IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 20, Issue 6 Ser.10 (June. 2021), PP 01-09
www.iosrjournals.org

A Study of Cervical Cytology in women with abnormal Cervix and Comparison of Conventional Papanicolaou Smear and Liquid-based Cytology

Dr. Sunita Rai [1], Dr. Prakriti Gupta [2], Dr. Sachin Singhal [3 *], Dr. Ajay Patel [4], Dr. Dharmesh Chandra Sharma [5]

[1] *Pathologist, Madhur Pathology & Assistant Professor, Pathology G. R. Medical College, Gwalior, India*
[2] *Demonstrator Pathology, G. R. Medical College, Gwalior, India*
[3] *Medical Officer, G. R. Medical College, Gwalior, India*
[4] *PG Student, Pathology, G. R. Medical College, Gwalior, India*
[5] *Pathologist, Madhur Pathology, Gwalior, India*
[*] *Corresponding author Dr. Sachin Singhal*

Abstract
Uterine cervix cancer accounted for 6.5 % of cancer in women globally with 9.4% in India in 2020. Cervical cytology plays a significant role in cervical cancer screening program. Conventional Pap smear (CPS) and Liquid Based Cytology (LBC) are two methods available now. Liquid based preparations provide even distribution of cells, reduction in mucus, blood, and inflammatory cells and, effective fixation. In some settings, LBC has replaced the CPS, offering practical advantage. The current studied was conducted to assess the utility of LBC in settings of a private laboratory in India. This prospective one year study was conducted on 393 patients referred for cervical cytological examination with their related complaints by Obstetricians and Gynecologist of various hospitals of this region. Most common age group was 21-30yrs. closely followed by 31-40 years (p = 0.000002). The most common presenting complaint of patients was of white discharge per vagina (42.74%). Case distribution of age groups versus type of inflammation was statistically significant with the exception where the number of cases is less. Premalignant epithelial abnormalities (ASCUS and LSIL) were reported mostly in the age group of 31-40 years. Almost equal incidence of unsatisfactory smears while comparing CPS and LBC was reported and no difference in the detection of epithelial cell abnormalities using both the methods was noted. To conclude, CPS is equally effective to LBC in detection of cervical premalignant lesions and invasive carcinoma, and is especially useful in resource limited settings and large scale screening in developing countries.

Keywords - *Cervical cancer, Conventional Pap smear, Liquid based cytology*

Date of Submission: 06-06-2021 Date of Acceptance: 20-06-2021

I. Introduction

Cancer of Uterine cervix cancer accounts for 6.5 % of cancer in women globally with nearly 604127 new cases detected in 2020 [1]. In India, year 2020 recorded 123 907 (9.4%) cervical cancer cases. [2] Deaths due to cervical cancer in India were 77 348 (9.1 %), cumulative risk of 1.30 and 5 year prevalence of 283 842 with 42.82 cases per 100000 population [2]. In modern era cervical cytology plays a significant role in cervical cancer screening program. In 1940 George Papanicolaou first introduces cervical cytology as a screening method to reduce the incidence of cervical cancer [3]. Conventional Pap smear (CPS) and Liquid Based Cytology (LBC) are two methods available now.

Incidence and mortality in cervical cancer have decreased substantially in all western countries as result of cytological screening. In some settings, liquid-based cytology (LBC) has replaced the conventional Papanicolaou (Pap) test, offering practical advantage. [4]

Liquid based preparations provide even distribution of cells on slide surface, reduction in mucus, blood, and inflammatory cells and, effective and even fixation. These improvements have led to higher detection rates of cervical intraepithelial neoplasia (CIN), lower rates of atypical squamous cells of undetermined significance (ASCUS), and/or a lower rate of unsatisfactory smears [5, 6, 7]. Several studies have shown increased sensitivity of LBC over CPS, whereas others showing decreased or equal sensitivity and specificity [8, 9, 10].

The current study was conducted to compare LBC with CPS in the setting of a private laboratory in India and evaluate the utility of LBC over CPS.

II. Materials And Methods

The present study was conducted on the female patients who were referred for cervical cytological examination with their related complaints by Obstetricians and Gynecologist of various hospitals of this region at Madhur Pathology and Research Center, Gwalior.

