

## APPLICATION OF THE 2014 BETHESDA SYSTEM FOR REPORTING OF CERVICAL/VAGINAL CYTOLOGICAL LESIONS

Pratima Kujur<sup>1</sup>, Chandrakala Joshi<sup>2</sup>

<sup>1</sup>Associate Professor, Department of Pathology, Jawaharlal Nehru Memorial Medical College, Raipur, Chhattisgarh.

<sup>2</sup>Associate Professor, Department of Pathology, Jawaharlal Nehru Memorial Medical College, Raipur, Chhattisgarh.

---

### ABSTRACT

Pap smear (Conventional smear) is the most widely used cervical cancer screening test in the world. Negative intraepithelial lesion for malignancy, squamous intraepithelial lesion and cervical cancer remain important health problems for women worldwide. In developing countries like India, there is a great need for mass screening program for cervical lesion.

### AIMS AND OBJECTIVES

To assess the clinician utility of The 2014 Bethesda System Reporting of cervical and vaginal epithelial abnormalities.

### MATERIAL AND METHODS

All the cervical/vaginal cytology smears reported were retrieved and reviewed in the duration from 2007, 2008, 2009 and 2014.

### RESULTS

A total number of 1700 cases of Pap smears were retrieved during period of study, out of which 90.0% were satisfactory for evaluation; 35.5% were within normal limit and 55.6% were NILM. A few (8.14%) of the cases were reported as squamous intraepithelial lesion; 0.5% as atypical squamous cells and 0.19% were reported as atypical glandular cells.

### CONCLUSION

Pap smear is a proven tested tool for making an early diagnosis and treating cervical cancer in early stage. Thus, Pap smear is simple, less expensive diagnostics tool suitable for implementation in India.

### KEYWORDS

Atypical Glandular Cells, Atypical Squamous Cells, Cervical/Vaginal Cytology, Carcinoma of Cervix, Conventional Pap Smear.

---

**HOW TO CITE THIS ARTICLE:** Pratima Kujur, Chandrakala Joshi. "Application of the 2014 Bethesda System for Reporting of Cervical/Vaginal Cytological Lesions." Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 98, December 07; Page: 16366-16371, DOI: 10.14260/jemds/2015/2419

---

### INTRODUCTION

The examination of exfoliated cervical and vaginal cells for the detection of premalignant and malignant diseases has been performed for more than 50 years.<sup>1</sup> This screening method is commonly referred to as the Pap smear named for George N. Papanicolaou, who in 1923 described malignant cells in vaginal fluid aspirated from the fornix and pursued the development of screening procedure. The sampling procedure is designed to collect an adequate number of representative well-preserved epithelial cells including cells from the transformation zone.<sup>2</sup> The results of the Papanicolaou smear are communicated to the clinician utilizing a format and terminology formulated by the National Cancer Institute workshop (Developed in 1988 and revised in 1991) and referred to as the Bethesda System. Each cluster composed of a minimum of at least five appropriate cells is considered an adequate endocervical/transformation zone of component. A minimum of two clusters of well-preserved endocervical and a statement of a key component in the Bethesda System classification of cervical smears.<sup>3</sup> Again revised in 2001 and in 2014. The Worldwide HPV prevalence in cervical carcinoma is 99.7%.<sup>4</sup>

In developed countries such as USA, 85% of women had at least one Pap test through their lifetime, but this rate is only 5% in the developing countries. The five-year survival is 50% in developing countries, where it is 66% in developed ones.<sup>5</sup>

### Bethesda Terminology Changes

There were minimal changes relating to terminology itself. The 2014 Bethesda terminology is summarized in Table 1.

### AIMS AND OBJECTIVES

To assess the clinician utility of The Bethesda System Reporting of cervical and vaginal epithelial abnormalities.

### MATERIAL AND METHODS

This is a retrospective observational study carried out in the Department of Pathology, Pt. Jawaharlal Nehru Memorial Medical College, Raipur (CG) in the duration 2007, 2008, 2009 and 2014. A total number of 1700 conventional Pap smears were collected from women attending the Gynae OPD in the Department of Obstetrics and Gynaecology, Dr Bhim Rao Ambedkar Memorial Hospital, Raipur CG.

