



LEUCORRHOEA: NOT AN INNOCUOUS SYMPTOM.

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ABSTRACT

Background: Leucorrhoea is a major problem in gynecological practice. It can be "physiological" or "pathological." Common pathological causes are infections, cervicitis, atrophy, malignant and premalignant lesions of cervix.

Aims: To study the cervical cytology in women with leucorrhoea, to find any relation with age and parity, and evaluate the role of cytology in detecting lesions of cervix.

Methods and Material: Observational cross-sectional study. Total 2176 women with leucorrhoea were studied. Cervical scrape smears were taken with Ayre's spatula. Statistical analysis was done wherever applicable.

Result/Conclusions: Most common finding in cervical smears in leucorrhoea is Reactive Cellular Changes followed by 'Organisms', Candida being the most common. Prevalence of 'Epithelial cell abnormality' and squamous cell carcinoma increases with increasing age and parity, whereas prevalence of NILM is associated with younger age and lower parity. Epithelial Cell Abnormalities can also manifest as leucorrhoea. Therefore, regular screening of women with leucorrhoea is must.

KEYWORDS : Pap smear, Leucorrhoea, Candida, Cervical cancer.

Introduction

Leucorrhoea is one of the major problems encountered in gynaecological practice. The word Leucorrhoea means "running of white substance in excessive amounts."¹ Leucorrhoea can be physiological or pathological. An increase in normal vaginal secretions develops physiologically at puberty, during ovulation, pre-menstrual phase, during sexual arousal and during pregnancy; because of the increased vascularity of female genital tract at that time.² Physiological leucorrhoea does not need medical intervention. However, leucorrhoea with profuse quantity, foul smell, change in colour or blood-tinged needs immediate medical assistance.³ Common causes of pathological leucorrhoea are infections due to bacteria, virus, fungus or parasites, cervicitis, atrophic vaginitis, local causes like polyps, tear and foreign bodies. But, leucorrhoea may also be a symptom of cervical malignancies or precancerous lesions.⁴ Although it appears to be harmless and is usually ignored by most women, screening by pap smears is necessary to rule out precancerous or malignant lesions.

This study was done with the aim of studying the cervical cytomorphology in women complaining of leucorrhoea, to find any relation of these cytological findings with age and parity, and to evaluate the role of cytology in early detection of pre-malignant and malignant lesions of cervix.

Material and methods

Our study was an Observational cross-sectional study carried out in a Tertiary Care Hospital over a period of four years (November 2013-October 2017). Study was conducted on live subjects with approval from the Institutional Ethical Committee. Our study included women who came to Gynaecology OPD with complaint of leucorrhoea or gave history of leucorrhoea, irrespective of their age. Total 2,176 cases were studied.

Following women were excluded from our study:

- 1) Women with active bleeding per vaginam, because the presence of fresh blood may make the smear impossible to interpret.
- 2) Pregnant women.

Complete clinical history was taken and all women underwent a physical examination, including a pelvic examination. Cervical smears were collected with the help of wooden Ayre's spatula. The smears were fixed immediately in 95% ethyl alcohol, and stained by the Papanicolaou method of staining. Smears were interpreted using The Bethesda System 2001 for Reporting Cervical Cytology.⁵

Statistical analysis was done. Continuous variables like age of patient, was presented as Mean \pm Standard Deviation. Study variables were compared by applying Chi-square test. For small numbers, fisher exact test was applied wherever applicable. P-value < 0.05 was considered to be 'Significant'. P-value < 0.01 was considered to be 'Highly Significant'. Statistical software STATA version 13.1 was used for data analysis.

Results

We studied 2,176 women who were suffering with leucorrhoea. Maximum women in the present study were between 31-40 years of age (928 cases, 42.65%), followed by 663 cases (30.47%) in age group 21-30 years. Least cases were in the age group of below 20 years (22 cases, 1.01%).

Youngest patient in this study was 18 years old while the oldest patient was 85 years old. Mean age of all patients was 35.77 years (standard deviation 8.74).

Maximum number of women were Para 2 (1021 cases, 46.92%), followed by '≥Para 3' (565 cases, 25.97%). 147 women (6.75%) were nullipara, and remaining 443 women (20.36%) were Para 1.