Inclusion criteria: - Cases were selected on the basis of patient's complaints and their symptoms like; per vaginal bleeding, irregular menstruation, lower abdominal pain, post coital bleeding, excessive white discharge etc.

Exclusion criteria: - a) Patients below 18 years. b) Non cooperative patients. c) Endocervical and Endometrial lesions.

Patient's demographic data, clinical history and complaints were recorded. Exfoliative cytology specimens were collected for CPS and LBC along with per speculum examination of uterine cervix.

Conventional Pap smears were prepared after collection of specimen by Ayre's spatula and endocervical cytobrush. Residual material on both the spatula and cytobrush was rinsed in 10 -15 ml of Pap spin collection fluid i.e. Eziprep preservative solution. Pap spin collection fluid along with the collected material was transferred to test tubes and spun in Shandon cytospin. After centrifugation at 1500 rpm for 10 minutes, the supernatant was decanted and direct smear was prepared from the cell button; fixed in 95% ethyl alcohol for 20-30 minutes and stained by Papanicolaou stain. Papanicolaou stain was done as per standard protocol and smear was examined under microscope. Observations were noted down for compilation.

All data were collected, and compared statistically by frequency distribution and percentage proportion. Chi-square ($\chi 2$) test was applied to know the statistically significant difference (*p* value) of the data. Epicalc version 2000 software was used for calculations.

III. Observation and Results

This prospective one year study was conducted on 393 patients, who attended the Madhur Pathology Lab, Gwalior from Jan 2019 to December 2019.

a. Age wise distribution of the patients:-

Age range of patients was 18 to 72 years of age. Most common age group in the study was 21-30yrs. (126 cases; 32.06%), closely followed by 31-40 years (120 cases; 30.53%) and least common age group was above 70 yrs. (2 cases; 0.5%). Distribution of cases is statistically significant; *p-value: 0.000002*. (Table 1 and Figure 1)

Table No. 1: Age group wise distribution of the patients

Age group	No. of patients	%
11-20Yrs	6	1.52
21-30Yrs	126	32.06
31-40Yrs	120	30.53
41-50 Yrs	98	24.93
51-60Yrs	24	6.1
61-70Yrs	17	4.2
>70	2	0.50
Total	393	100

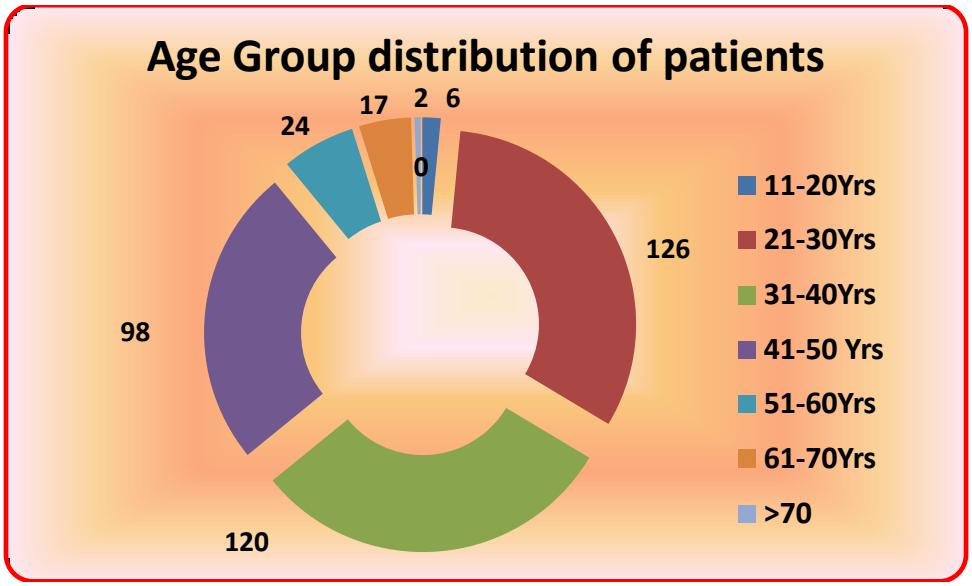

Figure No. 1: Age group wise distribution of the patients

b. Case distribution according to the presenting complaints

In our study, we observed that the most common presenting complaint of patients was of white discharge per vagina (168; 42.74%), followed by lower abdominal pain (119 cases; 327%) and difficulty in micturition (87caces; 22.13%). Bleeding per vagina, dysfunctional uterine bleeding and post coital bleed was also reported in some cases. Data distribution is statistically significant; *p-value: 0.000002*(Table 2 and Figure 2)

