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**Original Article**

**Prior history of sexually transmitted diseases in women living with AIDS in São Paulo, Brazil**

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**Objectives:** To describe the epidemiological profile, risk behaviors, and the prior history of sexually transmitted diseases (STDs) in women living with acquired immunodeficiency syndrome (AIDS).

**Methods:** Cross-sectional study, performed at the Centro de Referência e Treinamento em DST/AIDS of São Paulo. The social, demographic, behavioral, and clinical data such as age, schooling, marital status, age at first sexual intercourse, number of sexual partners, parity, use of drugs, time of HIV diagnosis, CD4 count, and viral load determination were abstracted from the medical records of women living with AIDS who had gynecological consultation scheduled in the period from June 2008 to May 2009.

**Results:** Out of 710 women who were scheduled to a gynecological consultation during the period of the study, 598 were included. Previous STD was documented for 364 (60.9%; 95% CI: 56.9%-64.8%) women. The associated factors with previous STDs and their respective risks were: human development index (HDI) < 0.50 (OR<sub>aj</sub> = 5.5; 95% CI: 2.8-11.0); non-white race (OR<sub>aj</sub> = 5.2; 95% CI: 2.5-11.0); first sexual intercourse at or before 15 years of age (OR<sub>aj</sub> = 4.4; 95% CI: 2.3-8.3); HIV infection follow-up time of nine years or more (OR<sub>aj</sub> = 4.2; 95% CI: 2.3-7.8)]; number of sexual partners during the entire life between three and five partners (OR<sub>aj</sub> = 2.2; 95% CI: 1.1-4.6), and six or more sexual partners (OR<sub>aj</sub> = 3.9; 95% CI: 1.9-8.0%); being a sex worker (OR<sub>aj</sub> = 1.9; 95% CI: 1.1-3.1).

**Conclusions:** A high prevalence of a prior history of STDs in the studied population was found. It is essential to find better ways to access HIV infection prevention, so that effective interventions can be more widely implemented.

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## Introduction

One reason for the increase of sexually transmitted diseases (STDs) in many developing countries is the lack of access to effective and reliable health care services.<sup>1</sup> Factors such as being young and sexually active, urban migration with sociocultural changes, multiple sexual partnerships without the use of condoms, and high prevalence of resistance against antimicrobial drugs also contribute to this increase.<sup>2,3</sup>

The analysis of studies performed in several countries<sup>4</sup> showed that people with STDs, even the non-ulcerative kind, presented a risk three to 10 times higher of being infected by the human immunodeficiency virus (HIV), depending on the STD type and etiology. People who live with HIV/AIDS (PLHA) have a high rate of prior STDs<sup>5,6</sup> and, if PLHA acquire any form of STD, the HIV viral load in the genital secretions increases,<sup>7,8</sup> causing its infectivity also to increase considerably. Among ulcerative STDs, it has been recently shown that genital herpes can be considered the main co-factor for the higher proportion of new HIV infections.<sup>9</sup>

In heterosexual partners, the higher the HIV plasma concentration the higher the risk of HIV transmission,<sup>10</sup> and a study of HIV infected men with urethritis-associated STD showed a HIV average concentration in the seminal plasma eight times higher.<sup>11</sup> However, some studies showed no correlation between the HIV viral load in the plasma and in the semen.<sup>12</sup>

Some STDs, as human papilloma virus (HPV) infection, generally present a higher prevalence among HIV-infected women when compared to HIV-negative women,<sup>13-16</sup> and this persistent infection constitutes a higher risk for the development of cervical intraepithelial neoplasia (CIN).<sup>17</sup>

According to the Brazilian Ministry of Health, 544,846 cases of AIDS were reported from 1980 to June 2009, and HIV infection is having an increasing impact on reproductive health in Brazil. During this time, the male to female ratio has been progressively reduced from 26.7:1 in 1985 to 1.5:1 currently.<sup>18</sup> Although the number of accumulated cases among males is higher than in females, women represent the population where the fastest epidemic growth is observed in the country.<sup>18</sup>

Women experience different constraints for the exercise of sexuality, making it difficult for them to incorporate protection practices, and health care services are not always able to deal with this situation, which in turn, increases their vulnerability.<sup>19</sup> Since women are asymptomatic for most STDs, the percentage in which these infections are involved in the HIV transmission is unknown.

The propose of this study was to describe the epidemiological profile, risk behavior, and frequency of prior STDs among women living with AIDS, aiming at collecting data that could be used in the implementation of prevention and assistance programs for women.

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## Methodology

This cross-sectional study was performed in the Centro de Referência e Treinamento em DST/AIDS in the city of São Paulo, Brazil (CRT-DST/AIDS). Out of approximately 4,000 HIV/AIDS patients receiving care at this center 1,100 were women.