A majority of the women (1810 cases, 83.18%) had no associated complaints other than leucorrhoea. Amongst women having other associated complaints, vulval itching was the most common, present in 136 (6.25%) cases. The second most common associated symptom was lower abdominal pain in 73 women (3.35%). 35 women (1.61%) with leucorrhoea had associated complaint of post-menopausal bleeding, and 26 women (1.19%) had associated post-coital bleeding. Lower backache and burning micturition were other associated symptoms.

Table 1. Distribution of Cases According To Macroscopic Appearance Of Cervix

SR. NO.	APPEARANCE OF CERVIX	NO. OF CASES	PERCENTAGE
(A)	Normal cervix	1709	78.54
(B)	Abnormal cervix	467	21.46
	Erosion	229	10.53
	Hypertrophy	97	4.46
	Erosion + Hypertrophy	19	0.87
	Congestion	81	3.72
	Growth	12	0.55
	Prolapse	4	0.18

	Nabothian cyst	19	0.87
	Cervical polyp	6	0.28
	TOTAL	2176	100.00

Table 1 shows the macroscopic appearance of cervix on per speculum examination in 2176 women complaining of leucorrhoea. 467 patients (21.46%) had macroscopically abnormal cervix. Commonest macroscopic abnormality of cervix was erosion, seen in 229 cases (10.53%).

Table 2. Distribution of Smears According To Adequacy of Specimen.

SR. NO.	ADEQUACY	NO. OF SMEARS	PERCENT
1	Satisfactory	2073	95.27
2	Not satisfactory	103	4.73
	-Paucity of cells	94	4.31
	-Intense inflammation obscuring cell details	8	0.37
	-Excessive drying artefact	1	0.05
	TOTAL	2176	100.00

Table 2 shows 2,073 (95.27%) smears were satisfactory for evaluation. 103 smears (4.73%) were unsatisfactory for evaluation, the most common reason being paucity of cells. The 2,073 satisfactory smears were further evaluated as per The Bethesda System 2001 for reporting cervical cytology.

Table 3. General Categorization of Smears According To The Bethesda System 2001

Sr. No.	General Categorisation	No. of Cases	Percentage
1	Negative for Intraepithelial Lesion or Malignancy (NILM)	1916	92.43
2	Others	2	0.10
3	Epithelial cell abnormalities	155	7.47
	TOTAL	2073	100.00

Table 3 shows smears classified into three general categories as per The Bethesda System 2001. A major bulk (1916 cases, 92.43%) of these was formed by "NILM" smears (Negative for Intraepithelial Lesion or Malignancy). "Epithelial Cell Abnormalities" were found in 155 (7.47%) smears. 2 cases were in the "Others" category.

Table 4A. Distribution of NILM Smears into Different Categories as Per The Bethesda System 2001

SR. NO.	CATEGORY UNDER NILM	NO. OF CASES	PERCENT.
1	Within Normal Limits (WNL)	156	7.53
2	Organisms	464	22.38
	Shift in flora suggestive of Bacterial vaginosis (BV)	174	8.39
	Fungal organisms morphologically consistent with Candida species	218	10.52
	Trichomonas vaginalis (TV)	20	0.96
	Cellular changes consistent with Herpes Simplex Virus	5	0.24
	Bacteria morphologically consistent with Actinomyces species	4	0.19
	Tuberculosis (granulomatous cervicitis)	6	0.29
	Leptothrix	2	0.10
	Larval form of nematode (Strongyloides Stercoralis)	1	0.05
	Ova of Trichuris trichiura	1	0.05
	Microfilaria	1	0.05
	Mixed infections	32	1.54
	-Bacterial vaginosis + Candida	21	1.01
	-Bacterial vaginosis+ Trichomonas vaginalis	5	0.24

	-Candida + Trichomonas vaginalis	3	0.14
	-Candida + Leptothrix	1	0.05
	-Bacterial vaginosis+ Trichomonas+ Candida	2	0.10
3	RCC*	1221	58.90
	-RCCI†	1210	58.37
	-RCC IUCD‡	11	00.53
4	Atrophy	75	3.62
	Total	1916	92.43

*RCC- Reactive Cellular Changes; †RCCI - Reactive cellular changes associated with inflammation; ‡RCC IUCD – Reactive Cellular Changes associated with Intrauterine Contraceptive Device;

Table 4B. Distribution of Epithelial Cell Abnormalities into Different Categories as Per The Bethesda System 2001