Table No. 2: Distribution of presenting complaint

Name of complaints	No. of cases	%
White discharge P/V	168	42.74%
Lower abdominal pain	119	39.27%
Difficulty in micturition	87	22.13
Bleeding P/V	10	2.54%
Dysfunctional uterine bleeding	8	2.03%
Post coital bleeding	1	0.25%
Total	393	100

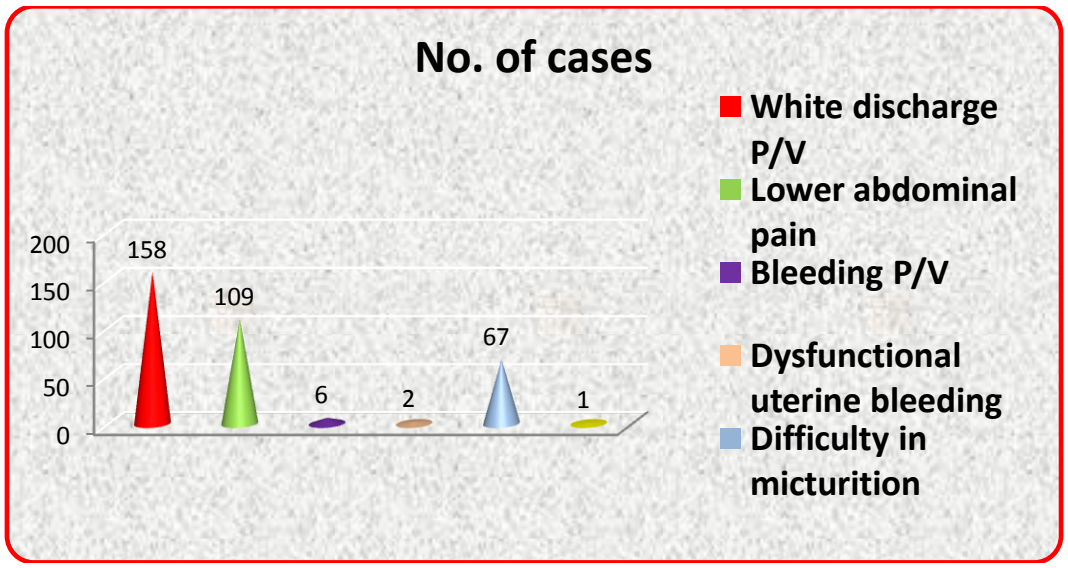

Figure No.2: Distribution of presenting complaint

c. Distribution of inflammation according to age:-

Out of 393 cases examined, mild, moderate and severe inflammation was reported in 158, 187 and 48 cases respectively. In all degrees of inflammation, most common age group was 20-30yrs, followed by 31-40yrs. and 41-45 yrs. i.e. child bearing age. By and large cases distribution of age groups versus type of inflammation is statistically significant with the exception where the number of cases is less. (Table 3 and Figure 3)

Table No.3: Type of inflammation in different age group

Age group	Mild inflammation	Moderate inflammation	Severe inflammation	*P Value*
11-20Yrs	2	3	1	*P*=0.606531
21-30Yrs	50	62	14	*P*=0.000001
31-40Yrs	51	57	12	*P*=0.000001
41-50 Yrs	38	44	16	*P*=0.001288
51-60Yrs	10	11	3	*P*=0.093015
61-70Yrs	7	9	1	*P*=0.046774
>70	0	1	1	*P*=0.603414
Total	158 *p-value: 0.000002*	187 *p-value: 0.000001*	48 *p-value: 0.000001*	*P*=0.000001

