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Short Communication

Prevalence of human immunodeficiency virus infection and associated risk factors among prison inmates in the City of Florianópolis

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Abstract

Introduction: This study aimed to estimate the prevalence of human immunodeficiency virus (HIV) infection among prison inmates and to define the behavioral profile of infected individuals. **Methods:** In total, 147 individuals were interviewed and provided biological material. The study population consisted of male individuals who presented at the health unit of the Florianopolis State Penitentiary. **Results:** The prevalence of HIV infection was 2.1% (95% confidence interval, 0.4-5.8). With respect to the behavioral profile of individuals, no variable showed statistical significance. **Conclusions:** The prevalence of HIV infection among prison inmates was higher than that reported for the general population.

Keywords: HIV. Prevalence. Prison.

In Latin America, the number of human immunodeficiency virus (HIV)-infected individuals is ~1.5 million[1]. In Brazil, it is estimated that 718,000 people are living with HIV and, in 2012, ~39,000 cases of acquired immunodeficiency syndrome (AIDS) were reported in Brazil[2]. Nevertheless, some marginalized populations are out of the public health context, even in large cities. This is the case for prison inmate populations; despite their predicted isolation, these populations are in contact with society through visits, by contact with prison agents, or during the Christmas pardon period.

According to data from the Prison Information System (InfoPen), Brazil has a prison population of 548,003 people. In the State of Santa Catarina, the number of incarcerated people is 16,623, generating a rate of 266 prisoners per 100,000 inhabitants. However, the number of vacancies in the State penitentiary system is 9,806, such that cells are typically overcrowded[3].

This situation, combined with the precarious and insanitary conditions of the prison cells, promote the spread of diseases such as HIV/AIDS. Furthermore, other factors, including a poor diet, sedentary lifestyle, insufficient hygiene habits, and drug abuse, contribute to the development of diseases, especially sexually transmitted diseases (STDs)[4].

The major aim of the present study was to establish the prevalence of HIV infection among the inmate prison population of the Florianópolis State Penitentiary, Santa Catarina, Brazil, and to define the behavioral profile of the HIV-infected individuals.

The study population consisted of male individuals who presented at the health unit of Florianopolis State Penitentiary. Informed consent was obtained from all participants. Initially, the calculated sample size was 103 patients[5]. However, a large number of individuals volunteered to participate in the study and, therefore, the population consisted of 147 individuals. This research was conducted in accordance with the Declaration of Helsinki, and the study protocol was approved by the CEP (CAAE: 40296114.0.0000.0110). Volunteers answered questions on a form approved by the ethics committee (Comitê de Ética em Pesquisa-CEP/HEMOSC); the questionnaire was applied by a research member who read the questions aloud and transcribed the answers. The questionnaire consisted of the following data: age, education degree, pre-incarceration income, use of injectable drugs, occurrence of conjugal visits, and the presence of piercings or tattoos. Regarding the use of injectable drugs, if the answer was yes, the interviewer asked if the individual had shared injecting equipment. Regarding any conjugal visits, if the answer was yes, the interviewer asked if they had used

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a condom. In addition, if piercings or tattoos were present, the interviewer asked if the individual had performed this procedure in a professional environment or if it had been performed in other places, such as within the penitentiary.

Subsequently, participants were submitted to blood sample collection by venipuncture. The samples were stored in tubes with a clot activator and gel separator (BD® Vacuteiner; BD Biosciences, Franklin Lakes, NJ, USA). The analysis of the samples was performed at the Professor Polydoro Ernani de São Thiago University Hospital (Florianópolis, Brazil), and involved a 4th generation immunoassay using the technique of direct chemiluminescence. Samples that tested positive for HIV were confirmed using the fast immunoblotting technique (DPP® HIV - 1/2; Bio-Manguinhos, Rio de Janeiro, RJ, Brasil).

Data obtained via the form and biological samples were tabulated using Microsoft Excel 2016® software (Microsoft Corporation, Redmond, WA, USA), and statistical analysis of the data was later performed using MedCalc® 14.8.1 software. Initially, the study population was characterized by a descriptive statistical analysis of the variables of interest. Subsequently, the relationship between these data and the frequency of HIV positivity was analyzed using Fisher's exact tests. The level of significance was set at 0.05, and 95% confidence intervals (CIs) were calculated.

The age of the study population ranged from 18-55 years. The time spent in school ranged from 0-11 years, and none of the volunteers had a graduation degree or equivalent. With regard to the pre-incarceration income in Brazilian Real (R$), the rate was between R$0.00 and R$10,000.00. Data from the questionnaire are shown in **Table 1**.

Anti-HIV testing was performed using 146 samples, as one sample did not have a sufficient volume for the analysis. The prevalence of positivity for this marker in the study population was 2.1% (95% CI, 0.45-5.8). However, none of the variables related to the behavior of individuals showed a statistically significant relationship with the frequency of HIV positivity (**Table 2**).

In 2014, the National Penitentiary Department [*Departamento Penitenciário Nacional* (DEPEN)] published a National Survey of Prison Information [*Sistema Integrado de Informação Penitenciária*] (INFOPEN)[6], which provides information about the inmate population. According to this, the national inmate population predominantly consists of young adults (aged 18-29 years), which comprise 56% of the total inmate population[6]. Notably, the proportion of young people in the prison system is higher than in the general Brazilian population[6]. In the present study, the age profile of the study population was reflective of the inmate population of the country, as 53.8% of the individuals were aged 18-29 years.