Data were abstracted from medical records of HIV-infected women. Women scheduled for a gynecological appointment in the outpatient gynecological clinics of the reference center between July 1, 2008 and May 31, 2009 were included in the study.

Social, demographic, behavioral, and clinical characteristics such as age, educational level, marital status, age at first sexual intercourse, number of sexual partners, parity, use of drugs, time elapsed since the diagnosis of HIV infection, CD4+ count, and HIV viral load determination, among others, were selected for analysis.

The study included women who used highly active antiretroviral drugs, and excluded those who did not have the results of CD4+ count and/or HIV viral load, and those whose gynecological consultation had not been described.

The reports of previous STDs were analyzed, as well as the results of laboratory exams and of cervical oncotic cytology. The variable race, self-reported, considered as black those women who declared themselves as black or brown. Educational level and the human development index (HDI) were used as indicators of social and economic level due to their association with several lifestyles characteristics. The data collected from the medical records were linked to the HDI database of the city of São Paulo for the year 2000, through the deterministic record linkage method, which made nominal identification between the two databases.

History of prior STDs (syphilis, herpes, gonorrhoea, *Chlamydia*, *Trichomonas*, hepatitis B, and HPV) was considered as dependent variable for the purpose of this analysis. The risks of prior STDs were computed for all independent variables of interest mentioned above.

The clinical and epidemiological information and the laboratorial findings were coded and stored in a database created for this purpose. The statistical program STATA 10.0 was used for data storage and analysis.

The analysis was performed using data exploratory techniques to check the distribution patterns and trends of the main variables. Then, univariate analysis was performed to check the association between variables. The chi-square test ( $\chi^2$ ) was used to assess the difference between proportions and odds ratio calculated with the respective 95% confidence intervals. Student's t-test and analysis of variance were used to assess differences between means. The variables were selected for stepwise logistic regression analysis based on a p-value equal to or lower than 0.25 in the likelihood ratio test. The importance of the variables for the final model was assessed with the likelihood ratio test, considering  $p < 0.05$ .

The project was approved by the Ethics Committee of Centro de Referência e Treinamento em DST/AIDS of São Paulo.

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## Results

A total of 598 women out of the 710 scheduled for the gynecological consultation in the study period were included. One-hundred and twelve (15.8%) were excluded for the following reasons: 33 (4.6%) women with no information about prior STDs; 29 (4.1%) did not have

previous or current gynecological consultations; 23 (3.2%) had never been on antiretroviral drugs; 18 (2.5%) had a negative HIV serology; and nine (1.3%) had acquired HIV through vertical transmission (VT) and never had sexual activity. Prior STDs was observed in 364 women (60.9%; 95% CI: 56.9%-64.8%).

The proportions of prior STDs were 44.0% (263/598) for HPV; 17.9% (107/598) for herpes; 6.2% (37/598) for syphilis; 3.0% (18/598) for *Trichomonas*; 2.2% (13/598) for hepatitis B; 0.8% (5/598) for gonorrhea; and 0.7% (4/598) for *Chlamydia*. It should be pointed out that 21.7% of the patients mentioned two or more prior STDs, in addition to HIV infection.

The socioeconomical, behavioral and clinical characteristics of the women are presented in Table 1. The majority of women was less than 40 years old (73.6%) at the time of HIV diagnosis, and most of them were white (67.2%). As to their educational level, 50% had completed more than 8 years of schooling, being 56.1% among the white women and 37.6% among the black women. More than 60% were not married and had no stable partner.

Table 2 describes the behavioral and clinical characteristics of the studied population, comparing women with and without a history of prior STDs. More than half of them (53.2%) began their sexual life after 15 years of age; 35.1% mentioned six or more sexual partners throughout life; and 2.7% declared themselves as sex workers. A total of 43.6% had been diagnosed with HIV infection for nine or more years, varying from 1 to 22 years.

Use of intravenous drugs was admitted by 2.2% of the women; 13.2% reported being non-injectable drug users and, among them, 41.8% used more than one drug.

Factors associated to prior STDs included in the logistic regression model are presented in Table 3. These factors and their correspondent risks were: HDI of the place of residence < 0.50 ( $OR_{aj} = 5.5$ ; 95% CI: 2.8-11.0); race other than white ( $OR_{aj} = 5.2$ ; 95% CI: 2.5-11.0); age of the first sexual intercourse up to 15 years ( $OR_{aj} = 4.4$ ; 95% CI: 2.3-8.3); follow-up time of the HIV infection of nine years or more [ $OR_{aj} = 4.2$  (95% CI: 2.3-7.8)]; number of sexual partners in lifetime between three and five ( $OR_{aj} = 2.2$ ; 95% CI: 1.1-4.6)], and six or more ( $OR_{aj} = 3.9$ ; 95% CI: 1.9-8.0)]; being a sex worker ( $OR_{aj} = 1.9$ ; 95% CI: 1.1-3.1).

