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Original Research Article

Cytodiagnostic Study of Papanicolaou Smears With Histopathological Correlation- An Emphasis on 2014 Bethesda System for Reporting Cervical Cytology

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Abstract

Background: Cervical cancer is the most common cancer among women in India. With the Papanicolaou smear method of screening, the incidence and mortality of cervical cancer has dramatically decreased. Recently the Bethesda System (TBS) 2014 for reporting the results of cervical cytology was developed with introduction of some newer terminology that could provide clear guidance for clinical management. ***Objectives:*** To correlate cervical cytology smears with histopathological diagnoses and to emphasize the importance of 2014 Bethesda system. ***Methods:*** This is a study done from Jan2017 to Dec2018. The pap smears received were evaluated and reported according to 2014 Bethesda system for reporting cervical cytology**.** The corresponding cervical biopsy and hysterectomy specimens received were correlated. RESULTS: In our study, we received 592 pap smears for a period of 2 years, 58-unstatisfactory, 453-NILM, 33-ASCUS, 18-LSIL, 7-ASC-H, 15-HSIL, 6-SCC & 2-AGUS. Histopathology correlation was found in 165 cases. The rate of concordance and discordance was 52.7% and 47.3% respectively. ***Conclusion:*** Histopathology is the gold standard in making definitive diagnosis in biopsies. But cervical cytology remains and important component of cancer screening program.

Keywords: Cervix, cytology, histopathology, Bethesda.

INTRODUCTION

The fourth most common cause of cancer and the fourth most common cause of death from cancer in women globally is the Cancer of the Cervix [1]. In developing countries about 70% of cervical cancers occur and 90% of the deaths. But in the developed countries due to the widespread use of screening programs the occurrence of cervical cancer has dramatically reduced [2]. Cervix is an organ which is easily accessible for inspection, colposcopy and for taking exfoliative and biopsy samples. Carcinoma of cervix has a long latent phase to progress from precursor to invasive lesions, thus forms an ideal malignancy to develop extensive cost-effective screening programs nationwide [3].

The Pap smear which has revolutionized the early detection of cervical cancer was first created by Dr George Nicholas Papanicolaou in 1940s. Since then it has evolved so much so that it has become a standard screening test for carcinoma cervix. Along with colposcopy it has made cervical cancer a curable disease if detected in the early stages [4].

The Bethesda system was conceived in1988 and revised in 1991 by the National Cancer Institute workshop [5]. The initial Bethesda System was convened to address a well- recognized but seemingly recalcitrant problem of discrepancies in the reports of Papsmears [6]. It has been evolving continuously with latest honing to formulate an easy-to-use convenient guide which can be easily accessible to cytopathologists worldwide [7]. The Bethesda system of cervical cytology has standardised terminologies for clear communication to the clinicians and provide the best service for women eventually. Bethesda has brought the world together with one cytologic voice and thus able to effectively communicate scientific and clinical data. True to this, the third edition of Bethesda atlas has refined the terminologies based on the last decade experiences [8].

Definitive diagnosis can only be made by microscopic examination of biopsy specimen as histopathology is considered as the gold standard[9].

In our study, the accuracy of pap test is determined by correlating with biopsy findings and

evaluating sensitivity, specificity, positive and negative predictive values.

AIMS & OBJECTIVES

- To study the importance of Pap smear study in non-neoplastic lesions and differentiating between premalignant and malignant lesions.
- To correlate abnormal cervical cytology smears with histopathological diagnoses.
- To emphasize the importance of 2014 Bethesda system.

MATERIALS AND METHODS

This is an observational study, done for a period of 2 years –January 2017 to December 2018 in Hassan Institute of Medical Sciences, Hassan. The pap smears received were fixed with alcohol and stained with pap stain. All the smears were evaluated and reported according to 2014 Bethesda system for reporting cervical cytology. The corresponding cervical biopsy and hysterectomy specimens received were fixed in 10% formalin for 24 hours. The tissue bits were processed and embedded in paraffin. Sections of 4-5-micron thickness were taken and stained by H&E for histopathological examination. The collected data were analysed by using SPSS software. The sensitivity, specificity and positive and negative predictive values were calculated.

RESULTS

In our study, we received 592 pap smears during the period of 2 years. The most common age group involved was 40-49 years with 233cases (39.3%) (Table-1). The youngest and oldest age seen was 21 and 88 years respectively. The most common diagnosis seen was Negative for Intraepithelial lesion/ malignancy (NILM) composed of 76.5%, out of which inflammatory smear formed the majority (342) (Table-2).

