

Original Research Article

Comparative study of cervical cytology in HIV-infected and non-HIV-infected women

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ABSTRACT

Background: Cervical cancer remains a major preventable cause of morbidity and mortality among women worldwide, with HIV-infected women demonstrating a substantially higher susceptibility to persistent HPV infection and cervical dysplasia. This study compares cervical cytological findings in HIV-positive and HIV-negative women using Pap smear screening.

Methods: A six-month retrospective study was conducted on 200 Pap smears (100 HIV-positive, 100 HIV-negative) reported according to the 2014 Bethesda System. Unsatisfactory smears were excluded and cytological patterns were analyzed and compared.

Results: HIV-positive women showed a markedly higher prevalence of cervical abnormalities. Squamous epithelial abnormalities (SEA) were observed in 17% of HIV-positive women compared to 5% of HIV-negative women. Non-squamous abnormalities, including infectious etiologies such as bacterial vaginosis, candidiasis and trichomonas, were also significantly higher in the HIV-positive cohort (34% vs 12%). NILM rates were substantially lower among HIV-infected women (49% vs 79%).

Conclusions: HIV infection is strongly associated with increased cervical cytological abnormalities, underscoring the need for early, routine and targeted cervical screening, including Pap and HPV testing, in HIV-positive women to enable timely intervention and reduce the risk of cervical cancer.

Keywords: Cervical cancer, HIV, SEA

INTRODUCTION

Cervical cancer ranks third among cancers affecting women globally.¹ In India, it accounts for approximately 6–29% of all cancers in women. The age-adjusted incidence rate varies significantly across regions, with the highest reported in Mizoram (23.07 per 100,000) and the lowest in Dibrugarh district (4.91 per 100,000).² Despite being highly preventable, cervical cancer remains a major public health concern. In 2020 alone, 604,127 women were diagnosed with the disease and 341,831 deaths were reported worldwide.³ Papanicolaou (Pap) smear screening plays a crucial role in the detection of cervical epithelial cell abnormalities, which range from moderate and severe

dysplasia to invasive malignancy.⁴ Early detection and treatment through screening have been shown to significantly reduce cervical cancer mortality.²

Importantly, women living with HIV are at a six-fold higher risk of developing cervical cancer compared to the general population.⁵ In a resource-limited country such as ours, authors have recommended conduction of awareness programs, counselling and routine Pap smear screening in HIV-positive women.⁶ Consequently, separate screening guidelines have been established for HIV-infected and non-infected women. This study highlights the need for improved healthcare practices for HIV-infected women, who face a higher risk of cervical abnormalities due to

weakened immune systems. HIV accelerates the progression of HPV infections the primary cause of cervical dysplasia and cancer making early and regular screening (e.g., Pap smears and HPV testing) essential. By comparing cervical cytology in HIV-infected and non-infected women, the study underscores the higher prevalence of abnormalities in the HIV-positive group. These findings support targeted screening strategies and may help shape healthcare policies to reduce the burden of cervical cancer in this vulnerable population.

Aim

To evaluate and compare cervical cytological abnormalities in HIV-positive and HIV-negative women using Pap smears, highlighting the impact of HIV on cervical health and the importance of targeted screening in HIV-infected women.

METHODS

The present study was a six-month retrospective analysis conducted in the Department of Pathology at the Surat Municipal Institute of Medical Education and Research, a tertiary healthcare centre in Surat. It included all Pap smears received between November 2023 and April 2024 from women who had undergone HIV testing. The study comprised 100 Pap smears from HIV-positive women and 100 from HIV-negative women.

The Pap-stained slides of the cases were retrieved and studied. Unsatisfactory smears were excluded. The data collected were tabulated and analysed. The required clinical history of the patients was obtained from the requisition forms and patient's file. The result of these pap smears was based on the 2014 Bethesda system for reporting cervical cytologic diagnoses. The report given by pathologists was based on the 2014 Bethesda reporting system. All the data were manually collected and subsequently analysed.

RESULTS

Authors have studied total 200 pap smear cases. 100 cases of women infected with HIV and 100 cases with non-HIV infected women. PAP smears with unsatisfactory result are been excluded from the study. HIV-positive women had a younger mean age (43 years) than HIV-negative women (48 years). This suggests cervical abnormalities tend to occur earlier in HIV-infected women, reflecting higher vulnerability due to immunosuppression (Table 1).

NILM was significantly lower in HIV-positive women (49%) compared to HIV-negative women (79%) as shown in table 2. HIV-positive women showed higher proportions of both non-SEA (34%) and SEA (17%) compared to non-infected women (12% and 5%, respectively). This highlights a nearly three-fold increase in precancerous lesions among HIV-positive individuals. Bacterial vaginosis (20% vs 8%), candidiasis (8% vs 2%) and

trichomonas infection (3% vs 1%) were all notably more common in HIV-positive women.

