

## Original Article

### Spectrum of infections in cervico-vaginal pap smears

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#### Abstract

**Background:** Cervical infections are commonly encountered problems occurring in the women of the reproductive age group. Pap smear, a screening test for carcinoma cervix is a simple, quick test that can also be used for diagnosing cervico-vaginal infections. The present study was undertaken to study the role of Pap smears in diagnosing cervico-vaginal infections and to study the spectrum of infections occurring in this region. **Methods:** A retrospective data of 1252 subjects of pap smears in R L Jalappa Hospital and Research Centre. The samples obtained were stained with Papanicolaou stain (Pap) and examined for bacteria, viruses, parasite or fungal infections. **Results:** : The overall frequency of normal, inadequate, infectious, inflammatory and neoplastic smears were 335(26.76%), 49(3.92%), 627(50.07%), 173(13.82%) and 68 (5.43%) respectively. The presenting complaints in <30age group were white discharge per vagina (WDPV) (60.6%) followed by pain abdomen (7.78%), where as in >30 age group it was WDPV(57.22%) followed by prolapse(10.29%) and dysfunctional uterine bleeding(2.77%). Smears showing lactobacilli were 393(62.67%). Among the infective smears, 173 cases (13.82%), the cytologic diagnosis was nonspecific inflammation. Other important infections were Gardnerella infection 115(18.34%), followed by fungal infection (candidiasis) 70(11.16%), trichomonas vaginalis 37(5.90%) and leptothrix 10(1.59%) and herpes 1(0.15%), Chlamydia 1(0.15%) and aspergillus 1(0.15%). **Conclusion:** The cervical smear the most simple and a quick test which is beneficial in diagnosing cervical infections. However, other ancillary tests need to be employed for confirmatory diagnosis.

**Key words:** Papanicolaou smear, cervico-vaginal infections, bacterial vaginosis, trichomonas vaginalis, fungal infections.

#### Introduction

Cervical infections are commonly encountered problems occurring in the women of the reproductive age group. They present with white discharge, foul smelling odour and pruritis.<sup>[1]</sup> Most of these infections are diagnosed on routine Pap smear examination. Pap smear first introduced by George Papanicolaou in 1943 is a screening test to detect the presence of abnormal cells in the cervix that could become cancerous if not diagnosed early<sup>(1)</sup>. Infectious vaginitis, a common health problem in women is caused by microbial agents. Several diagnostic modalities are employed to diagnose infectious vaginitis, but these tests may be subjective.<sup>[2]</sup> So Pap smear test which is a simple, quick, painless procedure employed to screen cervical cancer can also be used for diagnosing cervico-vaginal infections. Hence, this work was undertaken to study the utility of Papanicolaou smears in diagnosing cervico-vaginal infections and to study the spectrum of infections occurring in this region.

#### Materials and Methods

A total number of 1252 subjects are considered in our study as a retrospective analysis. Pap smears were received to the department of pathology from Jan to Dec 2011. Samples were obtained from married women attending the gynaecology OPD in the age group of 18-80 years with complaints of vaginal discharge, backache, dyspareunia, dysuria and post-coital bleeding. Patients having vaginal bleeding, other than postcoital, were excluded from the study. Informed consent obtained prior to sampling. Papanicolaou smears were taken from patients who were not menstruating. The patient was placed in lithotomy position, a speculum was inserted into her vagina and sample of cells were taken from in and around the cervix with Ayre's spatula (wooden scraper). The samples were smeared on glass slides, fixed in alcohol fixative, stained with Papanicolaou stain (PAP stain). The slides were examined under light microscopy by qualified cytopathologists for

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Only some cases were correlated with microbiology cultures as not all Pap smears were accompanied by vaginal swab cultures. Our study is based on descriptive analysis of the data. Hence no statistical analysis was done. Ethical clearance was obtained from the institutional ethics committee before commencement of this study.

## Results

The age group ranged from 18-80 years, with age <30 being 244 (19.4%) and >30 being 1008 (80.5%). The overall frequency of normal, inadequate, neoplastic, inflammatory and infective smears were 335(26.76%), 49(3.92%), 627(50.07%), 173 (13.82%) and 68(5.43%) respectively. The presenting complaints in <30age group were white discharge per vagina (WDPV) (60.6%) followed by pain abdomen (7.78%), where as in >30 age group it was WDPV (57.22%) followed by prolapse (10.29%) and dysfunctional uterine bleeding (2.77%). In 173 cases (13.82%), the cytologic diagnosis was nonspecific inflammation (Fig.1a). The micro-organisms observed in our study were: (a) Lactobacilli, (b) Bacterial vaginosis, (c) Candida (d) Trichomonas Vaginalis (d) Others.

