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COMPREHENSIVE ANALYSIS OF CERVICOVAGINAL PAPANICOLAOU SMEAR IN A SPECIALIZED MEDICAL CENTRE BY A MULTIFACETED APPROACH

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ABSTRACT: -

Introduction: We aimed at surveying the range of cervical smear cytological patterns and their correlation with the patient's clinical vignettes undergoing Papanicolaou (Pap) smear analysis at our medical center.

Methods: A prospective cross sectional study was exercised wherein Pap smear cases, along with clinical findings from requisition forms and cytopathology observations, were collected from the pathology department over six months and documented in a predetermined pro forma.

Results: 1,344 cases were investigated. Most cases were aged 41–50 years (31.1%) and multiparous (68.5%). White discharge was the prevailing clinical presentation (31.2%), followed by abdominal pain (23.1%) and irregular cycles (14.7%), while asymptomatic cases accounted for 14.6%. Unsatisfactory samples were found in 22 cases (1.6%), with sparse cellular squamous components being the most common cause (17 cases, 77.3%). Malignancy was ruled out in 96% of cases, while 19.7% showed infection or inflammation. Atypical squamous cells of undetermined significance (ASC-US), high-grade squamous intraepithelial lesion (HSIL), Atypical Squamous Cells, HSIL cannot be excluded (ASC-H) and low-grade squamous intraepithelial lesion (LSIL) were detected in 1.3%, 0.8%, 0.2% and 0.07%, respectively.

Conclusion: The Papanicolaou smear, a vital instrument for carcinoma cervix screening, enabling early detection of inflammatory, infectious, benign, and malignant pathologies, thereby reducing morbidity and mortality. Careful interpretation is essential, particularly in patients of postmenopausal bleeding, cervical discharge, and inflammatory smears, to clinch epithelial cell abnormalities meticulously and doesn't go unnoticed.

INTRODUCTION: -

In Indian women cervical cancer is only second to breast cancer, representing one-fifth of global cases. It ranks as the fourth rampant cancer in women and the seventh overall worldwide, and is caused almost entirely by human papillomavirus (HPV). According to 2020 estimates from GLOBOCAN, there were 1,23,907 new cases and 77,348 deaths, with an age-standardized incidence rate of 18 per 100,000 women and a cumulative risk of 2.01%[1]. Although, we find a decreasing trend in developed countries, over 80% of the cases occur in middle-income nations[2]. Additionally, carcinoma cervix is rising among younger women, and it is responsible for 20% of cancer-related maternal deaths[3].

India has had a national cancer program since 1975, initially focusing on establishing sophisticated cancer institutions. Recently, Indian people have an increasing trend in the popularity of cervical malignancy, largely ascribed to a shortfall of health consciousness and inadequate healthcare admittance to screening facilities. Given the present occurrence rates in India, the yearlong number of fresh cases is prudent to surge to 225,000 by 2025[4].

Due to easy accessibility to clinical examination, cervical cancer may be prevented, or at least diagnosed at an early stage. Cervical cancer, as pre-invasive lesions progress slowly and respond well to treatment, amenable for early disclosure and appropriate management. The implementation of a dual approach to cervical cancer prevention—HPV vaccination and regular screening - can significantly reduce both incidence and mortality, ultimately minimizing its impact as a public health threat.

Invasive cervical cancers are foreshadowed by cytomorphological changes in the cervical epithelium that perseverate for several years. The natural progression of cervical cancer allows for early detection of epithelial lesions using a simple and effective screening tool, the Papanicolaou (Pap) smear[6]. Developed by George Papanicolaou in 1939, the Pap smear requires getting cast off superficial cells from the transformation zone, subsequently analyzing the exfoliative cervical cytology by a cytopathologist. The Bethesda System for Reporting Cervical Cytology (TBSRC), introduced in 1988, established standardized publicizing terminology that ensures reproducibility across different pathologists and effectively communicates relevant information to healthcare providers. Ensuing Bethesda workshops have refined these reporting terminologies. The 2014 Bethesda System[7] (TBSRC 2014) introduced only a littlest revision to the terminology itself but refined morphological criteria, added optional educational notes, and recommended reporting benign-seeming endometrial cells for women over 45 years of age. This recommendation is based on the reliable predictive value of [specific test/method] for detecting endometrial hyperplasia and carcinoma in postmenopausal women[8].

We intended to identify the range of cervical Pap smear patterns and investigate their clinical findings interrelationship.

MATERIALS AND METHODS: -

A prospective cross-sectional study design was adopted containing all Pap smear cases received from June to November 2023, at the Department of Pathology, Saveetha Medical College and Hospital, Chennai. Institutional Ethical Committee approval was accomplished. All Pap smear cases from patients aged ≥ 21 years, with clinical findings noted on the requisition form, were recorded in a predetermined pro forma. Cytopathological observations were accomplished at the Department of Cytology.