SR. NO.	CATEGORY	NO. OF CASES	PERCENT.
1	Squamous	130	6.26
	ASCUS ¹	50	2.41
	ASC-H ²	4	0.19
	LSIL ³	39	1.88
	HSIL ⁴	21	1.01
	Squamous cell carcinoma	16	0.77
2	Glandular	25	1.21
	Atypical Glandular Cells (AGC)	21	1.01
	Adenocarcinoma in-situ	0	0.00
	Adenocarcinoma	4	0.19
	TOTAL	155	7.47

¹ASCUS – Atypical Squamous Cells of Undetermined Significance; ²ASC-H – Atypical Squamous Cells, cannot exclude High grade lesion; ³LSIL – Low-grade Squamous Intraepithelial Lesion; ⁴HSIL – High-grade Squamous Intraepithelial Lesion

Table 4A shows classification of NILM smears into different categories based on Bethesda system. Maximum number (58.37%) of smears belonged to the category of "Reactive Cellular Changes associated with Inflammation" (RCC). Most common organism was Candida in 218 cases (10.52%), followed by Shift in flora suggestive of Bacterial Vaginosis (BV) in 174 cases (8.39%). Budding yeast forms of Candida are shown in Figure 1. Table 4B shows classification of Epithelial cell abnormalities into different categories based on Bethesda system. Most common was 'Atypical Squamous Cells of Undetermined Origin' (ASCUS) in 50 cases (2.41%), followed by 'Low-grade Squamous Intraepithelial Lesion' (LSIL) in 39 cases (1.88%). We encountered 16 cases (0.77%) and 4 cases (0.19%) of Squamous Cell Carcinoma and Adenocarcinoma, respectively. Figure 2 depicts cell morphology in Atypical squamous cells, cannot rule out high-grade squamous intraepithelial lesion (ASC-H) and High-grade squamous intraepithelial lesion (HSIL).

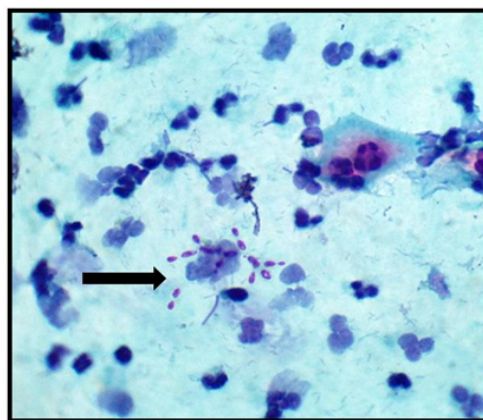


Figure 1. Candida. Photomicrograph shows budding yeast forms of Candida (arrow). Squamous cells have a polychromatic cytoplasm. (Pap 400x)

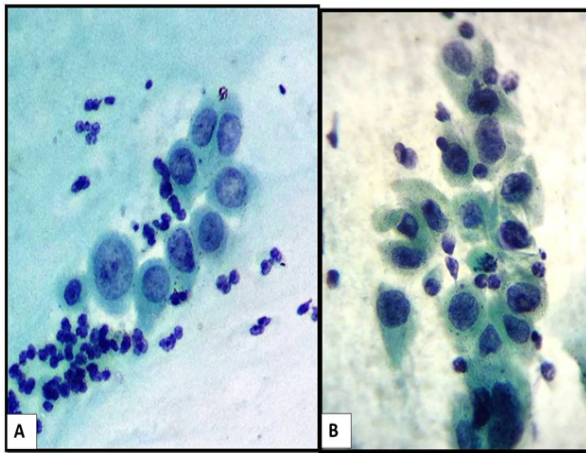


Figure 2. (A) ASC-H. Photomicrograph shows cells which are smaller in size (similar to metaplastic cells). N/C ratio is increased; nuclei are enlarged, with mild hyperchromasia and mild chromatin irregularity. **(B) HSIL.** Photomicrograph shows parabasal-type cells with dense cytoplasm and markedly raised N/C ratio. Nuclei are hyperchromatic with coarse granular chromatin and irregular nuclear contour. (Pap 1000x)

