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Original Research article

Cervical Abnormalities Detected via Pap smear in HIV-Seropositive Women: A Cross-Sectional Analysis

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ABSTRACT

Background: Women with HIV face a notably higher chance of developing cervical dysplasia than those who are HIV-negative. The occurrence of dysplasia linked to HPV increases as immune function declines. This research looks into the abnormalities identified through Pap smears and explores associated high-risk behaviors in women with and without HIV.

Materials and Methods: This cross-sectional study took place in a tertiary hospital in India. The research involved all HIV-positive women attending the clinic during this period who met the study's criteria. Pap smears were obtained from the exocervix and endocervix of all participants and were analyzed and reported according to the Bethesda system. Data analysis was conducted using Microsoft Excel and SPSS version 19.

Results: Findings among HIV-positive participants revealed that 21.79% had LSIL, 11.54% HSIL, and 2.56% SCC. Another 32.05% showed inflammatory changes or NILM. Comparatively, 84.27% of HIV-negative participants had no signs of malignancy, while 1.12% were classified as ASCUS. Among these HIV-negative women, 10.67% presented with LSIL, 3.93% with HSIL, and 0% with SCC. The differences between the groups were statistically significant ($p < 0.01$).

Conclusion:HIV/AIDS is strongly linked to a greater risk of cervical cell abnormalities. Regular Pap smear screenings are essential for this high-risk group to allow early detection and timely treatment, which could lower the global burden of cervical cancer and prevent its progression.

Key Words:HIV; Pap smear; Cervix, Women

INTRODUCTION

Cervical cancer is the third most common cancer affecting women worldwide. The majority of cases involve squamous cell carcinoma, with adenocarcinomas being the next most frequent type. Meanwhile, HIV-1—a retrovirus entered human populations roughly six decades ago, likely through multiple transmissions from chimpanzees and gorillas. This event marked the beginning of a global pandemic [1].

The prevalence of squamous intraepithelial lesions (SIL) among individuals with HIV has shown considerable variation in research. Cervical cancer, often developing as a result of cervical dysplasia, remains a pressing public health concern. In India, cervical cancer ranks as the second most common cancer among women, particularly those aged 15 to 44 years. Younger women are especially

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susceptible to infections with human papillomavirus (HPV) and other co-infections, though prevalence rates tend to decrease with age [2,3].

High-risk HPV strains, persistent infections, and elevated viral loads significantly influence the progression of precancerous lesions into cervical cancer. Even with the availability of antiretroviral therapy (ART), individuals living with HIV face a higher risk of HPV acquisition, often harbor multiple HPV types, and experience more rapid disease progression, including the onset of malignancies [4,5].

Women living with HIV are particularly vulnerable, as studies consistently link HIV seropositivity with an increased risk of cervical cancer. For HIV-positive women, this heightened susceptibility is primarily due to immune system impairments. These include reduced activity of B-cells, T-cells, and natural killer (NK) cells, along with chronic inflammation and abnormalities in mucosal immunity. They are more likely to experience rapid progression from low-grade to high-grade SILs or invasive cervical cancer and face a higher risk of recurrence after treatment. Accordingly, medical guidelines emphasize the importance of more frequent cervical cytology screenings for this group [6-9].

The link between cervical cancer and HIV/AIDS is well-recognized. Cervical cancer is even classified as an AIDS-defining condition. Immune suppression, particularly in cases of low CD4 counts, has been strongly associated with the persistence of high-risk HPV types and the progression of cervical abnormalities. Reduced CD4 counts are thought to contribute to the development of advanced premalignant and malignant cervical lesions. This connection has been supported by research that links weakened immune function, as reflected by CD4 counts, with a higher prevalence of cervical abnormalities [10-12]. This study aimed to compare Pap smear results between HIV-positive and HIV-negative women at an Indian Hospital.

MATERIAL AND METHODS

A comparative cross-sectional study was conducted at a tertiary hospital in India, focusing on a range of demographic and clinical factors. Information such as age, number of children, marital and educational background, smoking and drug use, number of sexual partners, contraceptive practices, age at first intercourse, and history of bleeding after sexual activity was gathered from participants.

Pap smears were collected from both the exocervix and endocervix using a plastic Ayres spatula and a cytobrush. These samples were sent to a pathology center for evaluation and reported following the Bethesda system guidelines. The cytopathologist reviewing the samples was unaware of the participants' HIV status to ensure unbiased results.

Data from the study were compiled into a Microsoft Excel spreadsheet and analyzed using SPSS version 19 software. Statistical analyses were performed, and findings with a p-value of ≤ 0.05 were considered to be statistically significant.

RESULTS

Table 1 shows comparison of age and cd4 count in study groups. The mean age of the HIV-positive group was significantly higher (41.63 ± 8.32 years) compared to the HIV-negative group (33.99 ± 5.07 years), with a p-value of <0.01. CD4 Count: The mean CD4 count in the HIV-positive group was 558.14 ± 246.53 cells/microliter, while the HIV-negative group had a significantly higher mean CD4 count of 1197.54 ± 120.73 cells/microliter ($p < 0.01$).