Slides were smeared, immediately fixed with 95% alcohol along with completely filled requisition form were sent to cytology section. All smears were stained by Papanicolaou stain and observed under the microscope 10x, 40x and 100x objectives. Reported with application of the 2014 Bethesda System for evaluation of cervical/vaginal lesions.

---

Financial or Other, Competing Interest: None.

Submission 20-11-2015, Peer Review 21-11-2015,

Acceptance 01-12-2015, Published 07-12-2015.

Corresponding Author:

Dr. Chandrakala Joshi,

A/210, Ekta Parisar,

Mal Viyanagar Durg, Chhattisgarh.

E-mail: ckj242@gmail.com

DOI:10.14260/jemds/2015/2419

---

### Inclusion Criteria

Women of age between 21- 70 years with presenting complaints, e.g. white discharge, pain in abdomen, burning micturition, post coital bleeding, intermenstrual bleeding, well preserved smear with complete clinical details and willing to Pap screening.

### Exclusion Criteria

Below 20 years and above 70 years, hysterectomy patient (Vault), diagnosed case of squamous cell carcinoma with or without therapy, infertility cases (Hormonal evaluation), during menstruation, pregnancy, post-partum, air dried smear, incomplete clinical details.

### RESULTS

In this study total number of 1700 Pap smear were screened during the period of 26 months; 1532 (90.00 %) smears were satisfactory for evaluation.

Table no. 2 show year-wise distribution of cases from 2007 to 2014 in year 2007 (January to June); total no. of 526 pap smear were retrieved, 480 (91.25%) were satisfactory for evaluation; in year 2008 (January-July) total no. of pap smear 554 retrieved, 482 (87.0%) were satisfactory for evaluation; in year 2009 (January to June) out of 230 pap smear 202 (87.82%) were satisfactory for evaluation; in year 2014 (June to Dec) out of 390 pap smear 365 (94.35%) were satisfactory for evaluation.

Fig. 1 shows pattern of cervical/vaginale lesions in Pap smear, 35% were normal, 56% were NILM and 9% were epithelial abnormalities in Pap smear.

Fig. 2 shows pattern of cervical/vaginale lesions reported as NILM. Out of 852 cases of NILM, 757 (44.52%) were non-specific inflammatory smear, 35 (2.05%) were of *Trichomonas vaginalis* and 20 (1.17%) were of candidiasis.

Table no. 3 shows age-wise distribution of smear of NILM. In this study the age of patient ranged from 21-70 years, 20.56% of patient were in 21-30 years of age group followed by % of patient were in 31-40 years of age. Maximum number of epithelial cell abnormalities observed between 31-40 years of age group. (Figure 4).

Fig. 3 shows out of 136(8%) cases of epithelial cell abnormalities, 66(3.88%) were LSIL, 50(2.94%) HSIL, 9(0.52%) cases were frank squamous cell carcinoma, 8(0.47%) cases ASCUS, 2(0.11%) cases in AGUS, 1(0.05%) case in AGUS-H.

### DISCUSSION

In present study out of 1700 smears 90% were satisfactory for evaluation, similar findings reported by Shrivastava M et al.<sup>6</sup> in 2011 (91.02%). Vijay Kumar Bodal et al.<sup>7</sup> in 2014 96% and Verma I et al.<sup>8</sup> in 2014 reported 97.6% of satisfactory smears. (Table 4).

In present study age ranged from 21 to 70 years, similar study reported by Jain V et al.<sup>9</sup> in 2010 20-80 years, but other authors reported range of various age group (Table 5).

In present study non-specific inflammatory lesions shows highest percentage 93.5% in comparison of other authors Kishor H, Suryawanshi et al.<sup>10</sup> in 2013, Shrivastava M et al.<sup>6</sup> in 2011 and Vijay Kumar Bodal et al.<sup>7</sup> in 2014.

In present study, candidiasis was reported in 2.4% of cases similar study reported by Shrivastava M et al.<sup>6</sup> in 2014 (Table 6).

In present study, 4.3% of LSIL, 3.26% of HSIL, 0.58% of SCC, 0.5% of ASCUS, 0.13% of AGUS and 0.06% of AGUS-H. These findings are not correlated with other authors.

We have a very low rate of ASCUS and AGUS and AGUS-H indicating that this diagnosis is made very selectively in present study. The clinical follow-up of ASCUS is variable. The options being repeat cytology, immediate colposcopy or

HPV DNA testing. Most of our patients have colposcopically directed biopsy as the next procedure.