Table 6. Relation of Age and Cytological Diagnosis

Category	≤20 Yrs		21-30 yrs		31-40 yrs		41-50 yrs		>50 yrs		P Value
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	
(A) NILM[†]	20	(100)	600	(95.5)	817	(91.9)	389	(90.3)	90	(85.7)	<0.001
1. WNL [†]	2	(10.0)	48	(7.6)	65	(7.3)	37	(8.6)	4	(3.8)	0.554
2. Organism	6	(30.0)	143	(22.8)	200	(22.5)	99	(23.0)	16	(15.2)	0.420
3. RCC [‡]	12	(60.0)	409	(65.1)	547	(61.5)	220	(51.0)	33	(31.4)	<0.001
4. Atrophy	0	(0)	0	(0)	5	(0.6)	33	(7.7)	37	(35.2)	<0.001
(B) OTHERS	0	(0)	0	(0)	0	(0)	1	(0.2)	1	(1.0)	1.000
(C) EPI ABN[§]	0	(0)	28	(4.5)	72	(8.1)	41	(9.5)	14	(13.3)	0.001
1. ASCUSI	0	(0)	12	(1.9)	23	(2.6)	12	(2.8)	3	(2.9)	0.821
2. ASC-H ^{**}	0	(0)	1	(0.2)	2	(0.2)	1	(0.2)	0	(0)	1.000
3. LSIL ^{**}	0	(0)	7	(1.1)	21	(2.4)	11	(2.6)	0	(0)	0.161
4. HSIL ^{**}	0	(0)	3	(0.5)	8	(0.9)	7	(1.6)	3	(2.9)	0.108
5. SCC ^{§§}	0	(0)	1	(0.2)	4	(0.4)	5	(1.2)	6	(5.7)	<0.001
6. AGCII	0	(0)	2	(0.3)	13	(1.5)	5	(1.2)	1	(1.0)	<0.001
7. ADC ^{***}	0	(0)	2	(0.3)	1	(0.1)	0	(0.0)	1	(1.0)	1.000
TOTAL	20	(100)	628	(100)	889	(100)	431	(100)	105	(100)	

[†]NILM-Negative for Intraepithelial Lesion or Malignancy; [†]WNL-Within Normal Limits; [‡]RCC- Reactive Cellular Changes; [§]EPI ABN – Epithelial Cell Abnormality; IASCU – Atypical Squamous Cells of Undetermined Significance; ^{**}ASC-H – Atypical Squamous Cells, cannot exclude High grade lesion; ^{**}LSIL – Low-grade Squamous Intraepithelial Lesion; ^{**}HSIL – High-grade Squamous Intraepithelial Lesion; ^{§§}SCC – Squamous Cell Carcinoma; ^{||}AGC-Atypical Glandular Cells; ^{***}ADC-Adenocarcinoma

Table 6 shows that prevalence of NILM was highest in women below 30 years of age and least in >50 years of age (p<0.001). The prevalence of 'Epithelial cell abnormalities' was found to be highest (13.3%) in women >50 years of age (p=0.001). Prevalence of Reactive Cellular Changes (RCC) was highest (65.1%) in 21-30 years age group and lowest (31.4%) in >50 years of age (p<0.001). Maximum prevalence of atrophy (35.2%) was seen in >50 years of age (p<0.001). Prevalence of Squamous Cell Carcinoma was highest (5.7%) in women >50 years of age (p<0.001). Whereas the prevalence of 'Atypical Glandular Cells' was highest (1.5%) in between 31-40 years of age, closely followed by 1.2% between 41-50 years of age (p<0.001).

Table 5. Prevalence of Trichomonas Vaginalis (TV), Shift in flora suggestive of Bacterial Vaginosis (BV), Candida and Mixed Infections According to Age

ORGANISM	≤20 years		21-30 years		31-40 years		41-50 years		>50 years		P value
	No.	%	No.	%	No.	%	No.	%	No.	%	
TV	0	0	6	0.96	6	0.67	8	1.86	0	0	0.648
BV	3	15	52	8.28	71	7.99	41	9.51	7	6.67	0.910
Candida	2	10	73	11.62	97	10.91	41	9.51	5	4.76	0.051
Mixed Infections	1	5	8	1.27	16	1.80	7	1.62	0	0	0.527
Total Population of The Age Group	20	100	628	100	889	100	431	100	105	100	

Table 5 shows prevalence of Trichomonas vaginalis (TV), Candida, BV and mixed infections in different age groups. Prevalence of TV was highest (1.86%) in women between 41-50 years of age. BV (15%) and mixed infections (5%) were found to be most prevalent in young women ≤20 years. Prevalence of Candida in present study was highest (11.62%) in between 21-30 years, followed closely by 10.91% in women 31-40 years of age. All these infections were relatively uncommon in women above 50 years of age.

