

SEROPREVALENCE OF THE HUMAN IMMUNODEFICIENCY VIRUS AND IMPACT ON FERTILITY IN COUPLES AT THE GYNAECOLOGICAL ENDOSCOPIC SURGERY AND HUMAN REPRODUCTIVE TEACHING HOSPITAL, CAMEROON

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Abstract: -

Introduction: The objective of our study was to evaluate the impact of HIV infection on the male and female fertility of couples followed at the Gynaecological Endoscopic Surgery and Human Reproductive Teaching Hospital (GESHRTH).

Materials and method: an analytical cross-sectional study was conducted over a period of 9 months from January 1st to September 1st, 2019 at the GESHRTH. A total of 279 complete files were included in our study consecutively. The qualitative variables were compared using a Chi² test or Fisher's exact test using Epi Info software version 3.5.4 with a statistically significant threshold $p < 5\%$. **Results:** The most represented female morphological abnormalities were tubo-ovarian adhesions, i.e. 48.4% (135), followed by uterine fibroids, i.e. 32.2% (90). Concerning men, 50.9% (142) had spermogram abnormalities among which oligospermia (42.7%) was mainly found. HIV seroprevalence was higher in women (36; 12.9%) than in men (12; 4.3%). The type of infertility and the morphological etiologies of female infertility were not related to HIV infection. On the other hand, all HIV-positive men (100%) had a sperm abnormality which was oligospermia ($p < 0.001$). **Conclusion:** HIV could have an impact on the occurrence of sperm abnormalities including oligospermia. However, prospective studies should be conducted to further investigate the effect of HIV on fertility.

Keywords: HIV, infertility, impact, GESHRTH, Cameroon.

INTRODUCTION

In 2020, 37.7 million people lived with HIV [1]. This growing population bears the burden of associated health problems that complicate long-term HIV infection [1]. In Cameroon, the prevalence of HIV has dropped significantly since 2004 among adults aged 15-49 years. In fact, the prevalence estimated at 5.5% during the DHS-III of 2004 fell to 2.7% according to the 2018 DHS-V [2]. The overall health of people infected with HIV has improved and many want to have children [3-4]. Infertility affects approximately 8% to 12% of couples worldwide [5]. In Cameroon, 20 to 30% of couples suffer from it and the prevalence varies from one region to another [5]. HIV affects fertility in various ways. HIV-positive people may wish to prevent transmission by avoiding sexual intercourse with their partners [6], moreover, the biology of HIV itself and certain biological alterations in reproductive physiology may explain subfertility in HIV-infected patients. HIV [7-9]. Shevchuk et al. showed that with prolonged survival in AIDS patients, there was a more pronounced loss of germ cells in the testes [10]. Studies have shown that HIV1-positive male patients undergoing treatment had modified sperm parameters [9]. In a retrospective study of 224 HIV-infected women, 5.3% of upper genital infections were reported, which corresponds to a frequency 10 times higher than that of the general population [11]. However, there are very few studies carried out to date but none in our context correlating the seroprevalence of HIV in infertile couples and its effects on fertility. The objective of our study was to evaluate the impact of HIV infection on the male and female fertility of couples followed at the Gynaecological Endoscopic Surgery and Human Reproductive Teaching Hospital (GESHRTH).

Materials and Method

Study type, location and period

An analytical cross-sectional study was conducted over a period from January 1st to September 1st, 2019, i.e. a period of 9 months at GESHRTH. The latter is a reference site in medically assisted procreation located in the city of Yaoundé in Cameroon.

Study population

The target population was made up of the records of couples followed for infertility at GESHRTH. Files containing the results of HIV serology, co-infections, spermogram and pelvic ultrasound were included in our study and incomplete files were excluded. The mode of recruitment was consecutive and not probabilistic.

Procedure

The selection of the files was made in the archiving service of the hospital center after having obtained the authorization of research from the administration. All the files meeting our selection criteria were scrupulously analyzed in order to extract the data necessary for our study. The information was collected using a previously tested and validated questionnaire with a coding to guarantee the anonymity of the participants.

Study variables

They consisted of sociodemographic data (age, sex, marital status), those relating to the type and origin of infertility, the results of the spermogram and pelvic ultrasound and the result of HIV serology.

Statistical analysis

The data collected was recorded and analyzed by Epi Info version 3.5.4 and Excel 2013 software. The quantitative variables were described by their central tendencies (mean, standard deviation, maximum, minimum). Qualitative variables were expressed as counts and proportions and compared using a Chi² test or Fisher's exact test when indicated. The strength of association was measured by the odds ratio (OR) with 95% confidence interval (95% CI). The statistical significance threshold was set at 5% ($p < 0.005$).