### CONCLUSION

Pap smear has been regarded as the gold standard for cervical cancer screening programs. In present study, maximum number of intraepithelial lesions observed between the age group of 31-40 years, so thorough screening is required in women of sexually active age group.

Papanicolaou (Pap) smear is a safe, non-invasive and effective method for detection of pre-cancerous, cancerous and non-cancerous changes in the cervix. In developing countries like India, there is a great need for mass screening program.

We recommend multiple clinical setups with these facilities to be available to all and Government should be providing funds.

### REFERENCES

1. Kline TS. The Papanicolaou smear. A brief historical perspective and where we are today. *Arch Pathol Lab Med* 121:205-210, 1997.
2. Schumann JL, O'Connor DM, Covell JL, Greening SE. Pap smear collection devices. Technical, clinical, diagnostic and legal considerations associated with their use. *Diagn Cytopathol* 8:492-503, 1992.
3. National Cancer Institute Workshop. The Bethesda System for Reporting Cervical/Vaginal Cytologic Diagnoses. *Acta Cytol* 37:115-124, 1993.
4. Walboomers JMM, Jacobs MV, Manos MM, Bosch FX, Kummer JA, Shah KV, Snijder PJF, Peto J, Meijer CJLM and Munoz N (1999). Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. *J Pathol* 189:12-19.
5. Ferlay J, Bray F, Pisani P, Parkin DM. Cancer incidence, mortality and prevalence worldwide [database]. Lyon, France: International agency for research on cancer (IARC); *Cancer Base* 2005;5:2.
6. Shrivastava M et al., Shrivastava OP et al. Pattern of Cervical Smear Cytology in Rural Medical College: *Pravara Med Rev* 2011;3(1).
7. Bodal KV et al., Brar KB et al. Correlation of Pap Smear with Histopathological findings in Malignant and non-malignant Lesions of Cervix. *Global Journal of Medical research: E Gynecology and Obstetrics* Volume 14 Issue 4 Version 1.0 Year 2014. Online ISSN: 2249-4618 & Print ISSN: 0975-5888.
8. Verma I, Jain V, Kaur T. Bethesda System for Cervical Cytology in Unhealthy Cervix. *Journal of Clinical and Diagnosis Research*. 2014 Sep, Vol-8(9):OC26-OC30.
9. Jain V and Vyas AS. Cervical neoplasia-cyto-histological correlation (Bethesda System) A Study of 276 Cases. *J Cytol Histol* 1:106. Vol 1, Issue 2.
10. Suryawanshi KH et al., Dravid NV et al. Evaluation of Pattern of Cervical Cytology in a Tertiary Care Hospital - A Four Years Study; *International Journal of Health Sciences & Research* (www.ijhsr.org) Vol.3; Issue: 7; July 2013.
11. Nayar Ritu et al., Wilbur DC et al. The Pap test and Bethesda 2014; *ActaCytologica* 2015;59:121-132.
12. Bahala et al. Cytological pattern of cervical papicolaou smears in Eastern Region of Saudi Arabia. *Journal of cytology* 2011;28(4):174-177.
13. Atilgan et al. Evaluation of cervical cytological abnormalities in Turkish population. *Indian journal of Pathology and Microbiology* 2012;55(1):52-55.