Mean age for NILM was 35.58 years and for epithelial abnormalities was 38.69 years. Mean age was found to be higher in patients with atrophy (52.49 years), HSIL (40.52 years), SCC (47.43 years) and Adenocarcinoma (40.5 years).

Table 7. Relation of Parity and Cytological Diagnosis

CATEGORY	NULLIPARA		PARA 1		PARA 2		≥PARA 3		P Value
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	
(A) NILM[†]	131	(95.6)	405	(94.6)	899	(93.1)	481	(88.7)	0.001
1. WNL [†]	14	(10.2)	39	(9.1)	72	(7.5)	31	(5.7)	0.137
2. Organism	36	(26.3)	104	(24.3)	228	(23.6)	96	(17.7)	0.021
3. RCC [‡]	78	(56.9)	257	(60.0)	576	(59.6)	310	(57.2)	0.726
4. Atrophy	3	(2.2)	5	(1.2)	23	(2.4)	44	(8.1)	<0.001
(B) OTHERS	0	(0)	0	(0)	1	(0.1)	1	(0.2)	1
(C) EPI ABN[§]	6	(4.4)	23	(5.4)	66	(6.8)	60	(11.1)	0.002
1. ASCUSI	1	(0.7)	9	(2.1)	23	(2.4)	17	(3.1)	0.387
2. ASC-H ^{**}	0	(0)	3	(0.7)	1	(0.1)	0	(0)	0.113
3. LSIL ^{**}	1	(0.7)	5	(1.2)	19	(2.0)	14	(2.6)	0.302
4. HSIL ^{**}	1	(0.7)	4	(0.9)	8	(0.8)	8	(1.5)	0.654
5. SCC ^{§§}	0	(0)	1	(0.2)	3	(0.3)	12	(2.2)	0.001
6. AGCII	2	(1.5)	0	(0)	11	(1.1)	8	(1.5)	0.038
7. ADC ^{***}	1	(0.7)	1	(0.2)	1	(0.1)	1	(0.2)	0.292
TOTAL	137	(100)	428	(100)	966	(100)	542	(100)	

[†]NILM-Negative for Intraepithelial Lesion or Malignancy; [†]WNL-Within Normal Limits; [‡]RCC- Reactive Cellular Changes; [§]EPI ABN – Epithelial Cell Abnormality; ASCUS – Atypical Squamous Cells of

Undetermined Significance; ^{††}ASC-H – Atypical Squamous Cells, cannot exclude High grade lesion; ^{†††}LSIL – Low-grade Squamous Intraepithelial Lesion; ^{††††}HSIL – High-grade Squamous Intraepithelial Lesion; ^{†††††}SCC – Squamous Cell Carcinoma; ^{††††††}AGC-Atypical Glandular Cells; ^{†††††††}ADC-Adenocarcinoma

Table 7 shows relation of parity with the cytological diagnosis. We found that in women '≥Para 3' there was significantly increased prevalence of Epithelial Cell Abnormalities (p=0.002) and decreased prevalence of NILM (p=0.001). There was a highly significant association of atrophy (p<0.001) and Squamous cell carcinoma (p=0.001) with high parity (i.e. in women ≥Para 3).

Prevalence of NILM was most common in women <30 years, in nullipara and Para 1. NILM showed a decreasing trend with increasing age and parity. "Epithelial cell abnormalities" and squamous cell carcinoma were most common in women more than 50 years of age and in '≥Para3' and showed an increasing trend with increasing age and parity. These findings were statistically significant.

Discussion

In our study, maximum cases (42.65%) were between 31-40 years of age, followed by 30.47% cases in between 21-30 years of age, while least cases (1.01%) were below 20 years of age. Findings of our study correlated with Suryawanshi et al (2013)⁶, Panda et al (2013)³, and Nikumbh et al (2012)⁷, who also found maximum cases in the age group of 31-40 years. Many studies showed least number of cases in ≤20 year age group correlating with our study.^{3,6,7,8,9}

Mean age of patients in our study was 35.77 years, whereas Nikumbh et al (2012)⁷ found mean age of patients in their study as 37 years.