Ethical considerations

We obtained a research authorization from GESHRTH, associated with an ethical clearance from the ethics committee of the Faculty of Medicine and Biomedical Sciences of Yaounde (FMBS). The information collected was used exclusively within the framework of this study and in strict compliance with the ethics and principles of the Helsinki Declaration of 1964 revised in October 2013. The anonymity of the couples recruited was respected throughout our study.

Results

Sociodemographic characteristics

Were retained in the study, 279 couples followed for infertility. The average age in women is 36.57 ± 6.79 years and in men 45.92 ± 10.09 years with extremes ranging from 20 to 54 years and 29 to 69 years respectively. The age groups most represented among women were those of 30-34 and 35-39 years, i.e. 25.8% (72) each, and among men, that of 50 years and over, i.e. 34.4% (96). The population was mainly made up of married people (213; 76.3%) living in urban areas (276; 98.9%) (see Table I).

Table I: Breakdown of the study population according to socio-demographic data

Variables	Females (N=279)		Males (N=279)	
	n	%	n	%
Age range				
20-24	6	2.1	0	0
25-29	33	11.8	3	1.1
30-34	72	25.8	15	5.4
35-39	72	25.8	78	27.9
40-44	63	22.5	48	17.2
45-49	24	8.6	39	13.9
≥50	9	3.2	96	34.4
Couple (N=279)				
	n	%		
Marital status				
Common-law (unmarried)	66	23.7		
Married	213	76.3		
Place of residence				
Rural area	3	1.1		
Urban area	276	98.9		

Etiology of infertility

In 204 couples, primary infertility was present, i.e. 73.1%. The abnormalities encountered in the women were mainly morphological (225; 80.7%). The most represented morphological abnormalities were tubo-ovarian adhesions, i.e. 48.4% (135), followed by uterine fibroids, i.e. 32.2% (90). Concerning the men, 50.9% (142) had abnormalities of the spermogram among which oligospermia (42.7%) was mainly found (see table II).

Table II: Distribution of the study population according to the type and origin of infertility

Variables	Number	Percentage
	N=279	(%)
Type of couple infertility		
Primary infertility	204	73.1
Secondary infertility	75	26.9
Female origin		
Morphological abnormalities	225	80.7
Others	54	19.3
Male origin		
Spermogram abnormalities	142	50.9
Others	137	49.1

Prevalence of HIV among couples followed for infertility

Of our 279 couples, HIV prevalence was higher among women (12.9%) compared to men (4.3%) followed for infertility. In our study, 36 (12.9%) couples were serodiscordant and women accounted for 83.7% (30) (see Figure 1).

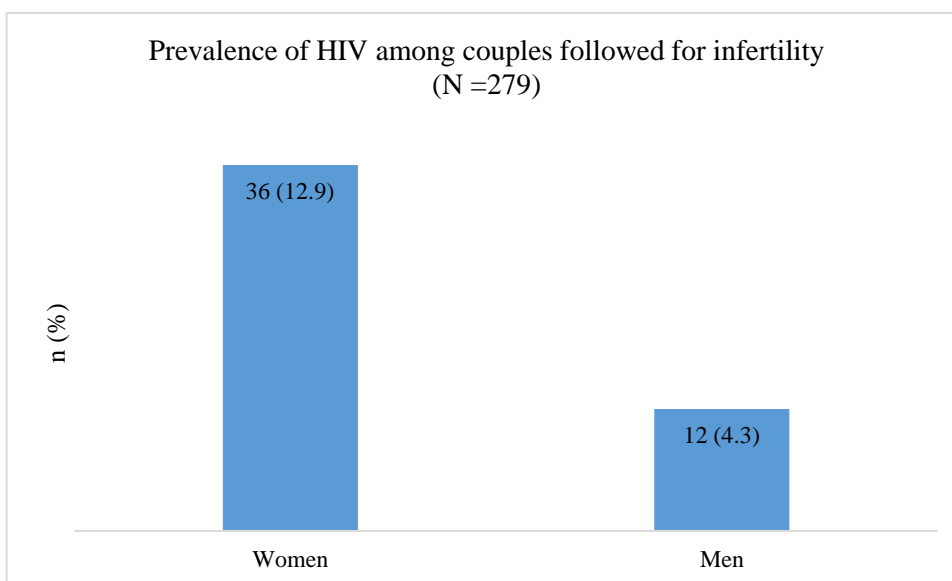


Figure 1 : Distribution of HIV-infected women and men in our study population

Effect of HIV in couples followed for infertility

The type of infertility and the morphological etiologies of female infertility were not related to HIV infection. On the other hand, all HIV-positive men (100%) had a sperm abnormality which was oligospermia (p<0.001) (see table III).