Pap smears were based on liquid based cytology (LBC) method. LBC engages in collecting cervical samples with a brush, which are then suspended in a liquid medium. This technique employs monolayer slide preparation, which has outplayed conventional Pap smears by virtue of various advantages not limited to improved fixation ability, decreasing the obscuring factors, and the use of standardized cell transfer. Cytological interpretation was performed in accordance with the TBSRC 2014[9] guidelines.

The data were analyzed using SPSS 21.0 for Windows. Descriptive statistics summarized the demographic and clinical characteristics of the study population. Frequencies and percentages were calculated for diagnostic categories and cellular patterns recognized in Pap specimens.

RESULTS: -

1344 patients were investigated in the present study. Age spanned between 21 and 84 years, with mean (40.7) years, median (40) years, and mode (42) years. Substantial affliction was noted in 41–50 years (419/1344, 31.1%), followed by 31–40 years (410/1344, 30.5%) and 21–30 years (287/1344, 21.4%). Most patients had a parity score of 2 (588/1344, 43.7%), followed by 1 (410/1344, 30.5%) and 3 (244/1344, 18.2%). The frequent clinical symptom was white discharge, observed in 31.2% of cases, followed by abdominal pain in 23.1%, irregular menstrual cycles in 14.7%, uterovaginal prolapse in 6.1%, post-coital bleeding in 4.9%, and postmenopausal bleeding in 2.8% of women (table 1).

Table 1 - Demographic and clinical characteristics of the study population

Specification	Category	No. (%)
Age (Years)	21 - 30	287 (21.4)
	31 - 40	410 (30.5)
	41 - 50	419 (31.1)
	51 - 60	148 (11)

	61 - 70	66 (5)
	≥ 71	14 (1)
	Mean ± SD (Range) 40.7 ± 11.3 (63)	
Parity	Nullipara	72 (5.4)
	Para 1	351 (26.1)
	Para 2	588 (43.7)
	Para 3	244 (18.2)
	≥ Para 4	89 (6.6)
Presenting complaints	Asymptomatic	196 (14.6)
	White discharge per vaginum	419 (31.2)
	Pain abdomen	320 (23.1)
	Irregular cycle	197 (14.7)
	Post-menopausal bleeding	38 (2.8)
	Something coming out through per vaginum	82 (6.1)
	Post coital bleeding	66 (4.9)
	Burning micturition	49 (3.6)

As depicted in table 2, omitting the clinical finding of healthy looking cervix in 26% (350/1344) of cases, per speculum examination detected white discharge in 30% (403/1344) of the study population, cervical erosion in 19% (255/1344), cervical hypertrophy in 10.9% (147/1344), and ectropion of cervix in 6% (81/1344).

Table 2 - Findings from per speculum examination of the study population

Clinical finding	No. (%)
Healthy looking cervix	350 (26)

White discharge per vaginum	403 (30)
Hypertrophied cervix	147 (10.9)
Cervical erosion	255 (19)
Ectropion of cervix	81 (6)
Bleed on touch	67 (5)
UV prolapse / cystocele / rectocele	41 (3.1)
Total	1344 (100)

Out of 1344 Pap smears, 1322 (98.4%) were satisfactory, while 22 (1.6%) were unsatisfactory for interpretation. The paramount causal factor for unsatisfactory smear was sparse cellular squamous components (17/22, 77.3%) [Table 3]. The prevailing cytological pattern was negative for squamous intraepithelial lesions or malignancy (NILM), accounting for 97.58% (1290/1322) of all Pap smears, followed by inflammatory smear, which comprised 20.05% (265/1322), as displayed in figure 1.