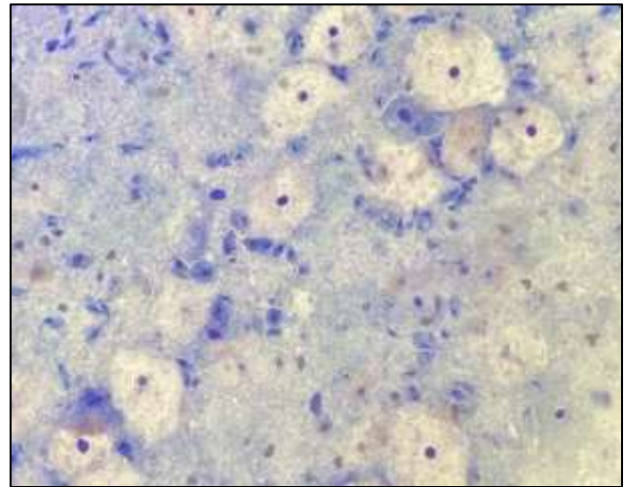


Figure 1: Presence of multiple trichomonas trophozoites (PAP stain, 40X).

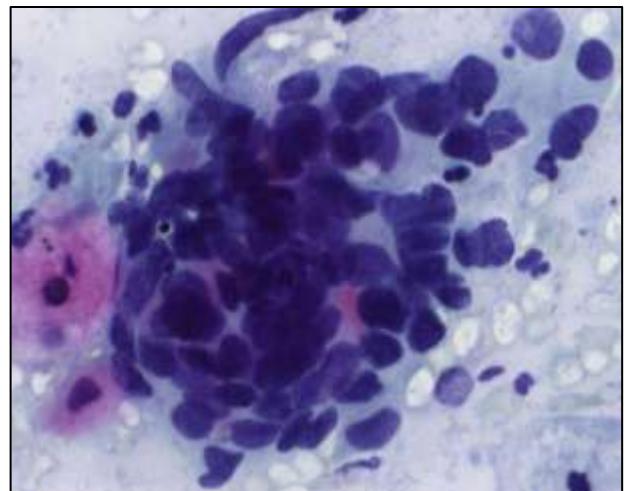


Figure 2: HSIL lesion (PAP Stain, 40X).

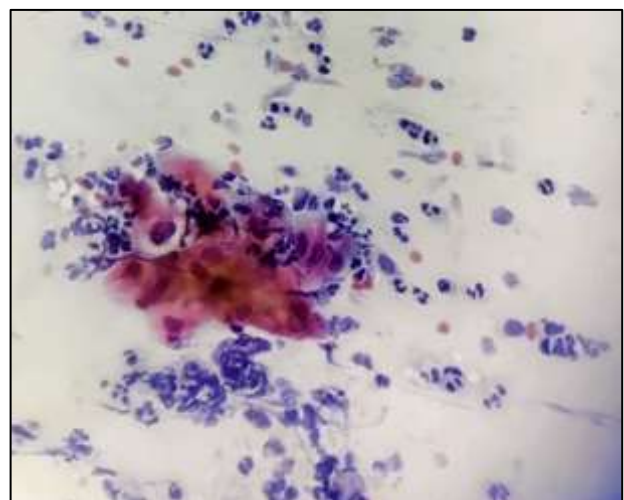


Figure 3: LSIL lesion (PAP stain, 40X view).

These findings support higher susceptibility to opportunistic infections in immunocompromised patients (Table 3). Higher-grade abnormalities (ASC-H, LSIL,

HSIL) were more frequent in HIV-positive women, with a combined SEA rate of 17% vs 5% in HIV-negative women as shown in Table 4.

Table 1: Age distribution in HIV and non-HIV patients.

HIV status	Age range (in years)	Mean age (in years)
HIV	21 to 70	43
Non-HIV	24 to 75	48

Table 2: Lesion types by HIV status and case numbers.

HIV status	Lesion	No. of cases/Percentage	Total
HIV	NILM	49	100
	Non-SEA	34	
	SEA	17	
Non-HIV	NILM	79	100
	Non-SEA	12	
	SEA	5	

Table 3: Lesion types by HIV status.

Lesion	HIV	Non-HIV
NILM	49	79
Bacterial vaginosis	20	8
Trichomonas vaginalis	3	1
Candidiasis	8	2
Atrophy	3	1

Table 4: Abnormal squamous lesions by HIV status.

Lesion	Non-HIV	HIV
ASC-US	4	2
ASC-H	3	1
LSIL	4	1
HSIL	5	1
SCC	1	0

Table 5: PAP smear results by HIV status and lesion type.

