepared from the left over material have been shown to increase the detection of HSIL significantly.<sup>(3)</sup>

The biggest benefit, as is evident from many studies, is the reduced rate of unsatisfactory smears.<sup>(4,5,6,7)</sup> The present study was undertaken to compare conventional paps smear with liquid based methods and to assess the diagnostic accuracy of LBC in our setting.

**Materials and Methods**

The present study was a prospective study conducted on the first 300 patients of all age groups ranging from 20 years to above 60 years those were visiting our diagnostic centre for pap smear tests from May to October 2015. The samples were collected with Rovers Cervex brush and a conventional slide was prepared and the brush head was detached and suspended in the preservative fluid. The conventional smear was fixed in alcohol immediately after preparation. The LBC fluid with the brush was then processed according to the standard protocol for BD LBC equipment.

The CPS and LBC slides were examined under the microscope for morphology of different cells for any abnormal cells and for unsatisfactory smears. The results were reported according to Bethesda system

(TBS) 2001. The abnormal results were compared with histopathology reports whenever possible.

**Results**

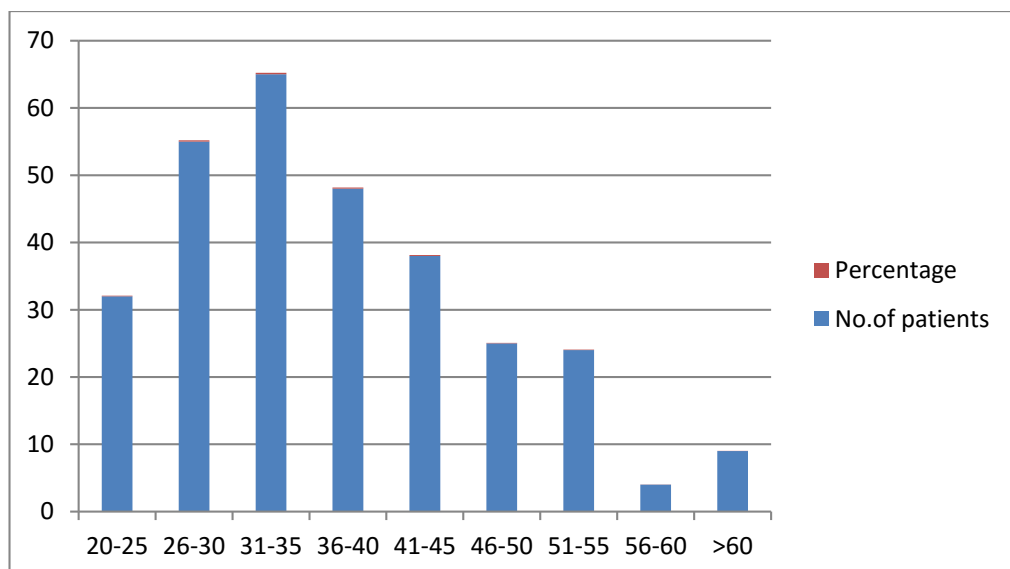
Split samples of CPS and LBC were analysed and reported using the Bethesda system 2001 and results were compared.

**Table 1 shows the demographics of patients enrolled for the comparison study.**

32(10.6%) patients were between 20-25 years of age, 55(18.3%) patients were between 26-30 years, 65(21.6%) patients were between 31-35 years of age, 48(16%) patients were between 36-40 years of age, 38(12.6%) patients were between 41-45 years of age, 25(8.3%) patients were between 46-50 years of age, 24(8%) patients were between 51-55 years of age, 4(1.3%) and 9(3%) patients were between 56-60 years and more than 60 years of age respectively. Highest number of patients 65/300 (21.6%) were between 31-35 years of age followed by 55(18.3%) between 26-30 and 48(16%) between 36-40 years of age.