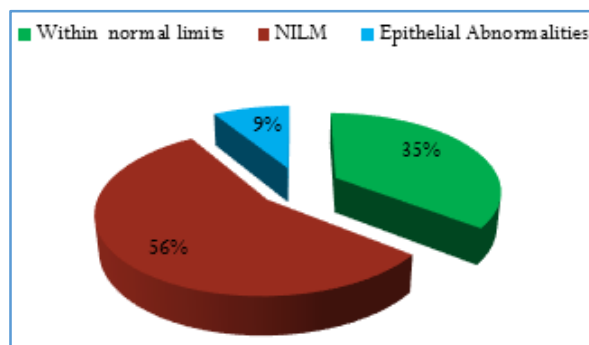
Table 1

<b>THE 2014 BETHESDA SYSTEM <sup>11</sup></b>
<b>SPECIMEN TYPE:</b>
Indicate conventional smear (Pap smear) vs. liquid-based preparation vs. other
<b>SPECIMEN ADEQUACY</b>
Satisfactory for evaluation (describe presence or absence of Endocervical/transformation zone component and any other quality indicators, e.g., partially obscuring blood, inflammation, etc.) Unsatisfactory for evaluation . . . (Specify reason) Specimen rejected/not processed (Specify reason) <input type="checkbox"/> Specimen processed and examined, but unsatisfactory for evaluation of epithelial abnormality because of (Specify reason)
<b>GENERAL CATEGORIZATION (optional)</b>
Negative for Intraepithelial Lesion or Malignancy <input type="checkbox"/> Other: See Interpretation/Result (e.g., endometrial cells in a woman <input type="checkbox"/> 45 years of age) <input type="checkbox"/> Epithelial Cell Abnormality: See Interpretation/Result (specify 'squamous' or 'glandular' as appropriate)
<b>INTERPRETATION/RESULT</b>
<b>NEGATIVE FOR INTRAEPITHELIAL LESION OR MALIGNANCY</b>
(When there is no cellular evidence of neoplasia, state this in the General Categorization above and/or in the Interpretation/Result section of the report--whether or not there are organisms or other non-neoplastic findings)
<b>Non-Neoplastic Findings (optional to report)</b>
Non-neoplastic cellular variations o Squamous metaplasia o Keratotic changes o Tubal metaplasia o Atrophy o Pregnancy-associated changes Reactive cellular changes associated with: Inflammation (includes typical repair) o Lymphocytic (follicular) cervicitis Radiation Intrauterine contraceptive device (IUD) Glandular cells status post hysterectomy
<b>Organisms</b>
Trichomonas vaginalis Fungal organisms morphologically consistent with Candida spp. Shift in flora suggestive of bacterial vaginosis Bacteria morphologically consistent with Actinomyces spp. Cellular changes consistent with herpes simplex virus Cellular changes consistent with cytomegalovirus
<b>OTHER</b>
<input type="checkbox"/> Endometrial cells (in a woman <input type="checkbox"/> 45 years of age) (Specify if "negative for squamous intraepithelial lesion")
<b>EPITHELIAL CELL ABNORMALITIES</b>
<b>SQUAMOUS CELL</b>
Atypical squamous cells • Of undetermined significance (ASC-US) • cannot exclude HSIL (ASC-H) Low-grade squamous intraepithelial lesion (LSIL) (Encompassing: HPV/mild dysplasia/CIN 1) High-grade squamous intraepithelial lesion (HSIL) (Encompassing: moderate and severe dysplasia, CIS; CIN 2 and CIN 3) • With features suspicious for invasion (if invasion is suspected) Squamous cell carcinoma
<b>GLANDULAR CELL</b>

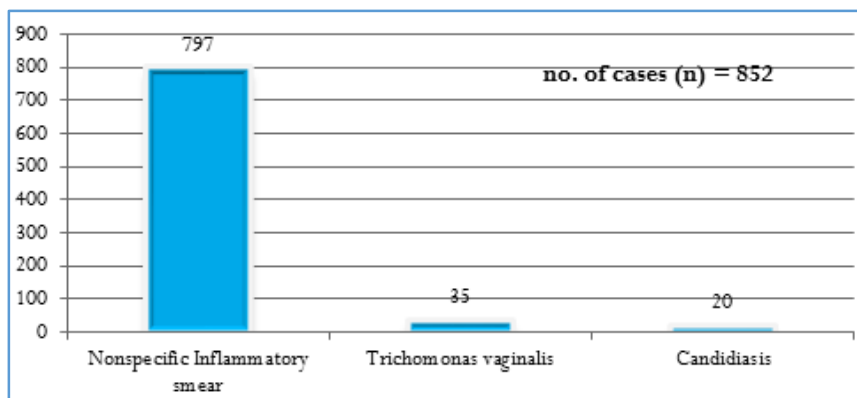
<p style="text-align: center;">Atypical</p> <ul style="list-style-type: none"> <li>• Endocervical cells (NOS or specify in comments)</li> <li>• Endometrial cells (NOS or specify in comments)</li> <li>• Glandular cells (NOS or specify in comments)</li> </ul> <p style="text-align: center;">Atypical</p> <ul style="list-style-type: none"> <li>• Endocervical cells, favor neoplastic</li> <li>• Glandular cells, favor neoplastic</li> </ul> <p style="text-align: center;">Endocervical adenocarcinoma in situ</p> <p style="text-align: center;">Adenocarcinoma</p> <ul style="list-style-type: none"> <li>• Endocervical</li> <li>• Endometrial</li> <li>• Extrauterine</li> </ul> <ul style="list-style-type: none"> <li>• Not otherwise specified (NOS)</li> </ul>
<b>OTHER MALIGNANT NEOPLASMS: (Specify)</b>
<b>ADJUNCTIVE TESTING</b>
Provide a brief description of the test method(s) and report the result so that it is easily understood by the clinician.
<b>COMPUTER-ASSISTED INTERPRETATION OF CERVICAL CYTOLOGY</b>
If case examined by an automated device, specify device and result.
<b>EDUCATIONAL NOTES AND COMMENTS APPENDED TO CYTOLOGY REPORTS (optional)</b>
Suggestions should be concise and consistent with clinical follow-up guidelines published by professional organizations (References to relevant publications may be included).