In our study, maximum cases (46.92%) were Para 2, followed by 25.97% cases which were Para 3 and above. Rahman et al (2013)⁴ found that maximum patients (90%) who complained of leucorrhoea were multipara. Kulkarni et al (2005)¹⁰ also found high parity to be significantly associated (p value <0.001) with leucorrhoea. This may be because women with high parity are at greater risk of vaginal infections, cervicitis, cervical erosion etc. that may lead to leucorrhoea in these women.¹⁰

Maximum cases in our study (83.18%) had no associated symptoms apart from leucorrhoea. Amongst women having other symptoms, vulvar itching was the most common followed by lower abdominal pain. Whereas Panda et al (2013)³ also studied 50 cases of leucorrhoea and they found lower abdominal pain and backache to be the most common associated symptom associated with leucorrhoea, followed by itching to be the second most common. This may be because of the wide difference between sample size in our study (2176 cases) and their study (50 cases).

Table 1 shows that in our study 21.46% cases had macroscopically abnormal cervix. Commonest macroscopic abnormality was cervical erosion (10.53%), followed by cervical hypertrophy (4.46%). Suryawanshi et al (2013)⁶ and Nikumbh et al (2012)⁷ also showed similar findings in their respective studies.

Table 2 shows distribution of smears into satisfactory and non-satisfactory, in present study. 2073 (95.27%) smears were satisfactory for evaluation, whereas 103 (4.73%) smears were not satisfactory for evaluation. Adequacy rates were fairly correlating with a number of studies, all showing more than 95% satisfactory smears.^{6,11,12,13,14}

Table 3 shows classification of the satisfactory smears in present study into three General Categories as per The Bethesda System 2001. The major bulk (92.43%) was formed by NILM smears, whereas Epithelial Cell Abnormalities were found in 7.47%. Table 8 shows findings of present study fairly correlated with most of the studies. However, Ranabhat et al (2011)¹² and Ahmed et al (2012)¹⁶ found low

prevalence of epithelial abnormalities. These differences may be because these studies were done in different countries, Nepal and Saudi Arabia, respectively. Different populations may have exposure to different risk factors, thus their variable prevalence. None of these studies classified any case in the 'Other' category, whereas we found 2 cases showing endometrial cells in women >40 years and classified them under the 'Other' category.

Table 8. Comparison of the General Categorization of Smears in Different Studies with Present Study

STUDY	YEAR	NILM* (%)	OTHERS (%)	EPI. ABN. † (%)
Balaha et al ¹⁴	2011	90.7	0	9.3
Ranabhat et al ¹²	2011	98.3	0	1.7
Bal et al ¹³	2012	94.8	0	5.2
Nikumbh et al ⁷	2012	94.2	0	5.8
Bukhari et al ¹⁵	2012	89.8	0	10.2
Ahmed et al ¹⁶	2012	98.7	0	1.3
Suryawanshi et al ⁶	2013	92.9	0	7.1
Present study	2012-14	92.43	0.1	7.47

*NILM – Negative for Intraepithelial Lesion or Malignancy; †EPI. ABN. – Epithelial cell abnormalities

Table 4A shows distribution of NILM smears into different categories as per The Bethesda System 2001. In the present study, 7.53% smears were 'Within normal limits'. This can be explained on the basis of physiological causes of leucorrhoea. 22.38% smears revealed organisms, 58.9% showed 'Reactive Cellular Changes' and 3.62% showed 'Atrophy' in present study. We found only few studies which classified NILM as per The Bethesda System categories. Table 9 compares the distribution of NILM smears in our study with these studies. Smears diagnosed as 'Within Normal Limits' showed prevalence rates varying widely from 16% to 43%. Similarly, prevalence of organisms was also widely variable ranging from 2.83% to 46.29%. Prevalence of 'Reactive Cellular Changes' in present study was somewhat close to that found by Bal et al (2012)¹³. Prevalence of 'Atrophy' in present study correlated with that of Suryawanshi et al (2013)⁶. Table 10 compares prevalence of common organisms found in our study with other studies. Prevalence of Candida organism in present study (10.52%) correlated well with that found by Rahman et al¹ in 2013 (10%). Its prevalence in other studies was found to be low. Prevalence of Shift in flora suggestive of Bacterial vaginosis (BV) in present study (8.39%) correlated well with that of Ranabhat et al¹² in 2011 (7.6%). It was found to be variable in other studies, ranging from 1% to 12%. Prevalence of Trichomonas vaginalis was similar as that found by Suryawanshi et al (2013)⁶ and Nikumbh et al (2012)⁷. Other studies mostly showed slightly lower prevalence, except Rahman et al (2013)⁴ who found a very high prevalence (10%) of Trichomonas vaginalis. Prevalence of Herpes simplex virus in present study was fairly correlating with studies of Ranabhat et al (2011)¹² and Suryawanshi et al (2013)⁶.