Table III : Impact of HIV on women and men followed for infertility in our study

Variables	HIV female serology		OR (95% CI)	p-value
	Positive N = 36 n (%)	Negative N = 243 n (%)		
Primary Infertility	24 (66.7)	180 (74.1)	0.957 (0.18-4.97)	0.959
Pelvic abnormalities	7 (19.4)	47 (19.3)	1.04 (0.20-5.43)	0.959
Uterine fibroids	12 (33.3)	78 (32.1)	1.41 (0.65-3.42)	0.290
Tubo-ovarian adhesions	17 (47.2)	118 (48.6)	0.66 (0.24-1.75)	0.405
HIV male serology				
Variables	Positive N = 12 n (%)	Negative N = 267 n (%)	OR (95% CI)	p-value
	Primary Infertility	6 (50.0)		
Oligospermia	12 (100)	107 (40.1)	-	<0.001

OR : Odd ratio, CI: Confidence interval

Discussion

At the end of our study, the general objective of which was to assess the impact of HIV infection on the male and female fertility of couples followed at GESHRTH, the age groups most represented in women were those of 30-34 and 35-39 years old, i.e. 25.8% (72) each. This is in agreement with the result of Adedigba et al in Nigeria in 2020 which demonstrated that the age group 31-35 years had the highest frequency of infertility [12]. This could be explained by the delay in women’s desire for pregnancy linked to social priorities such as the desire for a career, the instability of the labor market which leads women to plan their pregnancy later and later. The most represented age group among men is that of 50 years and over, i.e. 34.4%, which is in agreement with certain studies which have shown that male aging has a definite effect on reproduction and sexuality [13-15]. Primary infertility was mainly present in 204 couples, i.e. 73.1%. This is different from what was noted in a literature review on infertility in Africa where the proportion of primary and secondary infertility is approximately equal [13]. This difference could be related to the mode of recruitment because our study only took into account couples followed for infertility in a specialized center. The most represented morphological abnormalities were tubo-ovarian adhesions, i.e. 48.4% (135). This result is similar to that obtained by Adedigba et al who revealed that women with hydrosalpinx were 2.11 times more likely to be sterile than those without hydrosalpinx [12]. In men, 50.9% of the pathologies of the spermogram were found as the first cause of their infertility. Spermogram abnormalities were mainly oligospermia (42.7%) followed by azoospermia (7.2%). This result is comparable to that of Matumo et al, in Butembo (Democratic Republic of Congo) in 2020 which showed that 46% of the men of infertile couples presented anomalies in their spermogram with 10.4% of the cases of azoospermia which showed that 46% of men in

infertile couples presented abnormalities in their spermogram with 10.4% of cases of azoospermia [16]. In our study, HIV prevalence was higher in women (12.9%) compared to men (4.3%) followed for infertility. The HIV/AIDS prevalence rate in Cameroon is 2.7% [2]. These differences with our study could be due to the fact that infected couples wish to have children by medical assistance to limit the transmission of the virus. Since the advent of antiretrovirals, the need for fertility services in the HIV-positive population has increased and can be used for infertility management and protection against transmission or acquisition of HIV infection [4]. No association was found between HIV and female infertility. This contrasts with some observations that the fertility of HIV-positive women is lower than that of HIV-negative women [17]. In addition, our study reveals that all HIV-infected men had a decrease in sperm concentration. For James DM Nicopoulos et al in 2004 demonstrated that ejaculate volume, sperm concentration, total count, progressive motility and normal morphology were all significantly higher in the control group compared to HIV+ men ($p < 0.05$) [18]. This demonstrates that HIV infection influences male fertility. Our study was carried out in a single centre so the results cannot be generalized, however GESHRTH is the reference hospital for the care of infertile couples wishing to have children. The retrospective recruitment method also constitutes a limit in data collection.

Conclusion

The causes of primary and secondary infertility most commonly found in women were respectively tubo-ovarian adhesions and uterine fibroids and in men oligospermia. HIV seroprevalence was higher in women compared to men in case of infertility. HIV could have an impact on the occurrence of sperm abnormalities including oligospermia. However, prospective studies should be conducted to further investigate the impact of HIV on fertility.

Thanks

The research team would like to thank the administrative and technical staff of GESHRTH.

Conflicts of interest

The authors declare that they have no conflict of interest.

Contribution of the authors

Voundi Voundi Junior, Belinga Etienne and Voundi Voundi Esther designed the study. Ngono Vanina, Nyimbe Mviena Louise and Sahmo Simon Stevensen carried out the data collection. Belinga Etienne, Voundi Voundi Junior, Voundi Voundi Esther and Nyada Serge carried out the statistical analysis. Voundi Voundi Junior, Voundi Voundi Esther, Belinga Etienne and Nyimbe Mviena Louise wrote the manuscript. Noa Ndoua Claude, Nguefack Tsague and Toukam Michel proceeded to the critical reading of the manuscript. All authors have given their approval for publication.

