



## HIV, Syphilis, Hepatitis B, and Hepatitis C in Incarcerated Women in a Metropolitan Detention Center in Northeast Brazil

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### Authors' contributions

*This work was carried out in collaboration among all authors. Author RMNE designed the study and wrote the first draft of the manuscript. Author MSBN wrote the protocol and collect the data. Author MBDCB collect the data and managed the analyses of the manuscript and managed the literature searches. Author JEJ managed the analyses of the study and wrote the final version. All authors read and approved the final manuscript.*

### Article Information

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### ABSTRACT

**Background:** Human immunodeficiency virus (HIV) is a retrovirus that attacks the immune system cells, and causes AIDS (acquired immunodeficiency syndrome). Incarcerated populations have a recognized increased risk of sexually transmitted infections (STIs).

**Objectives:** The study was aimed to identify the frequency of HIV, syphilis and hepatitis B/C in women incarcerated in a prison in a big city in northeast Brazil.

**Study Design:** Descriptive cross-sectional quantitative study.

**Methodology:** The sample was composed of incarcerated women in a medium- to high-security prison in a metropolitan region in northeast Brazil. Between January and October 2018, 200

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prisoners were interviewed to collect their socio-demographic data. At that time, a drop of peripheral blood was collected to perform syphilis, HIV, and hepatitis B and C rapid tests after informed consent was obtained.

**Results:** The age of the women ranged from 19 to 62 years old (mean=32.85±10.4). The time of incarceration varied between less than one to 10 years (mean=3.6±2.1). The majority of the women were single (71.5%), not pregnant (97%), mixed race (68.5%), housewives (30.5%) and had an elementary school education (51%). Among the 122 women tested for syphilis, 24 were positive (19.7%). HIV was present in 4 of the 200 tested woman (2%), and hepatitis C was identified in 3 of the 91 tested patients. All 85 patients tested for hepatitis B were negative. When considering the time of incarceration, the results were not significantly different.

**Conclusion:** Only the frequency of syphilis was high, at almost 20%, which is higher than those observed in other studies from other regions of Brazil and other countries.

**Keywords:** HIV; syphilis; hepatitis B; hepatitis C; sexually transmitted diseases.

## 1. INTRODUCTION

Incarcerated populations have a recognized increased risk of sexually transmitted infections (STIs). Women in prison are considered a high-risk group, especially due to the risk of pregnancy and poor outcomes, but screening for sexually transmitted infections is very limited, especially in low-income countries. Reduced screening may have led to undiagnosed cases. So, besides the other risk factors common to all people, incarcerated women is a risk population [1].

Human immunodeficiency virus (HIV) is a retrovirus that attacks the immune system cells, and causes AIDS (acquired immunodeficiency syndrome). HIV infection has been demonstrated to be 4 to 6 times more prevalent in the incarcerated population than in the general population, and it is even more prevalent in African Americans and Hispanics [2]. It is necessary to remember that in addition to viral characteristics and host defences, Other factors, as co-infections and co-morbidities, contribute to the HIV infection course [3].

Another STI that is frequently reported in incarcerated populations is syphilis, caused by *Treponam pallidum*. Although its incidence in developed Western countries decreased until 1980, the incidence of syphilis has increased in recent years, mainly among people who engage in high-risk behaviours. The estimated prevalence ranges from 0.2% in high-income countries to 1.3% in low-income countries [4].

Hepatitis B (DNA virus) and C (RNA virus) virus, the most common causes of chronic viral hepatitis, are also important pathogens in incarcerated populations; sometimes the infection was contracted before the time of

imprisonment [5]. In general, STIs seem to be have an increased frequency in incarcerated populations due to high social vulnerability and exposure to risk factors (unprotected sexual intercourse, anal intercourse, large number of sexual partners, other STI and drug use) in addition to a lack of appropriate measures for the prevention and treatment of infected individuals [6].

The objective of this study was to identify the frequency of HIV, syphilis and hepatitis B/C in women incarcerated in a prison in Fortaleza in northeast Brazil.