Table 9. Comparison of Various NILM Categories in Present Study with Other Studies

STUDY	YEAR	WNL [†]	ORGANISM	RCC [†]	ATROPHY
Balaha et al ¹⁴	2011	43.13%	46.29%	1.71%	0.34%
Bal et al ¹³	2012	16.70%	3%	71.30%	-
Suryawanshi et al ⁶	2013	16.16%	2.83%	80.00%	4%
Present study	2012-14	7.53%	22.38%	58.90%	3.62%

*WNL-Within Normal Limits; †RCC-Reactive Cellular Changes

Table 10. Comparison of Common Organisms Found in Present Study with Other Studies

STUDY	YEAR	CANDIDA	BV*	TV†	HSV‡
Ranabhat et al ¹²	2011	1%	7.60%	0.45%	0.34%
Suryawanshi et al ⁶	2013	0.67%	1%	1%	0.16%

Rahman et al ⁴	2013	10%	12%	10%	-
Sengul et al ¹⁷	2014	2.70%	5.60%	0.20%	-
Kalantri et al ¹⁸	2014	6.70%	0.60%	0.20%	-
Present study	2012-14	10.52%	8.39%	0.96%	0.24%

[†]BV- Shift in flora suggestive of Bacterial vaginosis; [‡]TV-Trichomonas vaginalis; [§]HSV-Herpex Simplex Virus

Few less common organisms were also encountered in present study, which have been reported by many workers in previous studies. These infections were Microfilaria^{19, 20, 21}, larva of Strongyloides stercoralis^{22, 23} and ova of Trichuris trichiura²⁴. Presence of larva of Strongyloides stercoralis and ova of Trichuris trichiura was confirmed by stool examination in the respective patients, in present study. Although presence of these parasites is mostly due to contamination, it helps in diagnosis of the stool infection and starting specific therapy for it.

Table 4B shows distribution of Epithelial cell abnormalities into different categories as per The Bethesda System 2001. Table 11 shows comparison of prevalence of epithelial cell abnormalities in our study with that of other studies. Our findings fairly correlated with other studies. According to the National Cancer Institute Workshop Guidelines (1992)²⁶, the frequency of reporting ASCUS in a laboratory should be under 5%. We reported 2.41% cases of ASCUS, which was a good quality measure.

Table 11. Comparison of Prevalence of Various Epithelial Cell Abnormalities in Present Study with Other Studies

STUDY	YEAR	ASCUS*	ASC-H [†]	LSIL [‡]	HSIL [§]	AGC	SCC**	ADC ^{††}
Kapila et al ¹¹	2006	2.20%	0	1%	0.20%	0.80%	0.10%	
Balaha et al ¹⁴	2011	2.99%	0.60%	0.09%	0.68%	0.26%	0.34%	0
Ranabhat et al ¹²	2011	0.23%	0	0.34%	0.68%	0.23%	0.23%	0
Ahmed et al ¹⁶	2012	0.48%	0.06%	0.19%	0.37%	0.25%	0.10%	0.05%
Nikumbh et al ⁷	2012	0.96%	0	0.96%	1.98%	0.40%	1.60%	0
Bal et al ¹³	2012	0.30%	0	2.70%	0.70%	0.00%	1%	0.30%
Suryawan shi et al ⁶	2013	2.12%	0	2.12%	1.81%	0.00%	0.90%	0
Gupta et al ²⁵	2013	0.52%	0.05%	1.36%	0.91%	0.05%	0.28%	0
Sengul et al ¹⁷	2014	1.18%	0	0.39%	0.16%	0.07%	0.02%	0.006%
Present study	2012-14	2.41%	0.19%	1.88%	1.01%	1.01%	0.77%	0.19%

