High prevalence of RTIs/STIs among HIV-positive women on ART: the WETIV-R cohort study in Abidjan, Ivory Coast

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Background

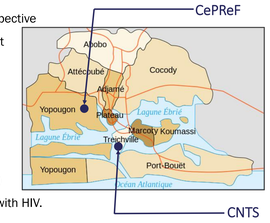
Reproductive tract infections (RTIs) include sexually transmitted infections (STIs) and non-transmissible genital tract infections such as bacterial vaginosis and candidiasis. RTIs/STIs could threaten sexual, reproductive, and maternal health of women living with HIV, especially in resource-limited settings, however prevention and management of RTIs and STIs are still poorly integrated in HIV care.

Data on RTI/STI prevalence in HIV-positive women are scarce in Ivory Coast. The study aimed to assess RTI/STI prevalence in HIV-positive women on antiretroviral therapy (ART) in Abidjan and to identify risk factors associated with RTI/STI coinfection.

Methods

Study design and setting

This was a cross-sectional study nested in a prospective cohort of HIV-infected women in care (WETIV-R) at two health facilities in Abidjan, Ivory Coast: the National Center for Blood Transfusion (CNTS) and the Center for AIDS Management and Formation (CePReF). These health facilities were located in densely populated districts in Abidjan (Treichville and Yopougon respectively) and act as ambulatory services for people living with HIV.



Study population

Eligible women were HIV-positive, aged 18–49 years, residing in Abidjan or in the nearby towns of Dabou and Bassam, and on ART for less than 24 months. Enrollment started in March 2017. Participants were approached while waiting for their routine HIV care visits. Exclusion criteria were currently pregnant and having genital mutilation that could interfere with visual gynecologic examinations. Information on the study purpose and procedures was provided to women, and only those who had given informed consent were included.

Data collection

Structured questionnaires were administered by trained midwives to collect information on socio-demographic characteristics, HIV and non HIV-related health, contraception, and menstrual hygiene practices. Women were asked to provide information on their partner if having declared to be in a stable relationship.

Assessment of RTI/STI: (1) Self-declaration on any discomfort including burning sensation in vagina or when urinating, pelvis pain, dryness, vulva irritation, pruritus, and presence of vaginal discharge); (2) Visual examination by trained midwives; and (3) Clinical diagnosis: samples from endocervical swabs were PCR tested for *Candida albicans, Chlamydia trachomatis, Mycoplasma genitalium,* and genital herpes simplex virus. Presence of *Trichomonas vaginalis* was assessed by optic microscopy and Giemsa stain. Gram stain was used to detect *Neisseria gonorrhoeae* infection and bacterial vaginosis (Gardnerella vaginalis or Mobiluncus spp.). For syphilis diagnosis, blood samples were analyzed using Venereal Disease Research Laboratory (VDRL) and *Treponema pallidum* hemagglutination assay (TPHA) testing. A confirmed syphilis case was declared when patients were positive for both tests. Infection with syphilis was suspected when patients were negative for TPHA and positive for VRDL.

Statistical analyses

Characteristics of the study population were described as median for continuous variables and as frequencies for categorical variables. Prevalence of RTIs (*Candida albicans*, bacterial vaginosis and non-specific vaginitis) and STIs (*Chlamydia trachomatis, Mycoplasma genitalium, Neisseria gonorrhoeae, Trichomonas vaginalis*, genital herpes and syphilis) was estimated as the proportion (the number of women with positive results divided by the total number of women who underwent testing). To investigate factors associated with RTIs/STIs, we focused on transmittable RTIs/STIs only: as a consequence, the outcome was defined as clinical diagnostic of any RTIs/STIs but bacterial vaginosis. Statistical association was first assessed using bivariate logistic regression models. A stepwise-descending approach was used to select variables for multivariate logistic regression models. Multivariate models were adjusted for women's age (>30 years old vs older), education level (participant finished middle school or not), and study site (CePReF or CNTS).

Results

Description of the study population

A total of 431 women included in the study had following characteristics:

- Median age : 36 years (interquartile range [IQR]31–40)
- Median CD4 count: 371 cells/mm^3 (IQR: 227–508)
- 75.6% (n=326) were married or in a stable partnership
- 61.5% finished middle school at least
- 69.4% had remunerated activity
- 67.5% were not using any contraceptive methods
- Among those who used contraceptives (n=140), 82.9% (116/140) relied on male condoms as a method of contraception
- 63.5% of women in relationship (207/326) have disclosed their HIV status to their partner
- 43.9% of women in relationship (143/326) were not aware of partner's HIV status
- Condom use was significantly lower among seroconcordant couples (44%) than among serodiscordant couples (76%) (P=0.001)

Table 1: Characteristics of the study population (N=431)

	Median	IQR
Age (n=414)	36	31-40
Age at first sexual relationship (years) (n=412)	17	16–18
Number of sexual partners during lifetime (n=417)	4	3–6
CD4 count (cells/mm^3) (n=418)	371	227-508

	N	%
Relationship status		
Married	123	28.5
Not married but in relationship	203	47.1
Single	104	24.1
Unknown	1	0.2
Education		
Lower than middle school education	265	61.5
Completed middle school education or above	160	37.1
Unknown	6	1.4
Have remunerated activity		
Yes	299	69.4
No	132	30.6
Contraceptive use		
None	291	67.5
Male condom	116	26.9
Hormonal contraception	20	4.6
Other	15	3.5
Couple-related characteristics (Women in relationship only: N=326)		
HIV status disclosed to partner		
Yes	207	63.5
No	115	35.3
Unknown	6	1.8
Partner's HIV status		
Known to be HIV+	73	22.4
Known to be HIV-	110	33.7
Unknown	143	43.9

Results

Prevalence of RTIs and STIs

Prevalence of any RTIs was 74.9% (95%CI: 70.8-78.9). Overall STI prevalence was 10.4% (95%CI: 7.9-13.8). Individual prevalence for *Chlamydia* and syphilis was 7.2%, and 2.3% respectively. Prevalence of herpes simplex virus and *Trichomonas vaginalis* was below 1.0%. Prevalence of *Candida albicans* was 25.0%. Bacterial vaginosis and non-specific vaginitis were observed in 54.8% of women. There were no cases of *Neisseria gonorrhoeae* or *Mycoplasma genitalium*.