REFERENCES

- [1] UNAIDS, Fact Sheet — Latest statistics on the state of the AIDS epidemic. GLOBAL HIV STATISTICS. <https://www.unaids.org/en/resources/fact-sheet> (accessed December 21, 2021)
- [2] National Institute of Statistics (INS), Republic of Cameroon. Demographic and Health Survey 2018, Ref. CMR_2018_DHS_v01_M. Data downloaded from <https://www.dhsprogram.com/what-we-do/survey/survey-display-511.cfm> (accessed August 26, 2021).
- [3] Heráček J, Sobotka V, Kolombo I, Urban M. HIV a poruchy mužské plodnosti [HIV and male infertility disorders]. *Klin Mikrobiol Infekc Lek.* 2012 Oct ;18(5) :150-5.
- [4] Agboghoroma CO, Giwa-Osagie OF. Management of infertility in HIV infected couples : a review. *Afr J Reprod Health.* 2012 Dec ;16(4) :13-20.
- [5] Nana PN, Wandji JC, Fomulu JN, Mbu RE, Leke RJI, Woubinwou MJ. Psycho-Social Aspects in Infertile Patients at the Main Maternity Unit of the Central Hospital of Yaounde, Cameroon, *Clinics in Mother and Child Health Vol. 8* (2011).
- [6] Saleem HT, Rosen JG, Quinn C, Duggaraju A, Kennedy CE. Contraception values and preferences of people living with HIV : A systematic review. *Contraception.* 2021 Nov 5 :S0010-7824(21)00433-9.
- [7] Kushnir V.A., Lewis W., HIV/AIDS and Infertility : Emerging Problems in the Era of Highly Active Antiretrovirals. *Fertil Sterile.* 2011 ; 96(3) :546-53.
- [8] Garolla A, Pizzol D, Bertoldo A, Menegazzo M, Barzon L, Foresta C. Sperm viral infection and male infertility : focus on HBV, HCV, HIV, HPV, HSV, HCMV, and AAV. *J Reprod Immunol.* 2013 Nov ;100(1) :20-9.
- [9] Frapsauce C, Grabar S, et al, Impaired sperm motility in HIV-infected men : an unexpected adverse effect of efavirenz ? *Hum Reprod Oxf Engl.* 2015 ; 30(8) :1797-806.
- [10] Shevchuk MM, Pigato JB, et al, Changing testicular histology in AIDS : its implication for sexual transmission of HIV, *Urology.* 1999 Jan ; 53(1) :203-8.
- [11] Clark RA, Brandon W, et al, Clinical manifestations of infection with the human immunodeficiency virus in women in Louisiana, *Clin Infect Dis* 1993 ; 17 :165-72.11.
- [12] Adedigba JA, Idowu BM, Hermans SP, Ibitoye BO, Fawole OA. The relationship between hysterosalpingography findings and female infertility in a Nigerian population. *Pol J Radiol.* 2020 Apr 13 ;85 :e188-e195.
- [13] Abebe MS, Afework M, Abaynew Y. Primary and secondary infertility in Africa : systematic review with meta-analysis. *Fertil Res Pract.* 2020 Dec 2 ;6(1) :20.
- [14] Colson, Marie-Helene. « Sexuality and pathologies of aging in elderly men and women », *Gérontologie et société*, vol. 35/140, no. 1, 2012, p. 109-130.
- [15] Brandt JS, Cruz Ithier MA, Rosen T, Ashkinadze E. Advanced paternal age, infertility, and reproductive risks : A review of the literature. *Prenat Diagn.* 2019 Jan ;39(2) :81-87.
- [16] Matumo P, Bunduki G, Kamwira IS, Sihalikyolo J, Bosunga K. Spermogram abnormalities in premarital consultations and in infertile couples in Butembo, Democratic Republic of Congo [Abnormal semen analyzes in men undergoing premarital screening and in infertile couples in Butembo -Democratic Republic of Congo]. *Pan Afr Med J.* 2020 Oct 13 ;37 :155.
- [17] Nguyen PV, Kafka JK, Ferreira VH, Roth K, Kaushic C. Innate and adaptive immune responses in male and female reproductive tracts in homeostasis and following HIV infection. *Cell Mol Immunol.* 2014 Sep ;11(5) :410-27.
- [18] James DM Nicopoulos, Paula A Almeida, Jonathan WA Ramsay, Carole Gilling-Smith, The effect of human immunodeficiency virus on sperm parameters and the outcome of intrauterine insemination following sperm washing, *Human Reproduction* 19 (10), 2289-2297, 2004.