Lactobacilli - Smears showing lactobacilli were 393/627(62.67%) (Fig.1b). These appeared as slender rod shaped bacilli associated with mild to severe inflammatory response. The common age group was between 31-40yrs and presented with white discharge per vagina 264(67.17%) followed by pain abdomen 18(4.58%). The other presenting complaints included dysfunctional uterine bleeding 13(3.30%) and post menopausal bleeding 13 (3.30%).

Bacterial vaginosis - accounted for 115/627 (18.34%) of our infections (Fig.1c). A diagnosis of bacterial vaginosis is based on 3 findings: a filmy background of small coccobacilli, individual squamous cells coated with a layer of coccobacilli along the cell membranes (Clue cells of Gardnerella vaginalis), conspicuous absence of lactobacilli.<sup>[2]</sup> The common age group was between 31-40yrs and presented with white discharge per vagina 79(68.69%) followed by prolapse 10(8.69%).

Fungal infection - The common fungal infection was Candida 70/627(11.16%) identified by the presence of yeast forms and pseudohyphae (Fig.1d). 1/627(0.15%) case of Aspergillus identified by the presence of conidiophores and conidia (Fig.2a) was reported. The age group of patients with fungal infection ranged between 31-40 yrs and they also

presented with curdy white discharge per vagina 45 (64.28%).

Trichomonas vaginalis - were reported in 37/627(5.90%) of our cases. These are 15-30um, pear shaped structures with a centrally located nucleus (Fig.2b).<sup>[2]</sup> The common age group was between 41-50yrs and they presented most commonly with white discharge 21(56.75%). The other complaints included cervicitis, pelvic inflammatory disease, fibroid uterus, ovarian cysts 7(18.91%).

Other infections - reported in our study include 10/627(1.59%) cases of Leptothrix which is a long, curving, filamentous bacteria (Fig.2c) and Chlamydia 1/627(0.15%) identified in cells showing coccoid bodies with a clear halo and vacuolated cytoplasm (Fig.2d). The age group ranged between 31-40 yrs and most of these cases also presented with white discharge per vagina 6(60%). Patient with chlamydial infection presented with dysfunctional uterine bleeding.

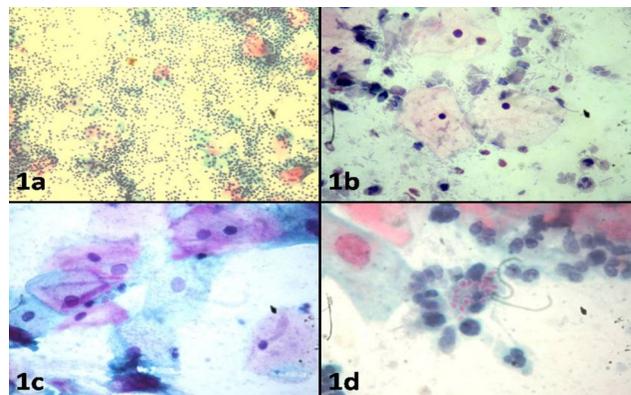


Figure:1 - a) Microphotograph of Inflammatory smear with predominance of polymorphonuclear leucocytes (Pap,X100) b) Lactobacilli (Doderlein bacilli) against an inflammatory background in cervicovaginal smears (Pap,X400) c) Gardnerella vaginalis (clue cell) - the surface of squamous cell is obscured by a large accumulation of anaerobic short rod like bacilli (Pap,X400) d) Candidiasis (moniliasis) - budding yeast forms of fungus (Pap,X 1000).

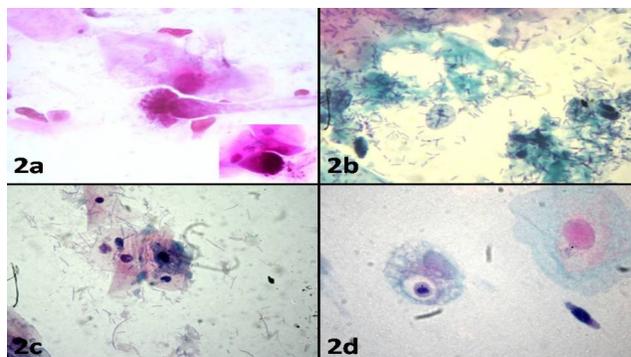


Figure :2 - a) Microphotograph of Aspergilliosis - showing conidiophore and conidia (Pap,X1000). Inset shows "fruiting body"(Pap,X1000) b) Trichomoniasis -grey - green ovoid structures with poorly preserved nuclei. Background shows lactobacilli (Pap,X1000) c) Leptothrix - long, curving, filamentous bacteria (Pap,X400) d) Chlamydial infection showing tiny elementary coccoid bodies surrounded by narrow clear zones seen in the cytoplasm of squamous cells (Pap,X1000).