## 2. MATERIALS AND METHODS

This was a cross-sectional quantitative study. The sample was composed of incarcerated women in a medium- to high-security prison in the metropolitan region of Fortaleza in northeast Brazil. Between January and October 2018, 200 prisoners were interviewed to collect their socio-demographic data. At that time, a drop of peripheral blood was collected to perform syphilis, HIV, and hepatitis B and C rapid tests after informed consent was obtained. The following serological tests were used: HIV Bioeasy – SD (Standard Diagnostic Inc., Republic of Korea); Alere Sfilis – SD; Vikia HBsAg – BioMérieux and Alere HCV – SD.

The prevalence of each infection was studied in the tested population; to evaluate the categorical data, a Fisher's exact test with a confidence interval of 95% was performed using GraphPad Prism 7.

## 3. RESULTS & DISCUSSION

The age of the women ranged from 19 to 62 years old (mean=32.85±10.4), and the age at sexual debut ranged from 11 to 18 years old

(mean=13.6±1.4). The time of incarceration varied between less than one to 10 years (mean=3.6±2.1). The majority of the women were single (71.5%), not pregnant (97%), mixed race (68.5%), housewives (30.5%) and had an elementary school educations (51%), as shown in Table 1.

Among the 122 women tested for syphilis, 24 were positive (19.7%). HIV was present in 4 of the 200 tested patients (2%), and hepatitis C was identified in 3 of the 91 tested patients. All 85 patients tested for hepatitis B were negative (Table 2).

**Table 1. Socio-demographic characteristics of incarcerated women from a metropolitan detention center in Fortaleza in the Northeast of Brazil (n=200)**

Characteristic	
Age	32.85 ( $\pm$ 10.4)
Sexual debut	13.6 ( $\pm$ 1.4)
Time of incarceration	3.6 ( $\pm$ 2.1)
Smoking	99 (49.5)
Yes	101 (50.5)
No	
Marital status (n [%])	23 (11.5)
Married / stable union	143 (71.5)
Single	1 (0.5)
Divorced	10 (5)
Widow	23 (11.5)
no reply	
Race (n [%])	7 (3.5)
White	37 (18.5)
Black	137 (68.5)
Mixed race	19 (9.5)
No reply	
Profession (n [%])	10 (5)
Autonomous	7 (3.5)
General Services	29 (14.5)
trade worker	5 (2.5)
Seamstress	61 (30.5)
Housewife	10 (5)
Student	69 (34.5)
No reply	
Schooling (n [%])	5 (2.5)
Illiterate	102 (51)
elementary School	38 (19)
high school	55 (27.5)
no reply	
Pregnant (n [%])	194 (97)
No	6 (3)
Yes	

**Table 2. Results of serological tests for Syphilis, HIV, Hepatitis B and C in incarcerated women from a metropolitan detention center in Fortaleza in the Northeast of Brazil**

Test (N)	Negative N (%)	Positive N (%)	Total N (%)
Syphilis * (122)	98 (80.3)	24 (19.7)	122 (100)
78 with no test			
HIV	196 (98)	4 (2)	200 (100)
Hepatitis B	85 (100)	0 (0)	85 (0)
Hepatitis C	88 (96.7)	3 (3.3)	91 (100)

**Table 3. Association between incarceration time and test for Syphilis, HIV, Hepatitis B and C in incarcerated women from a metropolitan detention center in Fortaleza in the Northeast of Brazil**

Test	incarceration time < 4 years N (%)	incarceration time ≥ 4 years N (%)	p*
Syphilis	61 (78.2)	37 (84.1)	0.4856
Negative	17 (21.8)	7 (15.9)	
Positive			
HIV	127 (99.2)	69 (95.8)	0.1339
Negative	1 (0.8)	3 (4.2)	
Positive			
Hepatitis B	52 (100)	33 (100)	-
Negative	0	0	
Positive			
Hepatitis C	40 (97.6)	48 (96)	1
Negative	1 (2.4)	2 (4)	
Positive			

\* Fisher's exact test for 95% confidence interval

When considering the time of incarceration, the results were not significantly different (Table 3).