Duration	Total no. of Pap Smear (1700)	Satisfactory for Evaluation (1532)
2007 January - June (6 months)	526	480 (91.25%)
2008 January- July (7 months)	554	482 (87.00%)
2009 January - June (6 months)	230	202 (87.82%)
2014 June- December (7 months)	390	368 (94.35%)

**Table 2: Shows Year-Wise Distribution of Cases**



**Fig.1: Shows Pattern of Cervical/Vaginal Lesions in Pap Smear**



**Fig. 2: Shows Pattern of Cervical/Vaginal Lesion reported as NILM**

Years	Nonspecific Inflammatory Smear	Trichomonas Vaginalis	Candidiasis
21-30	315 (20.56%)	14 (0.91%)	06 (0.39%)
31-40	300(19.58%)	11 (0.71%)	07 (0.45%)
41-50	132(8.61%)	09 (0.58%)	04 (0.26%)
51-60	35(2.28%)	01 (0.06%)	03 (0.19%)
61-70	15(0.97%)	0	0

**Table 3: Shows Age-wise Distribution of Smear of NILM**

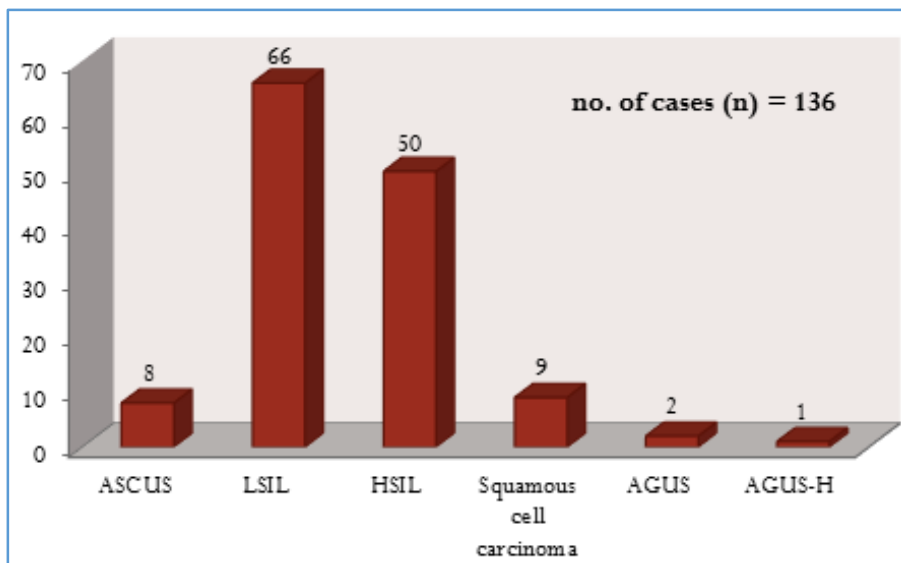


Fig. 3: Shows Distribution of Epithelial Cells Abnormalities

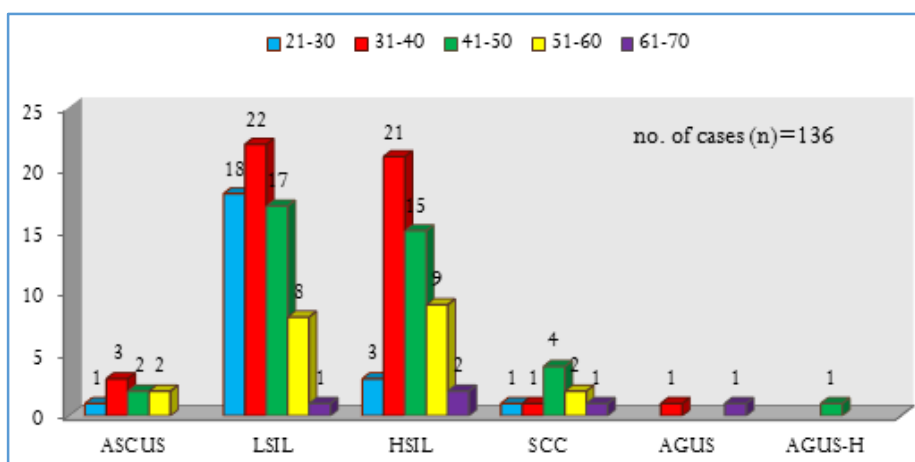


Fig. 4: Shows Age-Wise Distribution of Epithelial Cell Abnormalities

Maximum number of epithelial cell abnormalities observed between 31–40 years of age group.