Table 2: Prevalence of RTIs and STIs

	N	%	95% CI
Any RTIs/STIs	323	74.9	70.8–78.9
Any STIs	45	10.4	7.9–13.8
Bacterial vaginosis (*Gardnerella vaginalis* alone or + other bacteria) or non-specific vaginitis	236	54.8	50.1–59.4
Candida albicans	108	25.0	20.9–29.2
Chlamydia trachomatis	31	7.2	4.2–9.6
Syphilis	13	2.3	0.9–3.7
Genital herpes	3	< 1	0–1.0
Trichomonas vaginalis	1	< 1	0–0.6
Mycoplasma genitalium	0		
Neisseria gonorrhoeae	0		

In univariate analyses, no association was found between RTIs/STIs (except for bacterial vaginosis and non-specific vaginitis) and women's age, education level, frequency of condom use, and time since ART initiation. Women with HIV-infected partner were more than twice as likely to be diagnosed with RTIs/STIs than women with no partner or with the one not known to be HIV-infected. Interestingly, women with higher CD4 counts (≥500 cells/mm^3) were significantly more likely to have RTIs/STIs than women with lower CD4 counts (<200 cells/mm^3). After adjusting for age, education level, and study site, factors associated with clinically-confirmed RTIs/STI were having an HIV-positive partner (adjusted OR: 2.16, 95%CI 1.23–3.83, P=0.008) and having a higher CD4 count (≤500 cells/mm^3) (aOR 2.66, 95% CI 1.41–5.11, P=0.003).

Table 3. Factors associated with any transmittable RTIs/STIs and non-specific vaginitis in HIV$^+$ women living in Abidjan (N=431)

Factors	Any RTIs/STIs (n=148)	Univariate model OR[2] (95% CI[3])	P	Multivariate model[1] aOR (95% CI)	P
Age (years)					
> 30	114 (36.0)	1			
≤ 30	39 (40.2)	1.20 (0.75–1.90)	0.44		
In a stable partnership					
No	37 (35.6)	1			
Yes	111 (34.0)	1.09 (0.69 – 1.73)	0.72		
Education					
Lower than middle school education	84 (31.6)	1			
Completed middle school education or above	63 (39.3)	1.40 (0.93 – 2.11)	0.11		
Partner's HIV status					
No partner/partner not known to be HIV+	74 (22.9)	1		1	
Partner known to be HIV+	39 (53.4)	2.27 (1.37–3.80)	0.002	2.16 (1.23–3.83)	0.008
Regular condom use					
Never or sometimes	121 (37.5)	1			
At each or almost every time	21 (21.2)	0.45 (0.26–0.76)	0.0034		
CD4 count (cells/mm^3)					
<200	32 (36.3)	1		1	
[200;350[	43 (41.3)	1.24 (0.67–2.33)	0.50	1.34 (0.69–2.63)	0.38
[350;500[	39 (33.6)	1.57 (0.87–2.89)	0.14	1.65 (0.88–3.16)	0.12
≥500	31 (21.3)	2.52 (1.40–4.66)	0.003	2.66 (1.41–5.11)	0.003
Time since ART initiation					
<3 months ago	45 (39.1)	1			
3-18 months ago	77 (38.3)	1.08 (0.67–1.75)	0.74		
≥18 months ago	15 (15.4)	1.27 (0.73–2.21)	0.40		

1. Adjusted for age, education level, study site, and regular condom use.
2. Odds ratios
3. Confidence interval

Discussion

Prevalence of candidiasis, syphilis and bacterial vaginosis in our study was high but consistent with what has been observed in similar populations across Western and Southern Africa. However, a particularly high prevalence of chlamydia in our study population (7.2%) highlights the needs for better understanding of the issue and calls for more concerted efforts for prevention and management of RTIs and STIs in HIV care in Ivory Coast.

Close follow-up of syphilis cases is important given high childbearing desire (70%) and infrequent contraception use (32%) in this population.

The study highlights vulnerability of women in seroconcordant relationship, which needs to be further investigated with better data. It was also clear from our data that HIV-related communication is poor within the couple with 40% of women not having disclosed their HIV status to the partner and 44% not being aware of partner's HIV status. The women with clinically-confirmed syphilis were asked to bring their partner for testing and treatment; however no male partners came forth. Better communication on HIV and STI within the couple and male involvement in the management of STIs are necessary to ensure prevention and treatment efficacy.

The observed protective effect of lower CD4 count could be explained by survival bias: patients with critically low CD4 count might not have survived to be observed by our study. Other explanations might include the fact that severely immunosuppressed patients might engage in less sexual activity than healthier patients, therefore being less exposed to the risk of STI acquisition. In addition, potential undetected confounders could be responsible for such unexpected inverse associations.

Conclusion

- High RTI prevalence, including several STIs (Chlamydia, syphilis) among HIV-positive women on ART in Ivory Coast.
- Urgent needs for integrating RTI/STI prevention and management in HIV care.
- Particular vulnerability of women in seroconcordant couples needs further investigation. Better STI prevention among HIV-positive men, and STI management should involve both partners in testing and treatment.