Infections	Bukhari et al <sup>(1)</sup> (2010)	Levi et al <sup>(2)</sup> (2011)	Present study (2012)
Bacterial vaginosis*	75.7%	13.9%	18.34%
Fungal infection*	6.5%	13.9%	11.16%
Trichomonas vaginalis	7.3%	0.7%	5.90%

\*Bacterial vaginosis (*Gardnerella vaginalis*), Fungal infection (*Candidiasis*)

Table :1 – Comparison of our findings with other studies

## Discussion

Infectious vaginitis is one of the most common women's health problem world wide <sup>(1)</sup>. Several tests are used for the diagnosis of infectious vaginitis, but many may be subjective. Though Pap test has become a successful test for screening cervical cancers, it is also very useful for diagnosing cervico-vaginal infections<sup>(2)</sup>. The overall incidence of infectious vaginitis in our study was 50.07% when compared to the Western literature (38.3%)<sup>(1)</sup>. Studies have shown that the 3 leading microbial agents that are responsible for 90% of infectious vaginitis are the organisms causing Bacterial Vaginosis (BV), *Candida* species, and *Trichomonas vaginalis* <sup>(3)</sup>. Our study showed similar pattern of infections with predominance of bacterial vaginosis. Comparison of our study with other studies are shown in (Table -1).

The major bacteria causing bacterial vaginosis is *Gardnerella vaginalis*. The gold standard for diagnosing bacterial vaginosis (BV) was described by Amsel et al <sup>(4)</sup>. These include (1) a milky homogeneous vaginal discharge; (2) a vaginal pH of more than 4.5; (3) a fishy amine odor in the whiff test; and (4) clue cells on a saline wet mount. Our study showed about 18.34% of bacterial vaginosis as compared to Levi et al <sup>(2)</sup> (13.9%). But another study by Bukhari et al <sup>(1)</sup> showed higher incidence (75.7%). In our study 79 (68.69%) of cases presented with white discharge, fishy odour and presence of Clue cells was obvious on cytology examination. The reporting of BV is important as it predisposes to postoperative infections in both obstetrics and gynecology, pre-term delivery, chorioamnionitis, urinary tract infections, endometritis, and pelvic inflammatory disease <sup>(5)</sup>. BV also increases the risk of HIV acquisition<sup>(6)</sup>. Hence correct identification of these organisms are essential for optimal treatment.

Vulvovaginal candidiasis causes curdy white discharge as seen in our study population, which comprised 11.16% of cases in concordance with Levi et al <sup>(2)</sup> (13.9%). Most of the times they are symptomless and treatment is not indicated. They are thin-

walled blastospores 1.5-4 um in diameter or hyphae can be appreciated on Pap smears<sup>(6)</sup>. Seasonal variation of occurrence of Candidiasis was reported by Sodhani et al <sup>(7)</sup> who observed a higher detection rate in rainy season. But in our study we did not find any significant seasonal variation. The other fungus reported in our study was *Aspergillus*. Its presence should be reported with caution as the cytopathologist should be able to differentiate between a true infection and contamination<sup>(8)</sup>. In our case, *Aspergillus* was a contaminant, as cultures were negative. Hence, it is essential to rule out contamination to avoid unnecessary exposure of the patient to antifungal therapy, whereas true infection may further require thorough clinical examination and other relevant investigations to study the immune status of the individual <sup>(8)</sup>. The occurrence of Trichomoniasis in our study was 5.90%, similar to Bukhari et al <sup>(1)</sup> (7.3%). The reporting of Trichomoniasis is important since they are associated with adverse pregnancy outcomes such as premature rupture of membranes, pre-term delivery and low birth weight,<sup>(9)</sup> as well as increased risk of HIV transmission<sup>(6)</sup>. As per a study by Rietveld et al, trichomonas also showed seasonal variation with higher incidence in winter and lower incidence in summer<sup>(10)</sup>.