Table-1: Age Distribution

AGE IN YEARS	N (%)
20-29	43 (7.3)
30-39	145 (24.5)
40-49	233 (39.3)
50-59	93 (15.7)
60-69	57 (9.6)
70-79	16 (2.7)
80-89	05 (0.84)

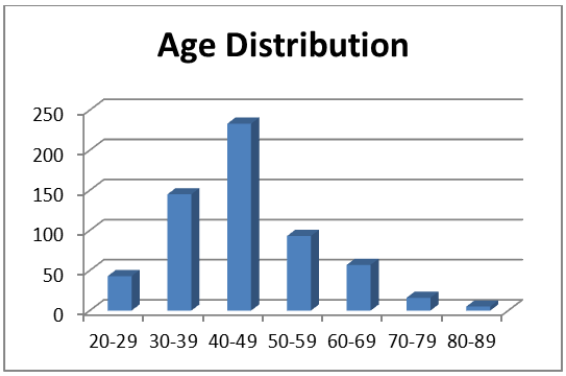


Table-2: Diagnosis of Pap Smears

Diagnosis		Frequency	Percentage (%)
UNSATISFACTORY	INADEQUATE	20	9.8
	HEMORRHAGE	17	
	INFLAMMATION	21	
NILM	NILM	53	76.5
	INFLAMMATION	342	
	ATROPHIC	17	
	ATROPHIC- INFLAMMATION	40	
	IUCD	01	
ASCUS		33	5.6
ASC-H		07	1.2
AGUS		02	0.33
LSIL		18	3.04
HSIL		15	2.5
SCC		06	1.0
TOTAL		**592**	**100**

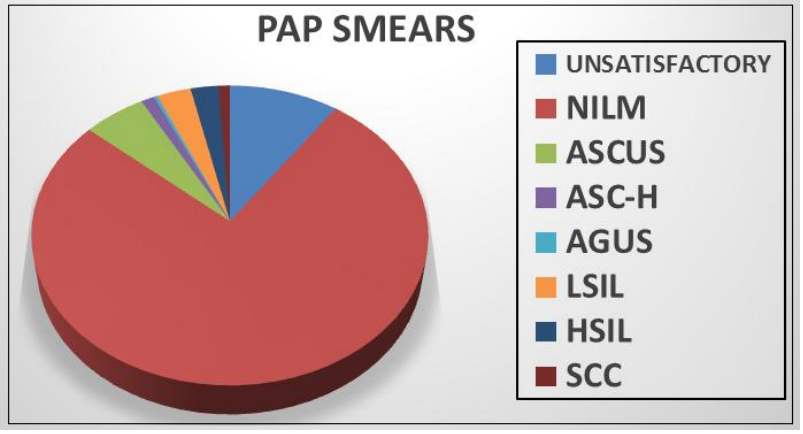


Table-3: Age- Diagnosis Correlation

AGE IN DECADES	UNS	NILM	ASCUS	ASC-H	AGUS	LSIL	HSIL	SCC
3RD	04	35	04					
4TH	13	126	04	01			01	
5TH	26	184	10	01	02	06	04	
6TH	08	64	05	02		09	03	02
7TH	06	29	09	02		03	06	02
8TH	01	12					01	02
9TH			01	01				03

Among 592 cases, we found correlation of histopathology for 165 cases (Table-4).

Table-4: Cyto- Histopathological Correlation (165 Cases)

Pap smear diagnosis	Histopathological diagnosis				TOTAL
	Normal	CIN 1	CIN 2, 3	CARCINOMA	
NILM	111	5	1	2	**119**
ASCUS	15	3	1	4	**23**
LSIL	2	1	2	4	**9**
HSIL	2	1	2	7	**12**
CARCINOMA	1	0	0	1	**2**
TOTAL	**131**	**10**	**6**	**18**	**165**

Among the 165 cases of pap smears with histopathological correlation, we found 115 cases in concordance and 40 cases in discordance (Table-5).

Table-5: Correlated and Non-Correlated Cases

Pap Smear Diagnosis	Number Of Cases	Correlated	Non-Correlated
NILM	**119**	111	8
ASCUS	**23**	0	23
LSIL	**9**	1	8
HSIL	**12**	2	10
CARCINOMA	**2**	1	1
TOTAL	**165**	**115**	**40**

A case of 48 year old female showed benign endometrial cells in pap smear. On histopathological examination endometrium was found to be atrophic.

The sensitivity, specificity, positive and negative predictive values were calculated and were as follows (Table-6).