**Table 1 - Distribution of the sociodemographic characteristics of women living with AIDS according to history of prior STD at the Centro de Referência e Treinamento em DST/AIDS, São Paulo, Brazil, 2008 to 2009**

Characteristics	With STD (n = 364)		Without STD (n = 234)		Total (598)		p
	n	%	n	%	n	%	
Age at AIDS diagnosis							0.591
up to 40 years	265	72.8	175	74.8	440	73.6	
> 40 years	99	27.2	59	25.2	158	26.4	
Educational level (years)							0.956
None	4	1.1	2	0.9	6	1.0	
1 to 4 years	29	8.0	19	8.1	48	8.0	
5 to 8 years	151	41.5	91	38.9	242	40.5	
9 to 11 years	135	37.1	87	37.2	222	37.1	
12 or more	42	11.5	33	14.1	75	12.5	
Unknown	3	0.8	2	0.9	5	0.8	
Race (self-referred)							< 0.001
White	202	55.5	200	85.5	402	67.2	
Not white	162	44.5	32	13.7	194	32.4	
Unknown	0	0.0	2	0.9	2	0.3	
Marital status*							0.909
Single	102	28.0	63	26.9	165	27.6	
Married/lives with partner	128	35.2	76	32.5	204	34.1	
Separated/divorced	62	17.0	46	19.7	108	18.1	
Widowed	69	19.1	47	20.1	116	19.4	
Unknown	3	0.8	2	0.9	5	0.8	
HDI of the residence district							< 0.001
> 0.550	172	47.3	213	91.0	385	64.4	
0-0.550	192	52.7	21	9.0	213	35.6	

STD, sexually transmitted diseases; HDI, human development index; \*five women with unknown data were excluded.

**Table 2 - Distribution of behavioral characteristics of women living with AIDS according to history of prior STD at the Centro de Referência e Treinamento em DST/AIDS, São Paulo, Brazil, 2008 to 2009**

Characteristics	With STD (n = 364)		Without STD (n = 234)		Total (598)		p
	n	%	n	%	n	%	
Age at first sexual intercourse							< 0.001
Older than 15 years	138	37.9	180	76.9	318	53.2	
Up to 15 years	190	52.2	33	14.1	223	37.3	
Unknown	36	9.9	21	9.0	57	9.5	
No. of partners in lifetime							< 0.001
1 to 2	34	9.3	68	29.1	102	17.1	
3 to 5	104	28.6	38	16.2	142	23.7	
6 or more	180	49.5	30	12.8	210	35.1	
Unknown	46	12.6	98	41.9	144	24.1	
Use of non-intravenous drugs							0.001
No	299	82.1	218	93.2	517	86.5	
Yes	63	17.3	16	6.8	79	13.2	
Unknown	2	0.5	0	0.0	2	0.3	
Use of intravenous drugs							0.007
No	349	95.9	234	100.0	583	97.5	
Yes	13	3.6	0	0.0	13	2.2	
Unknown	2	0.5	0	0.0	2	0.3	

STD, sexually transmitted diseases.

**Table 3 - Univariate and multivariate analysis of the factors associated with history of prior STD in women living with AIDS at the Centro de Referência e Treinamento em DST/AIDS, São Paulo, Brazil, 2008 to 2009**

Characteristics	OR <sub>br</sub>	95% CI (OR <sub>br</sub> )	p	OR <sub>aj</sub>	95% CI (OR <sub>aj</sub> )	p
HDI of the residence district						
> 0.550	1	-	-	1	-	-
0-0.550	11.3	6.9-18.5	< 0.001	5.5	2.8-11.0	< 0.001
Race (self-referred)						
White	1	-	-	1	-	-
Not white	5.0	3.3-7.7	< 0.001	5.2	2.5-11.0	< 0.001
Age at first sexual intercourse						
Older than 15 years	1	-	-	1	-	-
Up to 15 years	7.5	4.9-11.5	< 0.001	4.4	2.3-8.3	< 0.001
Time of HIV diagnosis (in years)						
1 to 8 years	1	-	-	1	-	-
9 years and more	4.4	3.0-6.3	< 0.001	4.2	2.3-7.8	< 0.001
No. of sexual partners in life						
1 to 2	1	-	-	1	-	-
3 to 5	5.5	3.1-9.5	< 0.001	2.2	1.1-4.6	0.045
6 and more	12.0	6.8-21.1	< 0.001	3.9	1.9-8.0	< 0.001

STD, sexually transmitted diseases; HDI, human development index.

