

Comparative study between liquid-based cytology and conventional cytology for assessment of cervical pap smears

Atul Chandrakant Mujumdar¹, Vasudha Mujumdar^{2*}

¹Associate Professor, Department of Pathology, Zydus Medical College and Hospital, Dahod, Gujarat, India

²Consultant in Pathology, Nagpur, Maharashtra, India

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Abstract

Background : The mortality rate of cervical cancer is very high globally. There is vast research, which is currently going on to decrease the high occurrence of cervical cancer. The scientists have found that the reduction in cervical cancer can be brought about by an approach that comprises of prevention, prompt diagnosis, successful and thorough screening, and various treatment measures. Currently, there are vaccines that protect against common cancer-causing types of human papillomavirus and can significantly reduce the risk of cervical cancer. In non-industrialized or developing countries where effective screening programs and prompt diagnostic measures are not available, diagnosing cervical cancer at an early stage with access to effective treatment can significantly improve the likelihood of survival. Liquid-based cytology (LBC) was invented and started at around the mid-1990s as an alternative technique to process the uterine cervical scrape smear samples. After that most of the industrialized nations have changed over from conventional or standard Pap smear to LBC. LBC has been suggested to be advantageous and favorable than Pap smear because of a smaller number of unsatisfactory smears. **Methods :** This study comprises of 287 cervical scrape smear samples from women visiting the Department of Midwifery and Gynecology over a timeframe of 1 year. Samples were taken and divided into two parts by split-sample technique. The cervical scrape substance was taken from the vaginal fornix, portio vaginalis and endocervix from all women. Glass slides for conventional or standard cytology and LBC were stained according to the Papanicolaou stain method. LBC was considered representative if the slide contained >5000 epithelial cells. Endocervical cells were considered present if the slide contained equal to 2 groups of glandular/metaplastic cells with 25 cells each or if the slide contained 210 dissociated glandular/metaplastic cells. **Results :** The study included 287 patients. Epithelial cell abnormality was observed in 10 cases in conventional smear while in LBC it was 11. In standard cervic scrape smear pap report of Unsatisfactory, normal, atrophic, altered flora and candida was in 22, 192, 23, 44 and 9 cases respectively. In LBC pap report Unsatisfactory, normal, atrophic, altered flora and candida was in 15, 214, 22, 44 and 13 cases respectively. Epithelial cell abnormality was seen in 10 (3.5%) cases by each the methods. Of these 10 cases low grade squamous intraepithelial lesion was observed in 2 cases, High grade squamous intraepithelial lesion in one case, Squamous cell carcinoma in one case and atypical squamous cells of undetermined significance in 6 cases. **Conclusion:** There was a similar detection rate of epithelial abnormalities and infections in both methods. US rate of CPS was 7.6% and 5.2% for LBC. Thus, LBC can be a superior test as compared to conventional or standard pap smear but has to be reconsidered in the deficient resource setting.

Keywords : Liquid Based Cytology, Conventional cervical Cytology, Standard Cervical Pap Smears, Epithelial Cell Abnormality.

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Introduction

Background: Cervical cancer is the 4th most common cancer in women with an estimate of 570,000 new cases in the year 2018 making the sum of around 6.6% of all female cancers. 90% of deaths from cervical cancer occur in non-industrialized and poor income nations. The researchers have found that the reduction in cervical cancer can be brought about by an approach that includes prevention, prompt diagnosis, successful and thorough screening, and various treatment measures. We have at present vaccines that protect against the most common cancer-causing types of human papillomavirus. The use of such vaccines can very significantly reduce the risk of cervical cancer in addition to other treatment modalities. In non-industrialized and poor nations where regular screening programs to search for cervical cancer in females in a given community is not feasible due to the non-availability of resources leads to high death rates due to cervical cancer [1-4]. So, diagnosing cervical cancer at an early stage and providing access to effective treatment can