Table 1: Comparison of Age and CD4 Count in study groups

Variable	HIV Positive Group (n=78)	HIV Negative Group (n=178)	P Value
Age (in years); Mean ± SD	41.63 ± 8.32	33.99 ± 5.07	<0.01
CD4 Count (in cells/microliter); Mean ± SD	558.14 ± 246.53	1197.54 ± 120.73	<0.01

In terms of multiple sex partners, a significant difference was observed between the groups, with 20.51% of the HIV-positive group reporting multiple sexual partners compared to 0% in the HIV-negative group ($p < 0.01$). The prevalence of white discharge was higher in the HIV-positive group (60.26%) compared to the HIV-negative group (22.47%), with a statistically significant difference ($p < 0.01$). A higher proportion of the HIV-positive group (32.05%) had an inflammatory smear with NILM, whereas none of the HIV-negative group exhibited this finding ($p < 0.01$). A larger proportion

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of the HIV-negative group (84.27%) had NILM compared to the HIV-positive group (32.05%). More individuals in the HIV-positive group (21.79%) showed LSIL compared to the HIV-negative group (10.67%). 11.54% of the HIV-positive group had HSIL, which was higher than the HIV-negative group (3.93%). 2.56% of the HIV-positive group had SCC, while none in the HIV-negative group exhibited this finding. The HIV-negative group had 1.12% with ASCUS, while no cases were reported in the HIV-positive group. No cases of squamous cell atypia were reported in either group (Table 2).

Table 2: Comparison of factors and Papa smear in study groups

Variable	HIV Positive Group; n (%)	HIV Negative Group; n (%)	P Value
Multiple Sex Partners			
No	62 (79.49)	178 (100)	<0.01
Yes	16 (20.51)	0 (0)	
White Discharge			
No	31 (39.74)	138 (77.53)	<0.01
Yes	47 (60.26)	40 (22.47)	
Pap Smear findings			
Inflammatory Smear, NILM	25 (32.05)	0 (0)	<0.01
NILM	25 (32.05)	150 (84.27)	
LSIL	17 (21.79)	19 (10.67)	
HSIL	9 (11.54)	7 (3.93)	
Squamous Cell Carcinoma	2 (2.56)	0 (0)	
ASCUS	0 (0.00)	2 (1.12)	
Squamous Cell Atypia	0 (0)	0 (0)	

Table 3 shows comparison of parity in study groups. A significant difference was observed in parity between the two groups. The HIV-positive group had a higher proportion of individuals with higher parity (P2+0, P2+1, P3+1, P4+1) compared to the HIV-negative group.

Table 3: Comparison of Parity in study groups

Parity	HIV Positive Group; n (%)	HIV Negative Group; n (%)	P Value
P0+0	11 (14.10)	27 (48.06)	<0.01
P1+0	6 (7.69)	5 (8.90)	
P1+1	3 (3.85)	24 (42.72)	
P2+0	9 (11.54)	7 (12.46)	
P2+1	37 (47.44)	7 (12.46)	
P3+1	9 (11.54)	1 (1.78)	
P4+1	2 (2.56)	2 (3.56)	

DISCUSSION

HIV-positive women exhibit a significantly higher prevalence of persistent HPV infections compared to HIV-negative women, particularly with HPV types linked to the development of high-grade dysplasia and cervical cancer [13]. In the current study, the mean age of participants in the HIV-positive group was 41.63 ± 8.32 years, with a range of 28 to 63years. Conversely, the mean age in the

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HIV-negative group was 33.99 ± 5.07 years, ranging from 27 to 48 years, with a median age of 33 years. The age difference between the two groups was statistically significant.

For CD4 counts, the HIV-positive group showed lower values compared to HIV-negative group. This difference was statistically significant. These findings are consistent with studies by Amphan et al. (28.87%), Leibenson et al. [14], Klein et al. [15] and BM Jha et al. [16], as well as the findings of Seethalakshmi et al. [17]. Studies conducted in Europe, the United States, and Africa have demonstrated similar trends, reporting abnormal Pap smear prevalence rates of 10–24% among HIV-positive women compared to 4–10% in HIV-negative women [18].

In this study, 20.51% of HIV-positive women reported multiple sexual partners, whereas none in the HIV-negative group did. This association was statistically significant. White vaginal discharge was observed in 60.26% of HIV-positive women and 22.47% of HIV-negative women, with a significant association. Pap smear findings among HIV-positive participants revealed that 21.79% had LSIL, 11.54% HSIL, and 2.56% SCC. Another 32.05% showed inflammatory changes or NILM. Comparatively, 84.27% of HIV-negative participants had no signs of malignancy, while 1.12% were classified as ASCUS. Among these HIV-negative women, 10.67% presented with LSIL, 3.93% with HSIL, and 0% with SCC. These differences were statistically significant. Similar results were reported by previous researchers [19-21].

Additional risk factors, including the number of sexual partners, addictions, and contraceptive methods, also showed significant associations. The p-value for these observations was <0.05, underscoring the statistically significant increased risk of cervical epithelial abnormalities in HIV-infected women compared to the general population. Parity also demonstrated a significant association between the two groups. However, a study by Kusumam VN found a significantly higher prevalence of LSIL among HIV-positive women, with no clear association with parity [22].

This study supports the conclusion that HIV-infected women are at a substantially greater risk for cervical epithelial abnormalities, emphasizing the need for tailored screening and preventive measures.

CONCLUSION

The study emphasizes that HIV-positive women face twice the risk of developing cervical cell abnormalities compared to those without HIV. While certain factors—such as younger age, reduced CD4 counts, length of disease, and the use of ART/HAART therapy—were analyzed, they did not show significant statistical associations. The findings highlight the critical importance of routine Pap smear screenings for women in this high-risk category, as such measures can help lower the worldwide impact of cervical cancer. Liquid-based cytology, a more advanced technique, is more reliable for identifying these abnormalities.

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