## Discussion

The purpose of this study was to describe the epidemiological profile, risk behaviors, and the frequency of prior STDs

in women living with AIDS receiving care at the Centro de Referência e Treinamento em DST/AIDS in São Paulo. A high prevalence of prior STDs was found in the population studied. In Brazil, there are few available studies that analyzed STD prevalence in PLHA.

Two studies were carried out in the state of Pernambuco. One assessed STD prevalence in 399 PLHA in a sample made up of heterosexuals (33%), homosexuals (23%), and bisexuals (11%), 75% males, in which syphilis was the most frequent disease, with a prevalence of 8.8%, followed by 5.8% of genital herpes and 4.3% of genital candidiasis.<sup>20</sup> The second study<sup>21</sup> assessed genital infection in women, showed frequencies of HPV, *Chlamydia trachomatis*, and *Trichomonas vaginalis* of 20.0%, 2.2%, and 2.2%, respectively. Grinsztejn et al.<sup>22</sup> found a HPV prevalence of 48% in a sample of 634 HIV-infected women in Rio de Janeiro.

Studies conducted in Jamaica and Taiwan<sup>5,6</sup> have shown rates of prior STDs in PLHA of 51.1% and 43.1%, respectively. In the present study, prior STD, in addition to presenting a higher proportion (60.9%), was significantly associated with the district of residence, race other than white, first sexual intercourse under the age of 16, three or more sexual partners in life, being a sex worker, and having been diagnosed with the HIV infection for nine years or more. These results are supported by other studies in Brazil, showing that the AIDS epidemic in the country affects predominantly (80%) individuals at the lower socioeconomic level.<sup>16,23</sup>

The available data provide further evidence that other STDs facilitate HIV transmission through direct biological mechanisms, and that the early treatment of STDs should be a part of high-quality strategies for the prevention of HIV infection.<sup>24</sup> Perhaps a high percentage of the participants of the present study have been infected, or have transmitted the HIV infection, due to a concomitant STD, since the majority of STDs are asymptomatic in women.

The high proportion of women with history of prior HPV in this study (44.0%) draws the attention to the need of preventive actions in relation to gynecological cancers, since many studies have shown a strong association between HIV and HPV co-infection and the development of CIN and genital cancer.<sup>25-27</sup> There is evidence that HIV-infected women have significantly higher CIN rates and a higher probability to evolve to invasive carcinoma than non-infected women.<sup>28-31</sup>

The present study found a history of prior genital herpes in 17.9% of the women, a higher rate than that reported by Saxton et al. (13.7%), in Ukraine.<sup>32</sup> Abu-Raddad et al., showed that herpes simplex virus 2 (HSV-2) infection is a biological co-factor in HIV acquisition and transmission, and can facilitate the spread of HIV infection even among the population with a lower risk of infection who maintain stable sexual partnerships.<sup>33</sup> History of prior of syphilis was observed in 6.2% of the sample, a similar rate to that found by Hutton-Rose et al. (7.3%),<sup>5</sup> although lower than that found by Saxton et al. (1.9%),<sup>32</sup> which may be explained by the lower age of their study population.

In the present study, history of prior *Chlamydia trachomatis* infection was low (0.7%). Perhaps due to the non-availability of routine diagnostic work-up for this infection in Brazil, and its asymptomatic character in up to 80% of the women. Its importance is not well known by the population. This fact must be considered in HIV acquisition, because of the high prevalence of this infection among the Brazilian female population according to a multicenter trial conducted by the

Ministry of Health,<sup>34</sup> and another study with a nationally representative sample,<sup>35</sup> with prevalences of 9.4% and 9.8%, respectively.

The use of retrospective data is one of the limitations of this study. The temporality of the infections could not be assessed. However, both the good quality of the data of the medical records and the low rate of missing information may counteract this limitation. In attempting to give socially accepted answers, another limitation that may have occurred would be the inaccuracy of the information on the use of condoms, age at first sexual intercourse, and number of sexual partners.

Health care services for HIV positive women exist, and they are able to control successfully the infection and prevent the disease progression. Although this is promising, there is still much work to be done to identify innovative interventions that target the social, cultural, and environmental influences of the STD presence in this group. It is also necessary to provide better ways to access prevention programs of HIV infection, so that effective interventions can be more broadly used. Sexually active women need confidential, affordable, and supportive services to teach them how to protect themselves against diseases, including STDs and HIV infection.

Considering that STDs are among the most well established risk factors for HIV infection, public health programs should be enforced with the implementation of control actions and tracking, diagnosis, and early treatment strategies, thus avoiding complications, reducing morbidity, and enhancing the sexual and reproductive health of the population.

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## Conflict of interest

All authors declare to have no conflict of interest.

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