significantly improve the likelihood of survival. In these nations with poor resources, detecting cervical neoplasia at an early stage and providing, the affected female, access to quality medical and surgical therapy can considerably increase the likelihood of survival. Risk factors for cervical cancer are early age at first sexual activity, multiple sexual partners, early age at first delivery, increased number of pregnancies, smoking, and immunosuppression [1,2]. Cervical cancer prevention in resource-poor settings requires affordable and effective screening programs that are designed to incorporate communities and their needs. Sexually transmitted human papillomavirus (HPV) is the most important risk factor for cervical intraepithelial neoplasia and invasive cervical cancer. Liquid-based cytology (LBC) was invented and started as Thin-prep® in 1996 as advanced and progressive technology to process the cervical samples in a more effective and errorless way. After that most of the industrialized nations have changed over from conventional or standard Pap smear to LBC. LBC has been proposed to be advantageous than Pap smear because of a smaller number of unsatisfactory smears meaning better diagnostic value. Liquid-based, thin layer technology was developed to address the limitation of Pap smear. More than 5,00,000 subjects have been studied with a preponderance of data indicating a significant benefit of liquid-based,

*Correspondence

Dr. Vasudha Mujumdar

Consultant in pathology, Nagpur, Maharashtra, India.

E-mail: vasudha936@gmail.com

thin-layer technology in the detection of cervical cancer precursor lesions and in the improvement of specimen adequacy. In various studies in the past, liquid-based cytology for cervical cancer screening has been shown to increase the detection rate for preneoplastic squamous intraepithelial lesions mostly greater than the conventional Papanicolaou (Pap) smear method. Liquid-based collection and processing provide better representative cervical sampling than conventional smearing of the specimen on a glass slide. Presently, two test methodologies are widely marketed and available to clinical laboratories, health systems, and clinicians that undertake cervical cytology[5-8]. LBC is characterized by enhanced sensitivity and specificity in comparison with conventional smear. The method is ensuring the improved fixation and exceptional preservation of nuclear details. Atypical cells are obvious; they aren't covered by other cells or background. LBC method is characterized by the low rate of unsatisfactory samples. The application of LBC for cervical cancer screening in countries with middle and low income is limited due to the financial restrictions, a conventional smear is still the basic method of cervical cancer screening in the developing world. In LBC, the sample is prepared by rinsing the sampling tool in a liquid-based medium to make a cell suspension. A slide with an evenly-distributed monolayer sheet of cells is prepared from this cell suspension. LBC is being marketed on the basis of its advantages like low unsatisfactory rates, increased sensitivity in detecting cervical precancerous lesions, standardized and automated preparations, fast screening, availability of ancillary tests including a human papillomavirus DNA test, and facilitation of computer-assisted screening[9-12].

Methods

The present cross-sectional observational study was conducted in the department of pathology in collaboration with the department of

midwifery and gynecology at Zydus Medical College and Hospital, Dahod, Gujarat. This is the study comprising of 287 cervical scrape smear samples from women attending the Department of Midwifery and Gynecology over a timeframe of 1 year. Cervical scrape smear samples were taken with due consent from females. These are then divided into two parts by split-sample technique, one part for conventional or standard cytology and one part for LBC preparation. Cervical scrape smears were taken from the vaginal fornix, vaginal portio, and endocervix from all women. Slides for conventional cytology and LBC were stained according to the method described by Papanicolaou. The LBC or liquid-based cytology slides are observed after staining. It was thought to be adequate, acceptable and was considered representative after determining epithelial cell count in the given glass slide. The epithelial cell count of 5000 and more was considered adequate and acceptable smear. We concluded that endocervical cells were present in any given slide if it fits into any of the two criteria. The first criteria is that it should contain 22 groups of glandular and/or also metaplastic cells with more than 5 cells in each group. The other criteria was the slide should contain 210 dissociated glandular or metaplastic cells". Samples were compared for the morphology of various cells, unsatisfactory rates and sensitivity of two methods for the detection of epithelial abnormalities according to the Bethesda system (TBS) 2001. Consent was obtained from all the study cases.