*ASCUS – Atypical Squamous Cells of Undetermined Significance; [†]ASC-H – Atypical Squamous Cells, cannot exclude High grade lesion; [‡]LSIL – Low-grade Squamous Intraepithelial Lesion; [§]HSIL – High-grade Squamous Intraepithelial Lesion; AGC-Atypical Glandular Cells; **SCC – Squamous Cell Carcinoma; ^{††}ADC-Adenocarcinoma

Table 5 shows prevalence of TV, Candida, BV and mixed infections in different age groups in present study. Prevalence of TV was highest in women between 41-50 years of age, whereas Kalantri et al (2014)¹⁸ observed it to be highest in 30-40 years age group. BV and mixed infections in present study were found to be most prevalent in young women ≤20 years, whereas Kalantri et al (2014)¹⁸ found them to be most prevalent in between 20-30 years. Prevalence of Candida in present study was highest (11.62%) in between 21-30 years followed closely by 10.91% in women 31-40 years of age. Kalantri et al (2014)¹⁸ found highest prevalence of Candida in between 30-40 years of age.

Table 6 shows relation of age and cytological diagnosis in present study. Prevalence of NILM was highest in women <30 years age and

least in >50 years of age. The prevalence of 'Epithelial cell abnormalities' was highest (13.3%) in women >50 years of age. Sengul et al (2014)¹⁷ also found a higher age associated with epithelial abnormalities and a lower age associated with smears showing no abnormal cells (p<0.05). Ranabhat et al (2011)¹² and Gupta et al (2013)²⁵ also found increased prevalence of abnormalities with increasing age. Also, squamous cell carcinoma in present study was most common (5.7%) in women >50 years of age. Gupta et al (2013)²⁵ also found maximum cases of carcinoma in age above 40 years.

Table 7 shows relation of parity with cytological diagnosis. In present study, we found that in women '≥Para 3' there was increased prevalence of all epithelial abnormalities (except ASC-H and adenocarcinoma). This association with high parity was statistically significant for squamous cell carcinoma. Bukhari et al (2012)¹⁵ and Gupta et al (2013)²⁵ also noted association of epithelial abnormalities and invasive carcinoma with high parity. But, Sengul et al (2014)¹⁷ had a different finding. They found that mean parity of patients with epithelial abnormalities (1.6) was lower than mean parity of patients with normal smears (2.8), and this was statistically significant (p<0.05).

Thus, leucorrhoea is a non-specific symptom of many varied underlying diseases. Therefore, detection of the underlying cause is very important for treatment. Cervico-vaginal infections can be treated satisfactorily when diagnosed. But most essentially, malignant or premalignant lesions need to be detected and managed as early as possible. Cancer cervix has well documented pre-neoplastic lesions which precede the invasive stage by 10-15 years. These lesions can be easily diagnosed by examination of Pap smear. Thus, we emphasize the need for cytological screening of women complaining of leucorrhoea keeping in mind the fact that cervical cancer is still one of the leading cancers among Indian women.⁹ Periodic and regular cytological screening of women with leucorrhoea goes a long way to detect and treat these lesions in its initial stage itself.

Conclusions

1. The most common finding in cervical smears in leucorrhoea is "Reactive Cellular Changes associated with Inflammation"; followed by 'Organisms' being the second most common.
2. The most common infection causing leucorrhoea is Candida, and second most common is Shift in flora suggestive of Bacterial vaginosis.
3. Epithelial Cell Abnormalities can manifest as leucorrhoea. Therefore, regular screening of women with leucorrhoea is must for early diagnosis, timely treatment, and thus reducing the progression of precancerous lesions to carcinoma.
4. Prevalence of 'Epithelial cell abnormality' and squamous cell carcinoma increases with increasing age and parity.
5. Prevalence of NILM is associated with younger age and lower parity.
6. The Bethesda System for Reporting Cervical Cytology is very useful as it provides fixed terminologies and criteria for diagnosis. This helps in maintaining the uniformity of reporting cervical smears and in effective communication between the cytologists and treating physician.
7. Papanicolaou smear is a simple, efficient and inexpensive tool for screening of women with leucorrhoea. It helps in early diagnosis and treatment of precancerous and cancerous lesions of cervix. It also helps in identification of infections, thus instituting specific treatment.

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