**Table 1: Demographics of patients**

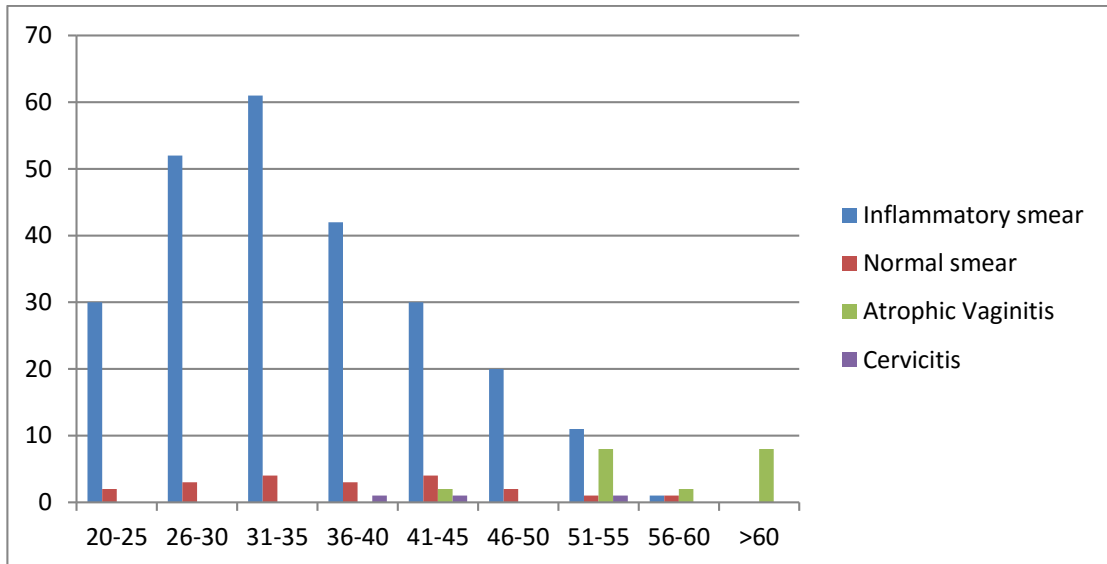
Age in years	Normal	Percentage
20-25	32	10.6 %
26-30	55	18.3%
31-35	65	21.6%
36-40	48	16%
41-45	38	12.6%
46-50	25	8.3%
51-55	24	8.0%
56-60	04	1.3%
>60	09	3.0%
<b>Total samples 300</b>		



**Figure 1**

**Table 2: Age wise distribution of microscopic findings based on LBC**

Age in years	Inflammatory smear	Percentage	Normal smear	Percentage	Atrophic Vaginitis	Percentage	Cervicitis	Percentage
20-25	30	10 %	02	0.66%				
26-30	52	17.3%	03	1.0%				
31-35	61	20.3%	04	1.33%				
36-40	42	14%	03	1.0%			01	0.33%
41-45	30	10%	04	1.33%	02	0.66%	01	0.33%
46-50	20	6.6%	02	0.66%				
51-55	11	3.6%	01	0.33%	08	2.66%	01	0.33%
56-60	01	0.33%	01	0.33%	02	0.66%		
>60					08	2.66%		
Total sample 300	247	82.3%	20	6.6%	20	6.6%	03	1%



**Figure 2**

**Table 2 shows age wise distribution of microscopic findings**

247/300 patients (82.3%) had acute inflammation, 20/300(6.6%) had normal smear on microscopy, 20/300 (6.6%) had atrophic vaginitis, 3/300(1%) had cervicitis. ASCUS was found in 2% (6/300) patients. 2 patients were found to have LSIL (0.66%) while one each (0.33%) were found to have HSIL and SCC on microscopy.