			NILM	Inflammatory disorder	ASCUS	LSIL	HSIL	Squamous Cell Carcinoma
HIV status	Positive	Number	49	31	4	3	5	1
	Negative	% within PAP smear	79	11	2	1	1	0
Total Number within PAP smear			128	42	6	4	6	1

DISCUSSION

HIV remains a global health concern, with over 38 million people living with the virus as of 2019. The South-East Asia region, which comprises 11 member states, is home to an estimated 3.5 million people living with HIV.⁷ This study aimed to evaluate the impact of HIV infection on cervical cytology by comparing 100 HIV-infected women with 100 non-infected women using Pap smear screening. Our findings indicate that cervical abnormalities are

significantly more prevalent in HIV-positive women than in their HIV-negative counterparts, which aligns with many other studies. In the study, the mean age of HIV-positive women (43 years) was lower than that of HIV-negative women (48 years), suggesting that cervical abnormalities tend to occur earlier in HIV-infected women. This is likely due to immunosuppression and persistent HPV infection. The finding reinforces the need for earlier initiation of cervical screening in HIV-positive women, as also recommended by WHO. Among the HIV-

positive group, 17% had squamous epithelial cell abnormalities (SEA), compared to only 5% in the HIV-negative group. Furthermore, the incidence of non-squamous epithelial abnormalities (non-SEA), including infections such as bacterial vaginosis and candidiasis, was also markedly higher in HIV-positive women (34% vs 12%). In contrast, a higher percentage of HIV-negative women had NILM (Negative for Intraepithelial Lesion or Malignancy) findings (79% vs 49% in the HIV-positive group). These cytological patterns were visually supported by our microphotographs: figure 2 showed classic HSIL morphology corresponding to the higher rate of high-grade lesions and figure 3 demonstrated LSIL features consistent with persistent HPV infection in this group.

Several studies have highlighted that HIV-positive women have a higher rate of persistent human papillomavirus (HPV) infections, particularly those types associated with high-grade dysplasia and cervical cancer.^{8,9} These findings align with those reported by Kusuman et al who observed a higher prevalence of squamous abnormalities in HIV-infected women (42%) compared to non-infected women (28%). Similarly, Seethalakshmi et al, reported 58% abnormalities in HIV-positive women versus 43% in HIV-negative women, though variations may be attributed to demographic and regional differences.¹⁰

Wright et al, found a 20% prevalence of cervical intraepithelial lesions (CIL) in HIV-infected women versus 15% in uninfected women, with HSIL being significantly more common in the HIV-positive group (12% vs 3%).¹⁰ Ellerbrock et al, reported SIL in 20% of HIV-positive women and only 5% in HIV-negative women, with a predominance of LSIL in the infected group.¹¹

In the present study, the most common infectious findings among HIV-positive women were bacterial vaginosis (20%), candidiasis (8%) and trichomonas vaginalis (3%), supporting the notion that immunosuppression in HIV-infected women predisposes them to recurrent or persistent infections. The results are also consistent with the study by Bhattacharya et al, which demonstrated 43% abnormal Pap smears in HIV-positive women versus 16% in HIV-negative women, with various cytologic findings including LSIL, ASC-US and inflammatory changes.¹²

Collectively, these findings underscore the higher burden of cervical abnormalities in HIV-infected women, attributed largely to immunosuppression and persistent high-risk HPV infection. This supports the World Health Organization's 2021 guidelines, which recommend primary HPV testing starting at age 25 in HIV-positive women, followed by regular screening every 3–5 years using a screen-triage-and-treat approach. Implementation of targeted screening programs in HIV-positive populations, particularly in resource-limited settings, is essential to ensure early detection, timely management and reduction in cervical cancer-related morbidity and mortality.

Limitations

The study did not include correlation with clinical or immunological parameters such as CD4 count, viral load and ART status, which may influence cervical cytological changes. In addition, HPV DNA testing was not performed, limiting assessment of the true burden of high-risk HPV infection in the study population.

CONCLUSION

In conclusion, HIV infected women have a higher prevalence of cervical dysplasia and pre-cancerous lesions compared to non-infected women, likely due to their weakened immune system. Regular cervical cytology screening, including PAP smears and HPV testing, is crucial for the early detection and prevention of cervical cancer in HIV-infected individuals. Effective HIV management and HPV vaccination can help reduce the risk of cervical abnormalities in this population. The primary aim of this study was to study the cervical cytologic changes in HIV positive patients, which has been accomplished. The secondary objective was to study the differences between HIV infected and non-infected individuals concerning cervical changes, which can still be worked upon further, especially for establishing a relationship between HIV infection and malignancy.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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