Author	Year	Total no. of Case	Satisfactory Smear
Shrivastava M et al. <sup>6</sup>	2011	680	91.02%
Vijay Kumar Bodal et al. <sup>7</sup>	2014	200	96%
Verma I et al. <sup>8</sup>	2014	125	97.6%
Present study	2015	1700	90.00%

**Table 4: Shows Comparison of Satisfactory Smears of Various Studies**

Author	Year	Age Group (Years)
Shrivastava M et al. <sup>6</sup>	2011	<20 ->50
Jain V et al. <sup>9</sup>	2010	20- 80
Vijay Kumar Bodal et al. <sup>7</sup>	2014	31-60
Present study	2015	21-70

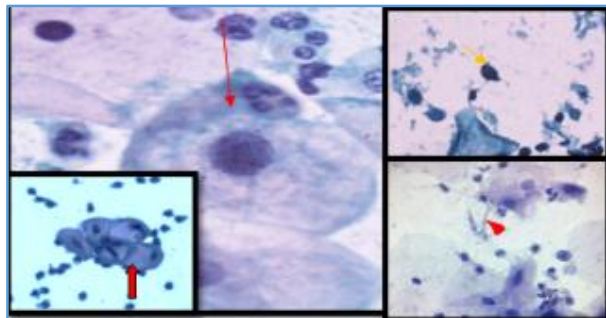
**Table 5: Shows Comparison of Age Group of Various Studies**

Author	Year	Nonspecific Inflammatory Smear	Trichomonas Vaginalis	Candidiasis
Kishor H. Suryawanshi et al. <sup>10</sup>	2013	920 (76.67%)	12(1.0%)	08(0.67%)
Shrivastava M et al. <sup>6</sup>	2011	176(28.16%)	123(19.68%)	15(2.40%)
Vijay Kumar Bodal et al. <sup>7</sup>	2014	118 (59.0%)		
Present study	2015	797(93.5%)	35(4.1%)	20(2.4%)

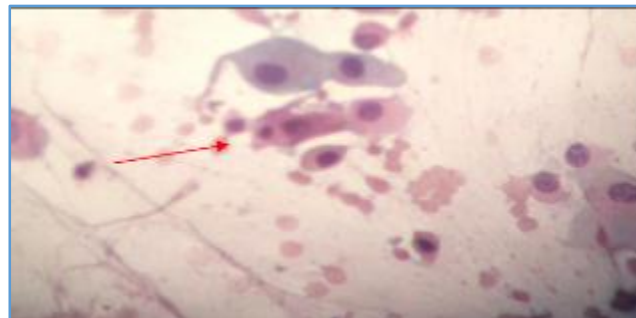
**Table 6: Shows Comparison of Pattern of Negative for Intraepithelial Lesion of Various Studies**