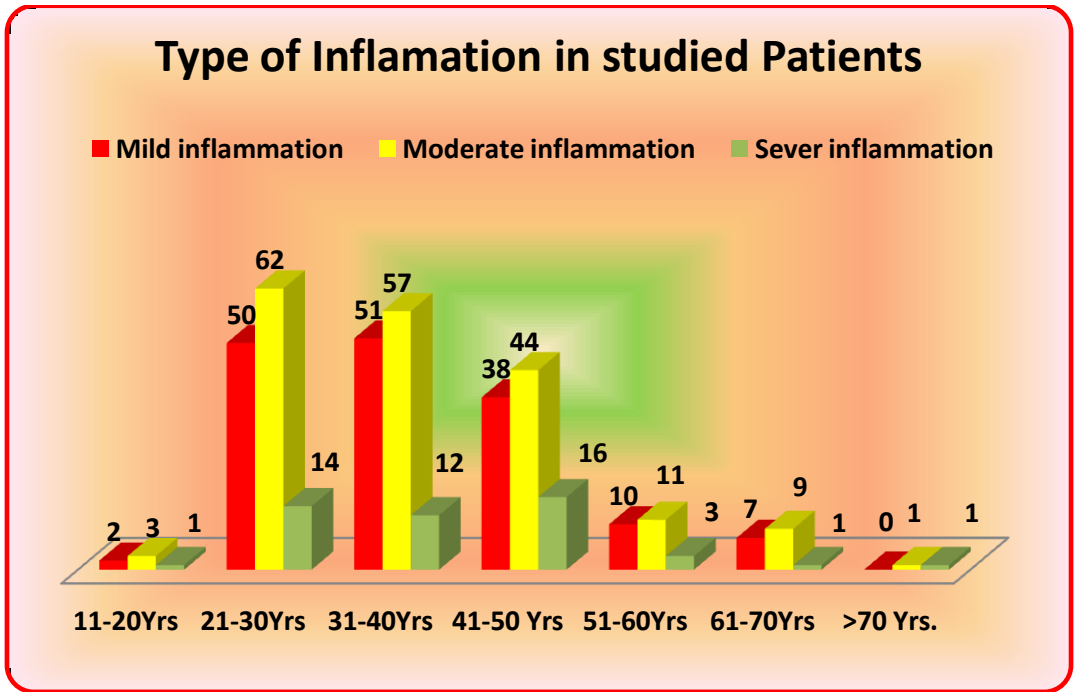

Figure No. 3: Type of inflammation in different age group

d. Type of the lesion in the study

Out of 393 cases, 365 (92.8%) cases were reported benign lesion while remaining 28 (17.2 %) cases were reported either as pre malignant or malignant condition. Out of 28 cases, 5 cases showed Atypical Squamous Cells of Undetermined Significance (ASCUS). Low Grade Intraepithelial Lesion (LSIL) was seen in 12 Cases. Five cases showed High grade Squamous Intraepithelial Lesion (HSIL), and Carcinoma were seen in 6 cases. The most common age group for ASCUS and LSIL was 31-40 years; however carcinoma and HSIL were seen in 61-70 years of age. Data distribution is statistically significant as shown in the table with the exception in the age group above 70 where the number of cases is only two. (Table 4 and Figure 4)

Table No.4: Type of the lesion in the different age group

Age group	Benign	ASCUS	LSIL	HSIL	Cancer	*P value*
11-20Yrs	6	-	-	-	-	*P*=0.000080
21-30Yrs	125	1	-	-	-	*P*=0.000003
31-40Yrs	112	2	6	-	-	*P*=0.000002

41-50 Yrs	89	-	5	2	2	*P*=0.000002
51-60Yrs	21	1	1	-	1	*P*=0.000001
61-70Yrs	10	1	-	3	3	*P*=0.001234
>70	2	-	-	-	-	*P*=0.091578
Total	365	5	12	5	6	*P*=0.000005