Statistical Analysis

Chi-square test is used for this study. The groups were calculated with the chi-square test using SPSS software. As required, the P-value was calculated. A P-value of 0.05 or less was considered statistically significant.

Results

A total of 287 patients were included in the study.

Table 1: Pap Report

Pap Report	Number of Cases (Conventional Smears) n=287	%	Number of Cases (LBC) n=287	%	Statistical Analysis
Epithelial cell abnormality	10	3.5%	10	3.5%	Not significant
Unsatisfactory	22	7.6%	15	5.2%	Significant
Normal	192	66.8%	214	74.6%	Not significant
Atrophic	23	8.0%	22	7.7%	Not significant
Altered flora	44	15.3%	44	15.3%	Not significant
Candida	9	3.1%	13	4.5%	Not significant

Epithelial cell abnormality was observed in 10 cases in conventional smear while in LBC it was 11. In conventional smear pap report of Unsatisfactory, normal, atrophic, altered flora and candida was in 22,192, 23, 44 and 9 cases respectively. In LBC pap report Unsatisfactory, normal, atrophic, altered flora and candida was in 15,214, 22, 44 and 13 cases respectively. Epithelial cell abnormality was seen in 10 (3.5%) cases by both the methods. Of these 10 cases low grade squamous intraepithelial lesion was observed in 2 cases, High grade squamous intraepithelial lesion in one case, Squamous cell carcinoma in one case and atypical squamous cells of undetermined significance in 6 cases. Squamous cell carcinoma case showed similar features in CPS and LBC samples with Diathesis as a characteristic feature. CPS samples showed the excess of blood obscuring the morphology of tumour cells, while it was clear in LBC samples. The main reason of unsatisfactory samples was insufficient cells[16-20].

Discussion

Cervical cancer is a growing health problem and a significant cause of mortality in women all around the world. In developing countries like India, the incidence of cervical cancer is high and greater than 80 percent of all cervical cancer cases are found in developing and low-resource countries. Because of a lack of awareness and difficulty in running cytology-based screening program[7]. Early detection of

cervical cancer and appropriate treatment is possible if screening tests are implemented properly[8]. Early cervical epithelial changes can be identified by a Pap smear test, which is the primary screening test for the detection of the early stage of invasive cervical cancer. The sensitivity of the Pap test in detecting a high-grade squamous intraepithelial lesion (HSIL) is 70.80%[9]. There is a need to carry out cervical cancer screening awareness programs and motivate them to visit the hospital for a cancer screening. In our study, epithelial cell abnormality was observed in 10 cases in conventional standard cervical scrape smear. In conventional standard cervical scrape smear pap report of Unsatisfactory, normal, atrophic, altered flora and candida was in 22,192, 23, 44 and 9 cases respectively. In a study by Sachan PL et al[10], 48.84% of the cases were negative for malignancy and 42.66% had inflammation. The epithelial abnormalities ASCUS, LSIL, and HSIL were found in 2.90%, 5.09%, and 0.48% of the women, respectively. Unsatisfactory reporting found in 6.42%. Studies also reported 95% and 74.5% had inflammation indicated by the Pap smear test, respectively[11,12] In the present study, an unsatisfactory smear (US) rate was reduced from 7.6% to 5.2% in LBC smears. The most common reason for the unsatisfactory smear was low cellularity in both the categories. The most common reason for an unsatisfactory smear (US) was low cellularity in both categories. Other studies have also shown the US

reduction in their studies[13,14].Fungal agents such as Candida were observed with ease on the LBC samples. Candidal hyphae were more easily identified in LBC. Similar findings were observed by Fitzhugh and Heller in their study[15].

Conclusion

In this study, LBC and conventional cytology were compared. The detection rate of epithelial abnormalities and infections was comparable in both methods. US rate of CPS was 7.2% and 5.1% for LBC. Thus, LBC can be a superior test as compared to conventional pap smear but has to reconsider in the deficient-resource setting.

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