Figure 1 - Distribution of cytological pattern

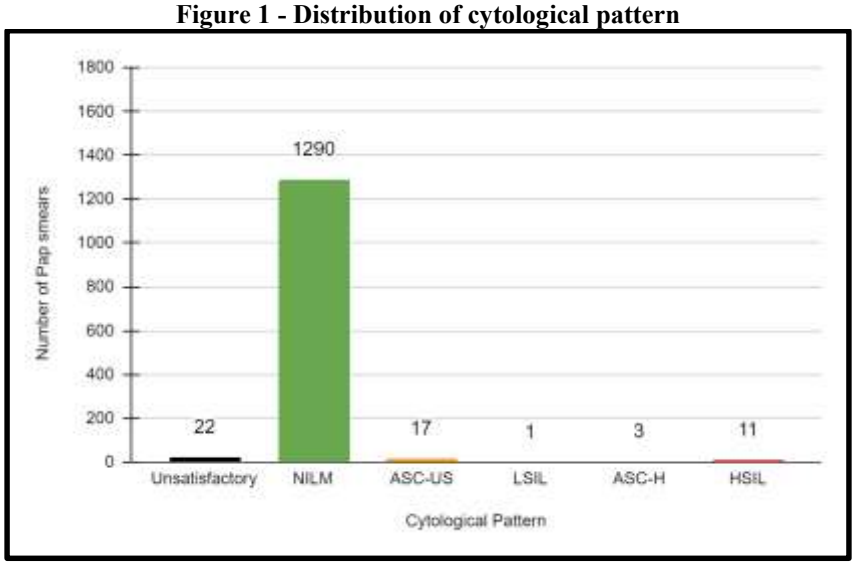

Table 3 - Factors contributing to unsatisfactory Pap smears

Reason	No. (%)
Sparse cellular squamous components	17 (77.3)
Abundant inflammatory cells	5 (22.7)
Total	22 (100)

Table 4 displays the proportionate distribution peculiar to the distinct oddity observed amongst satisfactory Pap smears. 32 cases (2.4%) had epithelial cell abnormality (ECA). Among the ECA cases, a hefty number funneled to atypical squamous cells of undetermined significance (ASC-US) [(17/32), 53.13%], seconded by high-grade squamous intraepithelial lesion (HSIL) [(11/32), 34.38%], trailed by atypical squamous cells–high-grade squamous intraepithelial lesion cannot be excluded (ASC-H) [(3/32), 9.38%], and low-grade squamous intraepithelial lesion (LSIL) [(1/32), 3.13%] as illustrated in figure 2.

Table 4 - Satisfactory Pap smears - Cytological abnormalities

Age group (Years)	Unsatisfactory smear No. (%)	Satisfactory smear				
		NILM No. (%)	ASC-US No. (%)	LSIL No. (%)	ASC-H No. (%)	HSIL No. (%)
21 - 30	3 (13.6)	281 (21.9)	2 (11.8)	0 (0)	0 (0)	1 (9.1)
31 - 40	7 (31.8)	398 (30.8)	1 (5.9)	1 (100)	1 (33.3)	1 (9.1)
41 - 50	7 (31.8)	401 (31.1)	6 (35.3)	0 (0)	1 (33.3)	4 (36.4)
51 - 60	4 (18.2)	138 (10.7)	4 (23.5)	0 (0)	0 (0)	2 (18.2)
61 - 70	0 (0)	58 (4.5)	4 (23.5)	0 (0)	1 (33.3)	3 (27.3)
≥ 71	1 (4.5)	13 (1)	0 (0)	0 (0)	0 (0)	0 (0)
Total	22 (100)	1290 (100)	17 (100)	1 (100)	3 (100)	11 (100)