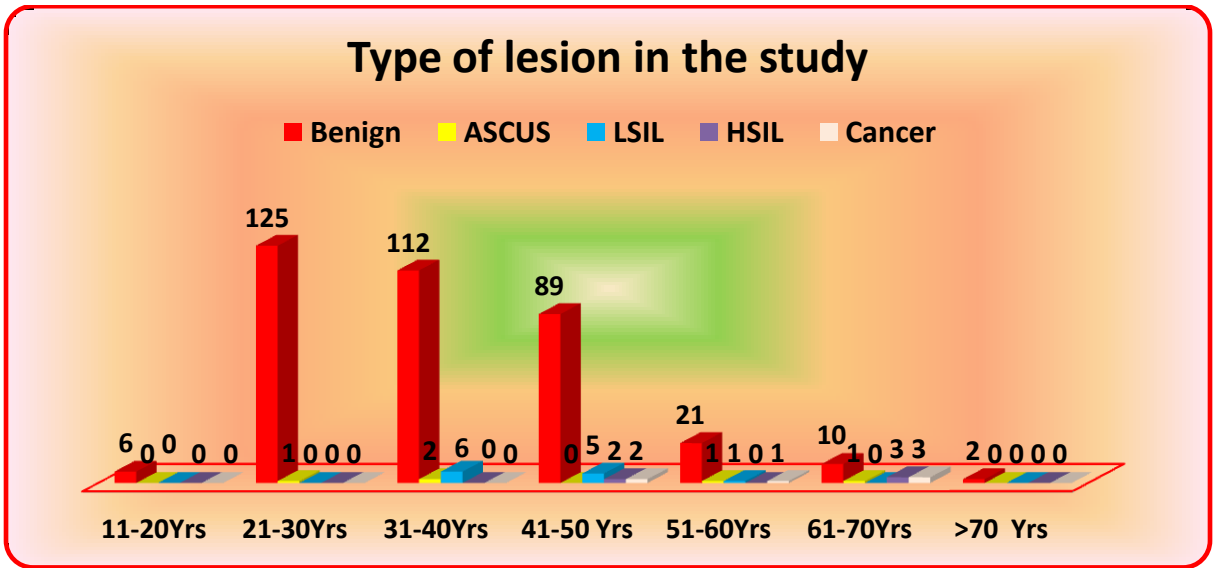

Figure No. 4: Type of the lesion in the different age group

e. Comparison between CPS and LBC:-

In our study, we performed both CPS and LBC on all samples. In this unsatisfactory sample reported on CPS were 12 as compared to 10 in LBC. Smears were reported normal in 28 cases in CPS and 33 in the LBC smears. ASCUS was reported in 5 cases in CPS and 3 cases in the LBC. Rate of Detection of LSIL in CPS was found in 6 cases and 2 cases in the LBC. HSIL was reported in 3 cases in CPS and in 5 cases in the LBC. Carcinoma was reported in 5 cases in CPS and 6 cases in the LBC. Case distribution of different type of lesion is statistically significant in the study while a report on CPS versus LBC in the study is statistically insignificant. (Table 5 and Figure 5)

Table No.5: Comparison between CPS and LBC

Category name	CPS	LBC	*P value*
Unsatisfactory	12	10	*P=0.669815*
Normal	28	33	*P=0.522053*
ASCUS	5	3	*P=0.479500*
LSIL	6	12	*P=0.157299*
HSIL	3	5	*P=0.479500*
Carcinoma	5	6	*P=0.763025*
	59: *p=0.000001*	69: *p=0.000001*	*P=0.376759*