This study demonstrated that majority of incarcerated women were of median age, were of mixed race, were single, were housewives, had low education levels and were frequently smokers. One study in incarcerated women in the USA demonstrated that the majority were younger than 30 years old, and the majority were African American and not pregnant [7]. In incarcerated Iranian women, the mean age was very similar to that in our findings [8]. Other studies disagreed with our findings regarding marital status; in one study, more than 40% of subjects were married in contrast to the single rate of 71.5% observed in our study [5,8]. As demonstrated here, the level of schooling was frequently low in other studies [1, 6]. However, in a study by Nokhodian et al. [8] almost 18% had a university diploma or above

The frequency of syphilis was high, at almost 20%, which is higher than those observed in other studies from other regions of Brazil (8.7%) [6] and other countries (1.4%) [7]. In a study of individuals released from jail, the frequency of syphilis was 19 to 32 times higher than that in the general population [9]. Women in correctional settings have nontreponemal test positivity rates between 0.3% and 23.8% [10,11].

The prevalence of HIV was 2%, which is considered high compared with findings in incarcerated women in the USA [7]. Hepatitis C was present in 3.3% of the incarcerated Brazilian women; this result is lower than 6%. An

interesting finding was the complete absence of hepatitis B. In another study of Brazilian women, the observed prevalence was 0.7% [5].

We consider that the study have limitations. The design is a cross-section. Due to cultural issues and the security service, some data was not collected, such as drug use and sexual practices.

#### 4. CONCLUSIONS

Incarcerated Brazilian women have a high frequency of syphilis and HIV infection. But, hepatitis is not so frequent in this population. It is very important to show this data so that the authorities can adopt policies for the care and prevention of sexually transmitted infections among inmates in the prison system.

#### CONSENT AND ETHCAL APPROVAL

Informed consent was obtained and the privacy rights were observed. The study has been carried out in accordance with The Code of Ethics of the World Medical Association and, was approved by the Research Ethics Committee of Unichristus (No: 2.762.003).

#### DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for

any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

### REFERENCES

1. Leichter JS, Seiler N, Wohlfeiler D. Sexually Transmitted Disease Prevention Policies in the United States: Evidence and Opportunities. *Sex Transm Dis.* 2016;43(2 Suppl 1):S113–21.
2. Arriola KR, Braithwaite RL, Kennedy S, et al. A collaborative effort to enhance HIV/STI screening in five county jails. *Public Health Rep.* 2001;116(6):520-9.
3. Sabin CA, Lundgren JD. The natural history of HIV infection. *Curr Opin HIV AIDS.* 2013;8(4):311-7.
4. Kitayama K, Segura ER, Lake JE, et al. Syphilis in the Americas: a protocol for a systematic review of syphilis prevalence and incidence in four high-risk groups, 1980-2016. *Syst Rev.* 2017;6(1):195.
5. Barros LAS, Pessoni GC, Teles SA, et al. Epidemiology of the viral hepatitis B and C in female prisoners of Metropolitan Regional Prison Complex in the State of Goiás, Central Brazil. *Rev Soc Bras Med Trop.* 2013;46(1):24-9.
6. Domingues RMSM, Leal MC, Pereira APE, et al. Prevalence of syphilis and HIV infection during pregnancy in incarcerated women and the incidence of congenital syphilis in births in prison in Brazil. *Cad. Saúde Pública.* 2017;33(11):e00183616.
7. Javanbakht M, Boudov M, Anderson LJ, et al. Sexually transmitted infections among incarcerated women: findings from a decade of screening in a Los Angeles County Jail, 2002–2012, *Am J Public Health.* 2014;104(11): e103-9.
8. Nokhodian Z, Yazdani MR, Yaran M, et al. Prevalence and Risk Factors of HIV, Syphilis, Hepatitis B and C Among Female Prisoners in Isfahan, Iran. *Hepat Mon.* 2012;12(7):442-7.
9. Wiehe SE, Barai N, Rosenman MB, et al. Test Positivity for Chlamydia, Gonorrhea and Syphilis Infection Among a Cohort of Individuals Released from Jail in Marion County, Indiana. *Sex Transm Dis.* 2015; 42(1): 30-6. DOI:10.1097/OLQ.0000000000000224.
10. Mertz KJ, Voigt RA, Hutchins K, et al. Findings from STD screening of adolescents and adults entering corrections facilities: implications for STD control strategies. *Sex Transm Dis.* 2002;29(12):834-9.
11. Willers DM, Peipert JF, Allsworth JE, et al. Prevalence and predictors of sexually transmitted infection among newly incarcerated females. *Sex Transm Dis.* 2008;35(1):68-72.

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