**Comparative study of CPS and LBC is shown in table 2.**

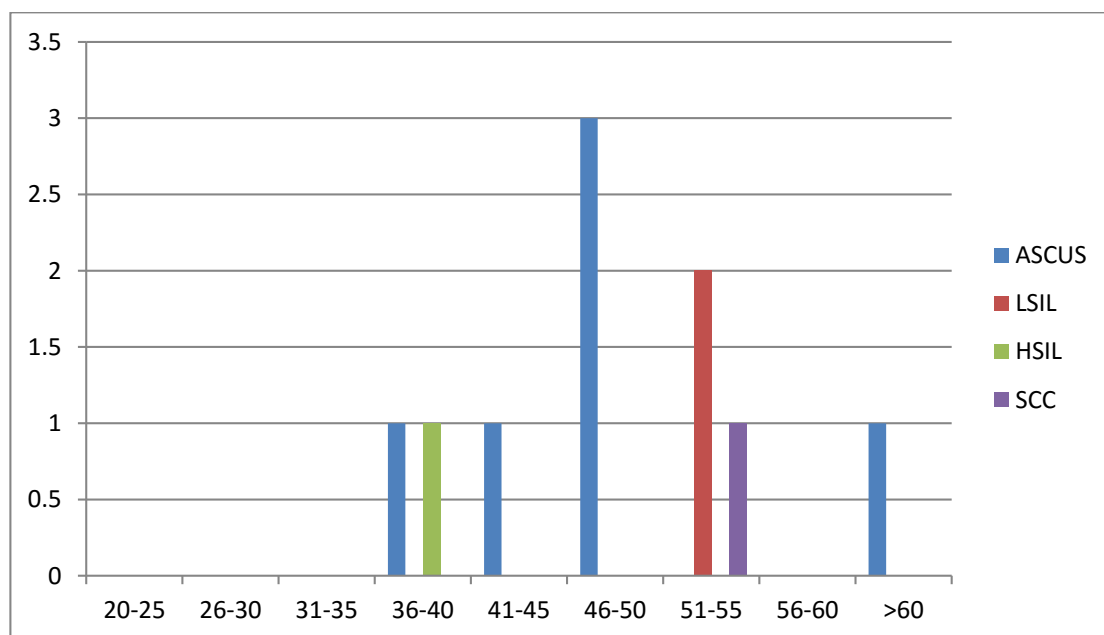
While only 5 patients were found to have unsatisfactory smear in LBC (1.67%), 20 patients had unsatisfactory smear in conventional smear (6.67%). Endocervical cells were not seen in conventional pap

smears while LBC showed presence of endocervical cells in all patients. Candida bodies were not evident in LBC smears while the CPS showed presence of candida bodies in 5 cases. ASCUS was reported in 10 (3.31%) patients by CPS while it was found to be present in only 6(2%) patients by LBC technique. These four cases were reported as inflammatory smears on LBC. The lower detection rate of ASCUS on LBC as compared to CPC may be attributed to better staining technique and no air drying artefacts in LBC technique.

We did not find any adeno carcinoma patients in the 300 samples which we studied. Rest of the cytology findings ie. Normal smear, atrophic smear, cervicitis, LSIL, HSIL, and SCC were seen in both CPS and LBC in equal numbers.