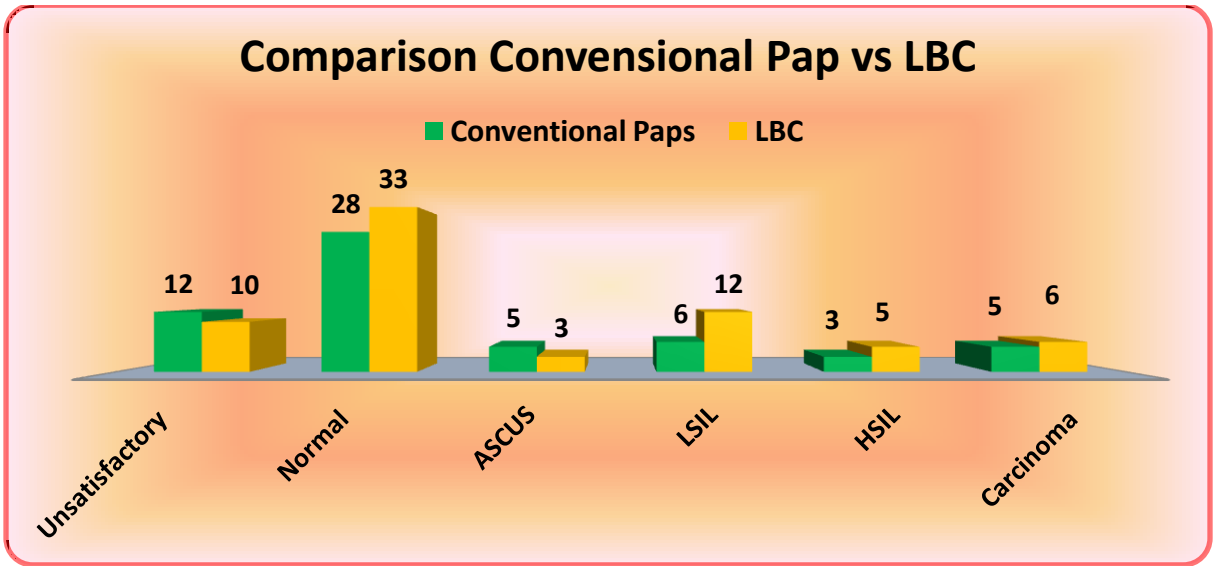

Figure No. 5: Comparison between conventional Paps and LBC

Cytological examination of different lesion's smears were shown in figure no. 6

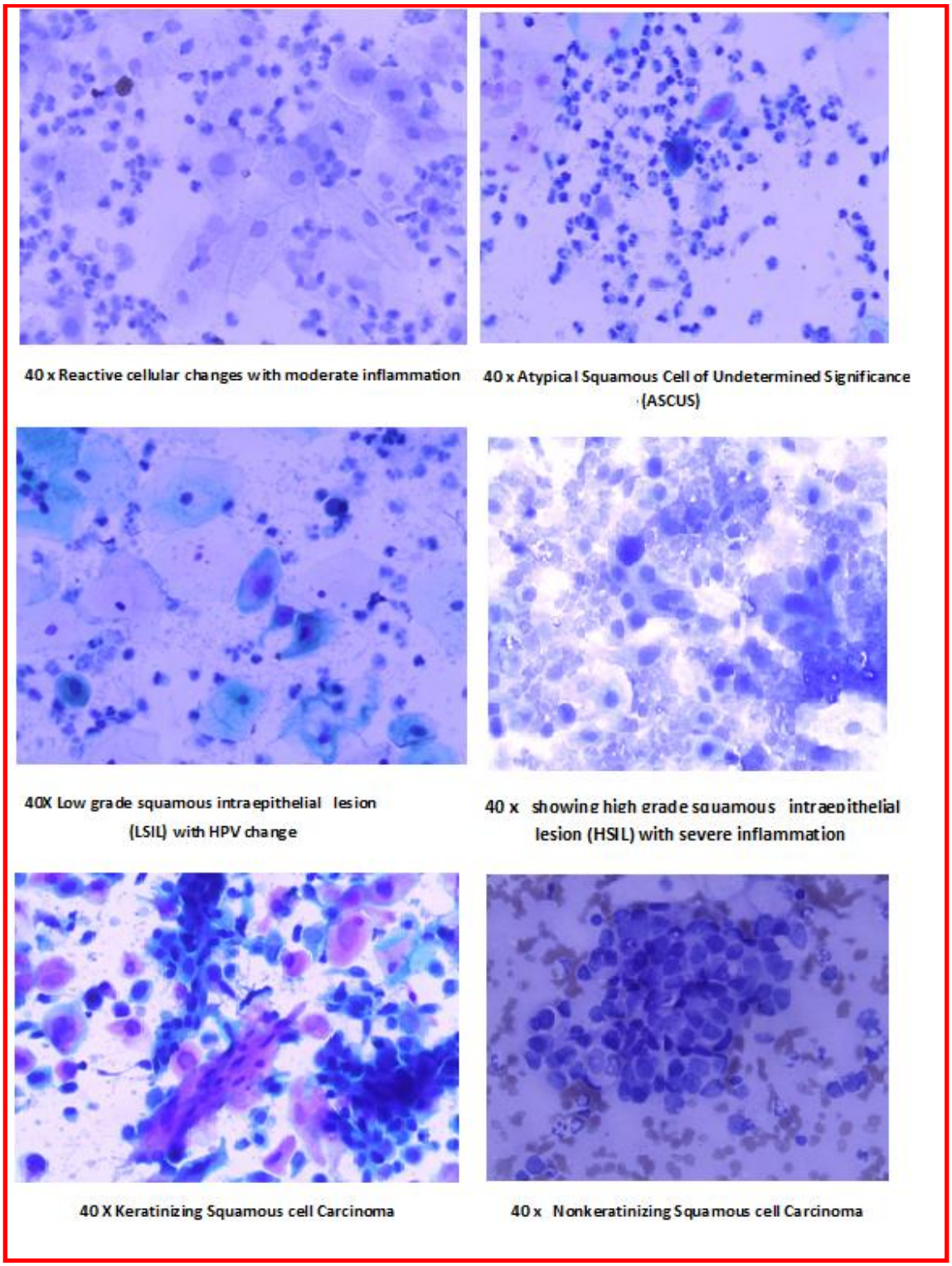

Figure No. 6-A to 6-F. Cytological examination pictures in the study

IV. Discussion

In our study most of the women were in the age group 21 to 40 years (31 to 40 years i.e. 36.4% and 21 to 30 years i.e. 33.8%). Similar results are found in study conducted by Gupta R *et al* [11]. This age group is most vulnerable for manifestations of cervical pathology as cervical lesions are slowly growing and takes 10-12 years to manifest after cervical insult.

In the present study white discharge per vagina (42.74%) was most common complaint which is similarly reported by Chaudhary *et al* (39%) [12].

Our results indicate statistically significant inflammatory findings in reproductive age group in contrast to results of Patel *et al* in which inflammatory Pap smear results increased across all age groups (27.41%). [13]

We reported premalignant epithelial abnormalities (ASCUS and LSIL) mostly in the age group of 31-40 years, coinciding with results of Sherwani *et al* [14]. However, other studies reported the bulk of premalignant lesion in 4th decade [15, 16]. Invasive carcinoma was found to be in older women in our study thus corroborating with role of HPV infection in appearance premalignant and malignant cervical lesions. Being sexually transmitted disease, the peak incidence of HPV infection will be shortly after commencement of sexual intercourse and the premalignant cervical also peaks about a decade after the peak incidence of HPV infection and a decade earlier than the malignant invasive cervical cancer [13].