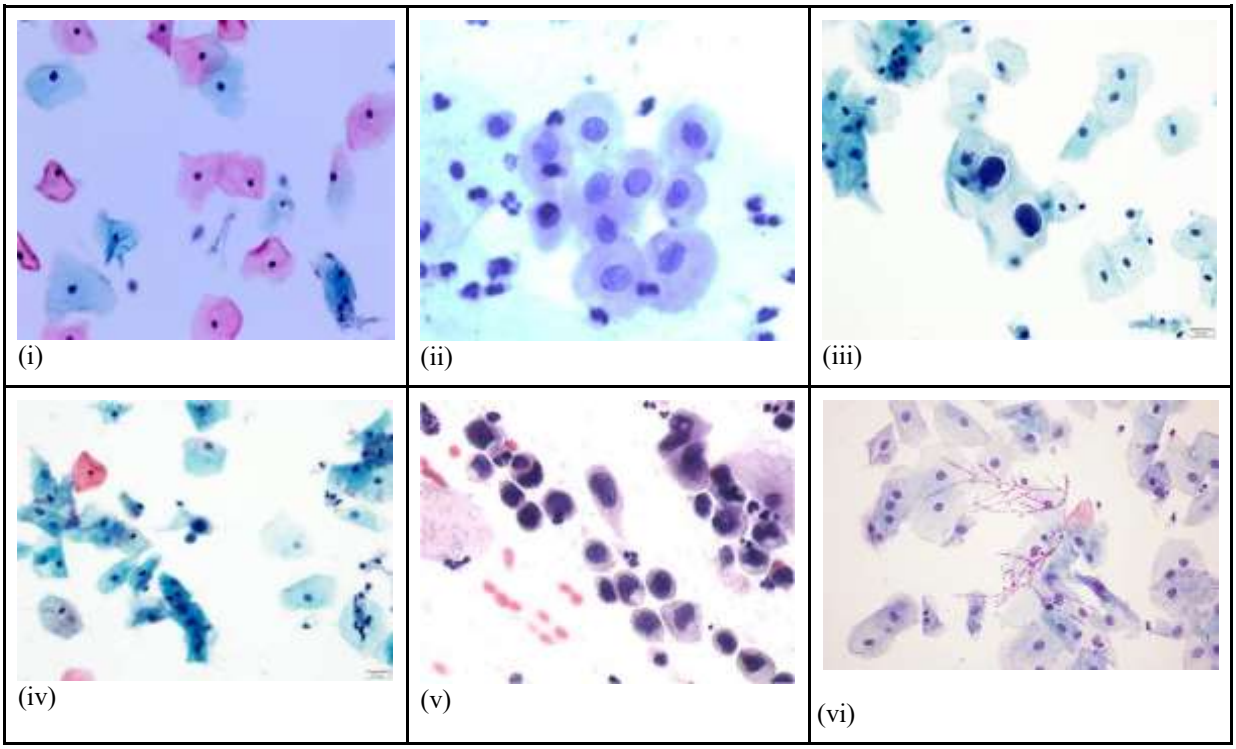

Figure 2 - Papanicolaou smear - cytological pattern

(i) Trichomonas: Small, gray-blue, pear-shaped organisms with a round to oval shape and an eccentric nucleus (Papanicolaou stain, ×400). (ii) Atypical squamous cells of undetermined significance (ASC-US): Isolated atypical cells within an inflammatory background (Papanicolaou Stain ×400). (iii) Low-grade squamous intraepithelial lesion (LSIL): Atypical cells of varying sizes with irregular nuclear membranes and inconspicuous

nucleoli (Papanicolaou Stain ×400). (iv) Atypical squamous cells cannot exclude high-grade squamous intraepithelial lesion (ASC-H): Cells exhibiting coarse chromatin, irregular nuclear membranes, and a high nuclear-to-cytoplasm ratio (Papanicolaou Stain ×400). (v) High-grade squamous intraepithelial lesion (HSIL): Syncytial sheet of parabasal-type cells with variations in nuclear size and shape, hyperchromatic nuclei, irregular nuclear membranes, and characterizing a high nuclear-to-cytoplasmic ratio (Papanicolaou Stain ×400). (vi) Candida Infection: Eosinophilic to gray-brown yeasts and pseudohyphae of organisms (Papanicolaou Stain × 400).

DISCUSSION: -

With shifts in lifestyle and demographic vignettes in middle-income countries, non-communicable diseases are looming as significant public health concerns, requiring effective control programs to prevent potential epidemics. The higher-than-expected presence of cervical malignancy is pertained to either the inefficiency or failure of existing prevention efforts. Cervical tumor is extensively screened in both high- and middle-income countries, with the Pap smear considered the primary screening method. However, various challenges, such as financial constraints, lack of awareness, and insufficient human resources, have limited its widespread acceptance.

In our study, the majority of cytological dysmorphology cases were sighted in cases ranging from 31 to 40 years (30.5%), trailed by the 21 to 30 years (21.4%). These findings align with the findings of Das et al[10], where 33.25% of abnormal cytology cases were observed in participants aged 30-39 years, and 16.4% were noted in those aged 20-29 years. The results are related to the findings from a yet another study by Garg P et al[11] that showed the maximum subjects were in the age group between 31 and 40 (32.72%).

In our study, after precluding asymptomatic cases, the most frequently noted clinical manifestations were white discharge per vaginum, abdominal pain, irregular cycle, prolapse, post coital bleeding, burning micturition and postmenopausal bleeding. This clinical symptomatology spectrum is comparable to earlier studies[12,13].

Satisfactory smears aggregated to 98.36%, which is amicable with the 98.6% stated by Patel et al(14) and 98.18% by Garg P et al[11], but higher than the 91.81% proclaimed by Banik et al[15] and 95.6% by Sharma et al[16].

The present study observed the rate of epithelial cell abnormalities at 2.4%, which is agreeable with work of Tailor et al[17] and Malpani et al[18].

In current study, ASC-US was essentially the paramount type of ECA, amounting to 1.3%, comparable to findings by Ilknur Çetinaslan Türkmen et al[19]. Following ASC-US, HSIL was the second frequent type of ECA, accounting for 0.8% of cases, which aligns with the results of research by Altaf et al[20].

In current research, among all ECAs, HSIL (36.4%) and ASC-US (35.3%) were principally noticed in the 41-50 years age bracket, which is coherent to work by Das D et al[10] and Parveen et al[21].

CONCLUSION: -

In South East Asia, cervical carcinoma is a headmost gynecological tumor. Its slow, progressive nature makes it amenable to mass screening, with cytology-based preemptive detection being one of the key methods. Recently, the incidence of cervical cancer has been alarmingly rising among younger women than expected. The awareness of Pap screening in the community should be propagated via various educational exercises and attempts should be widened for early age screening of women.

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