Author	Year	ASCUS	LSIL	HSIL	SCC	AGUS	AGUS-H
Bahala et al. <sup>12</sup>	2011	5.61%	0.16%	1.28%	0.64%	0.48%	
Shrivastava M et al. <sup>6</sup>	2011	4.96%	7.36%	3.52%	1.60%	1.12%	
Atilgan et al. <sup>13</sup>	2012	1.9%	0.5%	0.1%	0.0%	0.2%	
Verma I et al. <sup>8</sup>	2014	4.80%	5.60%	0.80%	0.80%	0.80%	0.80%
Present study	2015	0.5%	4.30%	3.26%	0.58%	0.13%	0.06%

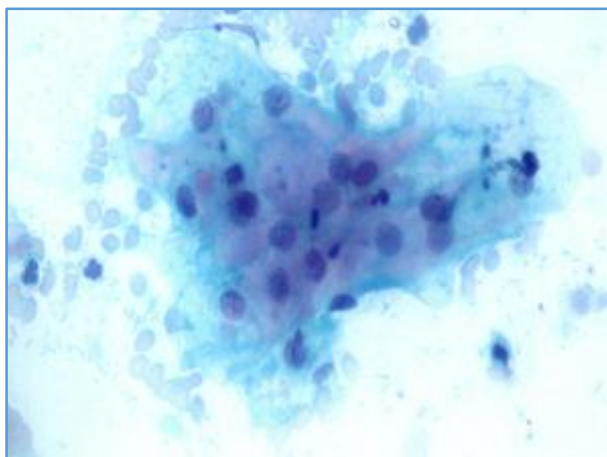
**Table 7: Shows Comparison of Epithelial Cell Abnormalities of Various Studies**



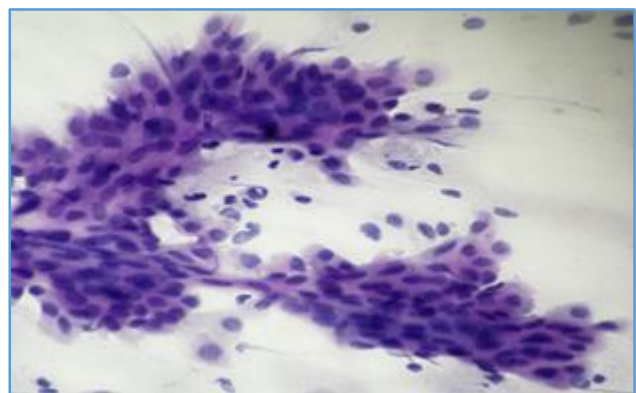
Photomicrograph of acute cervicitis changes in a smear, acute inflammatory exudation of polymorphs around and within the epithelial group (♥). Candida hyphae (♣), koilocytic atypia (♠), Trichomonas vaginalis organism (♣) (PAP x400).



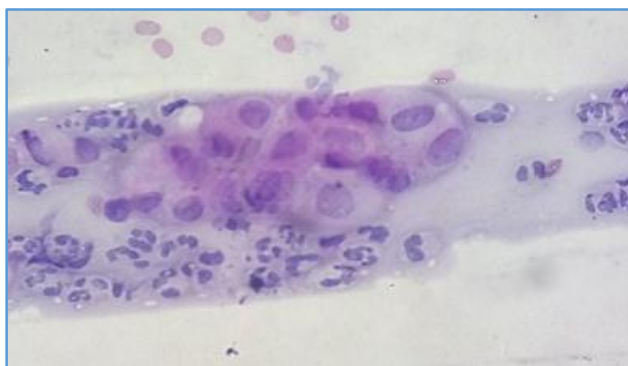
Photomicrograph of Pap smear of a case of squamous cell carcinoma showing small severely dyskaryotic cells with scanty cytoplasm, which shows keratinisation in cells. The background 'diatheses of leucocytes and cell debris (Papx400).



Photomicrograph of LSIL shows varying nuclear enlargement, abnormal chromatin pattern and mild irregularities of outline in inflammatory background (PAP x400).



Photomicrograph of pap smear of a case of AGUS-H showing the individual atypical endocervical cells are hyperchromatic with coarsely clumped chromatin. They show the characteristic feathering of the nuclei at the edge of the cluster (PAP x400).



Photomicrograph of HSIL show marked hyperchromasia of nucleus in the centre, abnormal chromatin pattern and narrow band of cytoplasm (PAPx1000).