We reported almost equal incidence of unsatisfactory smears while comparing CPS and LBC, contrary to widespread belief and a study by Pankaj S *et al* in which unsatisfactory smears were more commonly reported by conventional method (7.1%) than with liquid-based method (1.61%), and this difference is statistically significant. However, similar to our results they did not report any difference in the detection of epithelial cell abnormalities using both the methods [17]. Equal sensitivity of CPS and LBC has been concluded in earlier randomized control trials [9, 10]. Thus consolidating our stance that CPS is equally effective to LBC in detection of cervical premalignant lesions and invasive carcinoma, and is especially useful in resource limited settings and large scale screening in developing countries.

V. Conclusion

ABC has been found to be more superior to conventional smears only with respect to lesser number of unsatisfactory smears, but consider the economic implications of LBC; conventional Pap is more feasible in our setup.

Acknowledgment

The author(s) are thankful whole-heartedly to Mr. Rahul Verma and other technical staff of Madhur Pathology for their close cooperation and unstinted support without which this study would have not been possible.

Patient's consent

For the academic / publication of the data, written informed consent has been taken from all the patients in whom study is performed.

Funding

This research did not utilize any specific grant from any funding agency in the public, commercial or nonprofit organizations.

Competing Interests

Authors have declared that there are no competing interests.