Another interesting feature observed by Tirone et al <sup>(11)</sup> and Bukhari et al <sup>(1)</sup> is that *T.vaginalis* positive smears showed atypical cytology at ASCUS (atypical squamous cells of undetermined significance) level. Studies have shown that in trichomoniasis, the superficial and intermediate cells may show inflammatory atypia, nuclear hypertrophy, slight hyperchromasia, cytoplasmic vacuolization and a rare binucleation. These features could be confused for cervical carcinoma<sup>(12)</sup>. Hence careful interpretation of smears with trichomoniasis is essential. *Leptothrix vaginalis* is a filamentous bacterium found in the vagina of young females especially during pregnancy. The patients may present with vulvo-vaginal pruritis and irritation of the vaginal mucosa. Examination may reveal thick, yellowish vaginal discharge and often encountered in patients with poor personal hygiene. It usually occurs as a co-infection along with trichomonads. So finding leptothrix in Pap smears may give us clue of the co-existing trichomoniasis<sup>(13)</sup>. In our study we found one case having both leptothrix and trichomonas vaginalis together. There was only a single case of Chlamydial infection in our study. Chlamydia trachomatous infection has emerged as a major sexually transmitted pathogen responsible of various manifestations both in men and in women. It is associated with urethritis, mucopurulent cervicitis, endometritis, pelvic inflammatory disease and may also lead to infertility<sup>(14)</sup>.

such as insects, fungi and herbivorous mammals. By Some studies have shown its association with follicular cervicitis and carcinoma in situ<sup>(15)</sup>. Because the infection with *Chlamydia trachomatis* is of major clinical significance, the consensus is that the identification of this agent should always be confirmed by culture, as it was done in our study.

### Conclusion

Our study emphasizes the fact that the cervical smear is the most simple and a quick test which is beneficial in diagnosing cervical infections. Bacterial vaginosis was the commonest infection in our study population. Control of these infections is possible through regular screening and treatment. However, further studies need to be undertaken with inclusion of other ancillary tests for more confirmatory diagnosis.

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### References

1. Bukhari MH, Majeed M, Qamar S, Niazi S, Syed SZ, Yusuf AW, Yusuf NW. Clinicopathological study of Papanicolaou (Pap) smears for diagnosing of cervical infections. *Diag Cytopathol* 2010;40:35-41.
2. Levi AW, Harigopal M, Hui P, Schofield K, Chhieng DC. Comparison of affirm VPIII and Papanicolaou Tests in the detection of Infectious Vaginitis. *Am J Clin Pathol* 2011;135:442-47.
3. Fleury FJ. Adult vaginitis. *Clin Obstet Gynecol* 1981;24:407-38.
4. Amsel R, Totten PA, Spiegel CA, et al. Nonspecific vaginitis. Diagnostic criteria and microbial and epidemiologic associations. *Am J Med* 1983;74:14-22.
5. Eschenbach DA, Hillier S, Critchlow C, et al. Diagnosis and clinical manifestations of bacterial vaginosis. *Am J Obstet Gynecol* 1988;158:819-28.
6. A.McMillan. The detection of genital tract infection by Papanicolaou-stained tests. *Cytopathology* 2006;17:317-22.
7. Sodhani P, Murthy NS, Sartdana S, et al. Seasonal variation in genital tract infections as detected on Papanicolaou's smear examination. *Diagn Cytopathol* 1994;10:98-99.
8. Chandra S, Gaur D, Harsh M, Chaturvedi J, Kishore S. An unusual presentation of *Aspergillus* species in a routine cervicovaginal pap smear: a case report. *Acta Cytol* 2009;53:229-31.
9. Workowski KA, Berman SM. Sexually transmitted diseases treatment guidelines, 2006. *MMWR Recomm Rep*. 2006; 55:1-94.
10. Rietveld WJ, Boon ME, Meulman JJ. Seasonal fluctuations in the cervical smear detection rates for (pre) malignant changes and for infections. *Diagn Cytopathol* 1997;17:452-5.
11. Tirone NR, Souza CE, Michelin MA, Murta EF. Frequency of infectious agents for vaginitis in patients with a cytological diagnosis of atypical squamous cells of undetermined significance. *Eur J Gynaecol Oncol* 2008;29:144-7.
12. Bertini B, Hornstein M. The epidemiology of trichomoniasis and the role of this infection in the development of carcinoma of the cervix. *Acta Cytol* 1970;14:325-32.
13. Carvalho G, Kramer WM, Kay S. The presence of *Leptothrix* in vaginal smears. *Acta Cytol* 1965;9:244-6.
14. Robinson DT, Thomas BJ. The role of *Chlamydia trachomatis* in genital tract and associated diseases. *J Clin Pathol* 1980;33:205-33.
15. Hare MJ, Robinson DT, Cooper P. Evidence for an association between *Chlamydia trachomatis* and cervical intraepithelial neoplasia. *Br J Obstet & Gynecol* 1982;89:489-92.