**Table 3: Showing epithelial cell abnormalities**

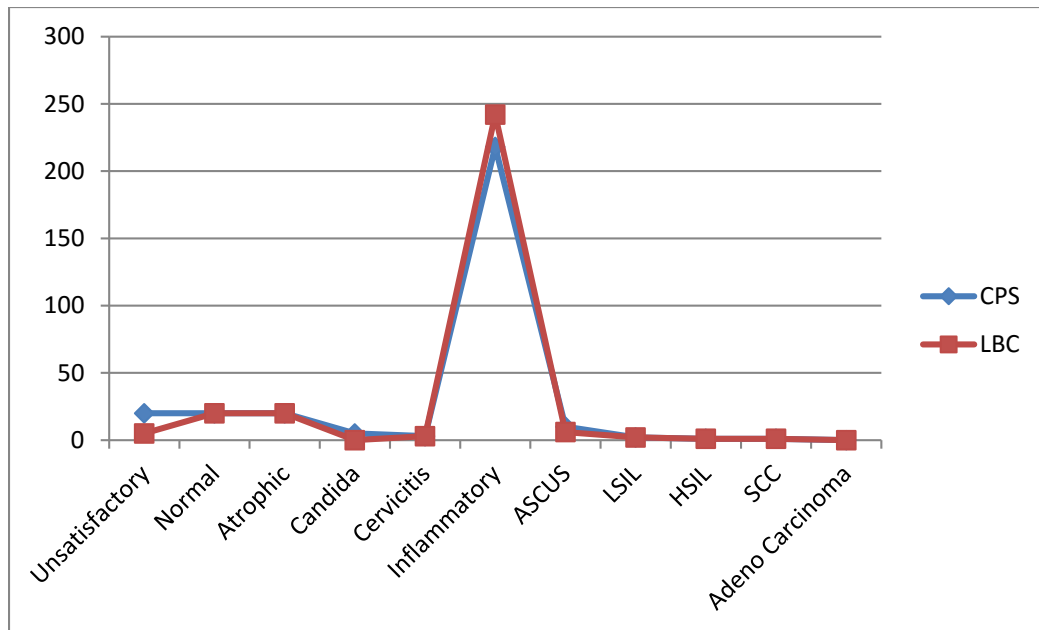
Age in years	ASCUS	Percentage	LSIL	Percentage	HSIL	Percentage	SCC	Percentage
20-25								
26-30								
31-35								
36-40	01	0.33%			01	0.33%		
41-45	01	0.33%						
46-50	03	1%						
51-55			02	0.66%			01	0.33%
56-60								
>60	01	0.33%						
<b>Total sample 300</b>	<b>06</b>	<b>2%</b>	<b>02</b>	<b>0.66%</b>	<b>01</b>	<b>0.33%</b>	<b>01</b>	<b>0.33%</b>



**Figure 3**

**Table 4: Cytology findings in patients, n=300...**

PAP REPORT	CPS	LBC
Unsatisfactory	20	05
Normal	20	20
Atrophic	20	20
Candida	05	0
Cervicitis	03	03
Inflammatory	218	242
ASCUS	10	06
LSIL	02	02
HSIL	01	01
SCC	01	01
Adeno Carcinoma	0	0



**Figure 4**  
**x- axis – Microscopic findings**  
**y- axis – Number of patients in different categories**

## Discussion

Cervical cytology was introduced by George Papanicolaou in 1940.<sup>(8)</sup> The American Cancer society endorsed the paps smear as an effective method for preventing cervical cancer in 1945. In a study by Park et al, it was established that sensitivity of conventional paps smear in detecting cancer precursors was less than 50%.<sup>(9)</sup> There are several limitations of CPS like inadequate smears, inadequate transfer of cellular material from brush to the slides, improper distribution of cells on the slides and presence of blood, mucus and other cellular debris which interferes with staining and microscopy.<sup>(10,11)</sup> Large number of false negative smears can be attributed to inadequate smears. LBC as been successful in addressing all these issues to a considerable extent. Moreover another advantage of LBC is better visualization of endometrial cells in three dimensional tight clusters with small kidney bean shaped nuclei and dark smudgy chromatin.

We found 5.66% unsatisfactory smears by CPS and 0.3% by LBC technique. Our results are comparable to the study done by Vikrant Bhan Singh et al who reported 4.3% unsatisfactory smears by CPS and 1.7% by LBC technique. They also observed inflammatory smears in equal number by both techniques.<sup>(12)</sup> N.Afsan et al in their study found that 83.1% cases were satisfactory for evaluation by LBC while 31.9% were satisfactory for evaluation on CPS.<sup>(13)</sup> In our study, satisfactory smears in LBC were 98.3% (295cases) and 93.3% (280 cases) in CPS which does not correlate with this study.

## Conclusion

Pap smear is the best screening method to detect cervical precancerous lesions and has been the mainstay of most of the screening programmes since decades. Our study confirmed that liquid based cytology technique has more advantages over conventional pap smear.. However, cost of LBC is still a hindrance in the wide spread use of LBC in developing countries like India, which if taken care of, may slowly replace conventional pap smears

**Conflict of interest:** None

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