References

[1]. GLOBOCAN 2020: New Global Cancer Data | UICC(cited 2021 June 6) from https://www.uicc.org/news/globocan-2020-new-global-cancer-data
[2]. 356-india-fact-sheets.pdf (iarc.fr)(cited 2021 June 6) from https://gco.iarc.fr/.../factsheets/populations/356-india-fact-sheets.pdf
[3]. Papanicolaou GN. Introduction of Pap smear in early detection of cervical malignancies. Am J Clin Path 1940; 19: 301-8.
[4]. Strander B, Andersson-Ellström A, Milsom I, Rådberg T, Ryd W. Liquid-based cytology versus conventional Papanicolaou smear in an organized screening program : a prospective randomized study. Cancer. 2007 Oct 25;111(5):285-91. doi: 10.1002/cncr.22953. PMID: 17724676.
[5]. Kirschner B, Simonsen K, Junge J. Comparison of conventional Papanicolaou smear and SurePath liquid-based cytology in the Copenhagen population screening programme for cervical cancer. Cytopathology. 2006;17:187–194.
[6]. . Karnon J, Peters J, Platt J, Chilcott J, McGoogan E, Brewer N. Liquid-based cytology in cervical screening: an updated rapid and systematic review and economic analysis. Health Technol Assess. 2004;8:iii, 1–78. 13.
[7]. Schledermann D, Ejersbo D, Hoelund B. Improvement of diagnostic accuracy and screening conditions with liquidbased cytology. DiagnCytopathol. 2006;34:780–785.
[8]. Arbyn M, Bergeron C, Klinkhamer P, Martin-Hirsch P, Siebers AG, Bulten J. Liquid compared with conventional cervical cytology: A systematic review and meta-analysis. ObstetGynecol 2008;111:167-77.
[9]. Confortini M, Bergeron C, Desai M, Negri G, Dalla Palma P, Montanari G, *et al.* Accuracy of liquid-based cytology: Comparison of the results obtained within a randomized controlled trial (the New Technologies for Cervical Cancer Screening Study) and an external group of experts. Cancer Cytopathol 2010;118:203-8.
[10]. Siebers AG, Klinkhamer PJ, Grefte JM, Massuger LF, Vedder JE, Beijers-Broos A, *et al.* Comparison of liquid-based cytology with conventional cytology for detection of cervical cancer precursors: A randomized controlled trial. JAMA 2009;302:1757-64.
[11]. Gupta, R., Sharda, A., Kumar, D. *et al*. Cervical Cancer Screening: Is the Age Group 30–65 Years Optimum for Screening in Low-Resource Settings?. *J ObstetGynecol India* (2021).
[12]. Chaudhary RD, Inamdar SA, Hari Haran C. Correlation of diagnostic efficacy of unhealthy cervix by cytology, colposcopy and histopathology in women of rural areas. Int J ReprodContraceptObstetGynecol 2014;3:213-8
[13]. Patel D, Savjiani N. Study of cytological pattern of pap smears and detection of cervical cancers in Gujarat, India. Arch CytolHistopathol Res 2019;4(4):293-296
[14]. Sherwani RK, Khan T, Akhtar K, Zeba A et al. Conventional Pap smear and Liquid Based Cytology for Cervical Cancer Screening: a Comparative Study. Jr of Cytol. 2007;24(4):167-72.
[15]. Gaur BS, Khare V, Gupta R. Study of abnormal cervical cytology in papanicolaou smears in a tertiary care center. Int J Adv Med 2016;3:569-72

[16]. Karuma, Gaspanal V, Van-Dan Brule R. The clinical profile and cervical cytomorphology. Indian Jr OfPathol Microbial. 2003;46(2):179-89.
[17]. Pankaj S, Nazneen S, Kumari S, Kumari A, Kumari A, Kumari J, Choudhary V, Kumar S. Comparison of conventional Pap smear and liquid-based cytology: A study of cervical cancer screening at a tertiary care center in Bihar. Indian J Cancer. 2018 Jan-Mar;55(1):80-83.

Dr. Sunita Rai, et. al. "A Study of Cervical Cytology in women with abnormal Cervix and Comparison of Conventional Papanicolaou Smear and Liquid-based Cytology."*IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 20(06), 2021, pp. 01-09