Table-6: Statistical Values of Pap Smears

DIAGNOSIS	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)
NILM	84.7	76.5	93.3	56.5
LSIL	10	94.83	11.1	94.23
HSIL	33.3	93.71	16.7	97.38
CARCINOMA	5.6	99.31	50	89.57

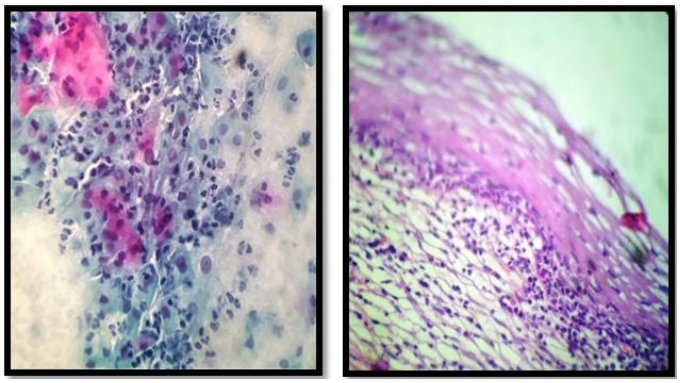


Fig-1: NILM-INFLAMMATORY SMEAR, CHRONIC CERVICITIS

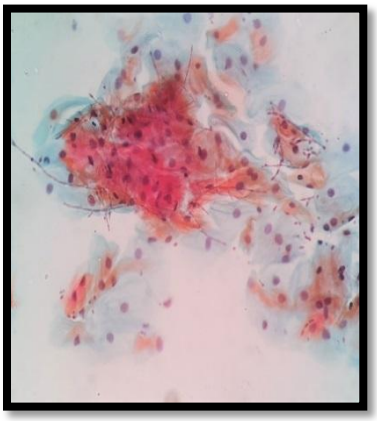


Fig-2: NILM-CANDIDA

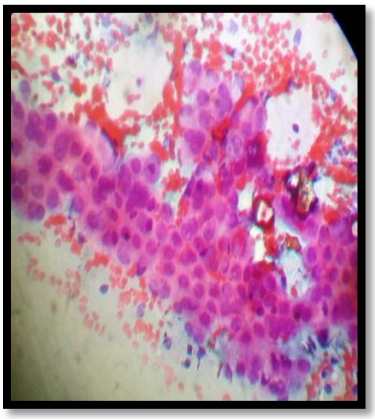


Fig-3: NILM-HERPES SIMPLEX VIRUS INFECTION

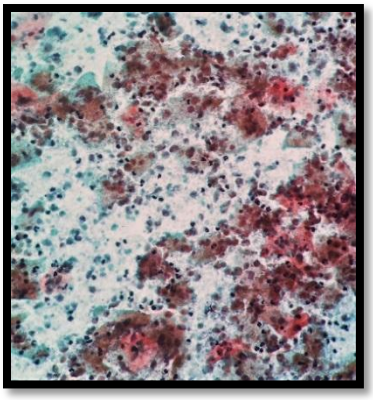


Fig-4: NILM-TRICHOMONAS VAGINALIS

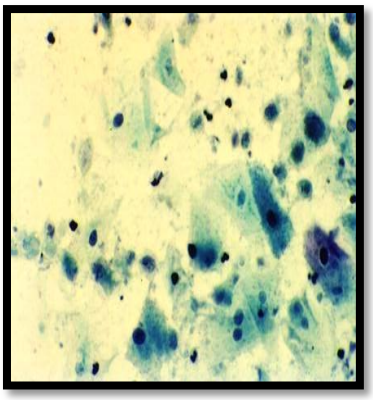


Fig-6: NILM, BACTERIAL VAGINOSIS

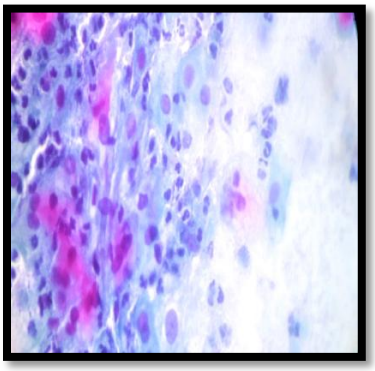


Fig-7: LSIL

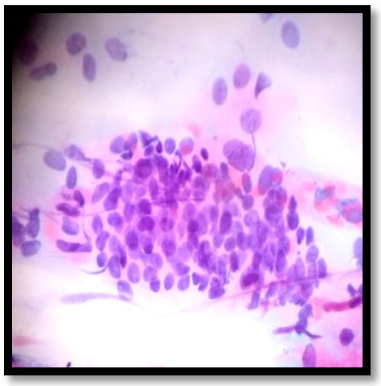
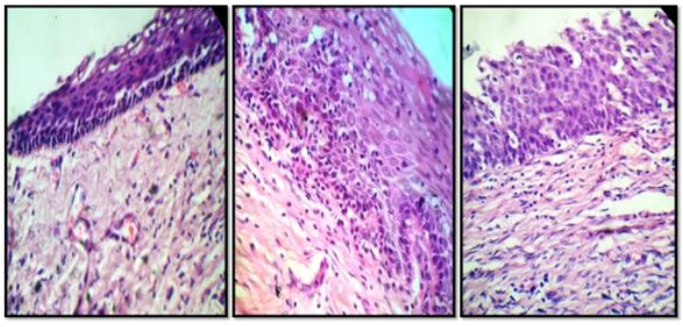
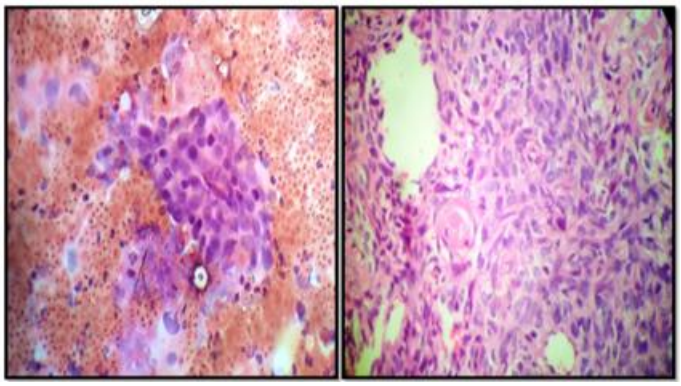
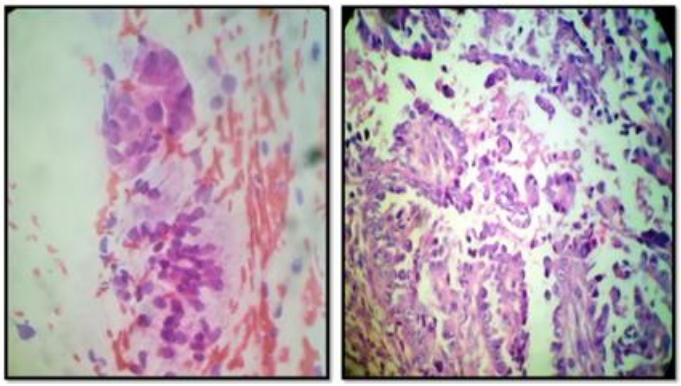


Fig-8- HSIL





SQUAMOUS CELL CARCINOMA



ADENOCARCINOMA

DISCUSSION

In the present study the mean age seen was 47.63 years, which was concordant to the study by Akinfolarin *et al*., [10] (45years). In the study by Tahera *et al.*, [11] and Kulkarni *et al.*, [1] the mean age seen was 35 years and 41.7 years respectively.

Table-7: Comparison with other studies

	Sensitivity	Specificity	PPV	NPV	Accuracy
Ramadevi *et al.*, [3]	29%	88%	78%	78%	78%
Atla *et al*., [4]	94.1%	64.28%	82.75%	85%	78.2%
Gupta *et al*., [9]	67.27%	92%	86%	79%	
Tahera *et al*., [11]	71.4%	89.8%	65.2%	92.2%	
Mallur *et al*., [12]	80%	81.54%	66.67%	89.83%	
Present study	69.7%	79.9%	60.5%	85.6%	76.6%

In Table-7, the present study was compared with other studies with respect to sensitivity, specificity, positive and negative predictive value. It shows pap smear has low sensitivity and Positive Predictive Value and has high specificity and Negative Predictive Value. By correcting errors during sample collection, preparing the smears, fixing and staining the smears, high false negative rates can be lowered. Ensuring good quality control in the laboratory is essential to improve the sensitivity of pap smears.

Diagnostic accuracy in our study is 76.6% which was comparable with the studies done by Ramadevi *et al.*, [3] (78%) and Atla *et al.*, [4] (78.2%).

CONCLUSION

The most successful screening program ever conceived to prevent cancer is the cervical cytology. It is the preferred first line management and is considered as the primary cervical cancer testing procedure. The high specificity of pap smears makes cervical cytology an important keystone for the screening regimen of cancer of the cervix as it defines risk thresholds.

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