Regarding the education of the inmate population, the study population had a low educational profile; 60% of participants had not attended or completed primary school. This finding is consistent with that reported by INFOPEN, wherein 68% of incarcerated people in Brazil did not attend or complete their fundamental education[6]. Additionally, only 13.8% of the interviewees in the present study completed high school, which is consistent with the national inmate population (8%). Conversely, ~32% of individuals in the general Brazilian population complete high school[6].

TABLE 1

Socioeconomic and demographic profile of study population.

Variable	Number	Percentage	Range/Median
Age (years)	147	100.0	18–55/29
18-29	78	53.8	
30-39	50	34.5	
≥40	18	12.4	
Educational level	145	100.0	0–11/6
unlettered	4	2.8	
incomplete fundamental school	83	57.2	
complete fundamental school	23	15.9	
incomplete high school	15	10.3	
complete high school	20	13.8	
Income (R$)	119	100.0	0–10,000/1,500

When asked about their income prior to incarceration, many participants did not know or chose not to report, since this information might be related to the crime or offense committed. However, 119 individuals responded to this question and the range of income was R$0.00 to R$10,000.00 (median, R$1,500.00). The INFOPEN does not provide information about the income of the prison population in the country and, therefore, it was not possible to compare this data with national statistics. However, according to the 2012 IBGE (Brazilian Institute of Geography and Statistics [*Instituto Brasileiro de Geografia e Estatística*]) data, the average income of the employed male population was R$2,048.00[7].

A number of studies have investigated the frequency of HIV infection among inmate populations in order to draw attention to the severity of this social problem. Notably, in countries where this type of study has previously been performed, the rate of HIV infection in prison populations was higher than that found in the general population[8]. This has also been shown to be case in Brazil; studies using the same observational approach as the present study demonstrated that the infection rate in the general population was 0.8% among men[9], while the rate of HIV infection among the male inmate population ranged from 1.54-5.7%[10] [11] [12]. A similar result was obtained in a study of 333 male inmates at the Penitentiary of Ribeirão Preto, where the prevalence of HIV infection was 5.7%[10]. Another study of 680 male inmates was conducted in a prison in São Paulo, and the prevalence of HIV infection was 1.8%[11]. Furthermore, a study involving 2,843 individuals from eight prisons in Mato Grosso do Sul showed a HIV infection prevalence of 1.5%[12]. These studies demonstrated that the prevalence of HIV infection in the Florianopolis State Penitentiary, which was 2.1%, was not different from that observed in other penal institutions. In the State of Santa Catarina, a study involving ~300,000 individuals who donated blood between 2007 and 2013 reported a prevalence of HIV positivity of 1.5%[13], showing that the prevalence of this virus in the general population is lower than that found in inmate populations.

TABLE 2

Relationship between behavioral variables and reactivity to human immunodeficiency virus.

Variable	Number	Percentage	HIV (negative/positive)	P-value*
Injected drug use (n=146)				1.0000
no	139	95.2	136/3	
yes	7	4.8	7/0	
Shared injecting equipment (n=6)				-
no	2	33.3	2/0	
yes	4	67.7	4/0	
Conjugal visits (n=146)				1.0000
no	109	74.7	107/2	
yes	37	25.3	36/1	
Condom use (n=37)				1.0000
no	32	86.5	31/1	
yes	5	13.5	5/0	
Piercing or tattoo (n=146)				1.0000
no	26	17.8	26/0	
yes	120	82.2	117/3	
Professional environment (n=117)				0.5500
no	77	65.8	74/3	
yes	40	34.2	40/0	

HIV: human immunodeficiency virus. *Fisher's exact test.

The behavioral habits of the inmates (**Table 2**) were not significantly associated with the prevalence of HIV infection[11] [12]. However, limitations inherent to the small sample size meant that it was difficult to analyze the relationship between the prevalence of HIV infection and behavioral habits. The use of injected drugs is an important pathway to HIV transmission, and seven (4.8%) subjects confirmed the use of injected drugs, of which the majority (67.7%) claimed to have shared injection equipment. Since the act of sharing injection equipment increases the risk of transmitting several infectious agents, it is important to develop prevention strategies, such as providing sterile materials or by treating drug addiction[14]. It is not possible to confirm that the act of sharing injection equipment was performed by the main injection drug users in the penitentiary that the present study was conducted, as the P-value obtained by analyzing this data using the Fisher's exact test was not significant.

Since individuals who are imprisoned are entitled to receive conjugal visits, during which they may have sex, the present study obtained data regarding the number of inmates who receive conjugal visits. It was shown that 74.7% of the inmates did not receive conjugal visits. However, among the individuals who did receive conjugal visits, 86.5% did not use condoms during sex. Notably, one of the individuals who tested positive for HIV had unprotected sex and exposed his partner to HIV infection. The state does provide condoms; however, the use of condoms to prevent STDs is uncommon among inmates, possibly due to the assurance of being in a stable relationship with a long-term partner. This behavior has also been reported in individuals awaiting trial in police stations in Naviraí, where interviewees claimed to not use condoms because of trusting their partner, and this fact could indicate that this individual had extramarital relations[15]. Since infectious agents such as HIV can be transmitted by other ways other than sexual transmission, it can be said that these subjects with fixed partners were exposed to these agents, also affecting their partners.

Invasive procedures, such as piercings and tattoos, can also transmit HIV. The majority (82.2%) of participants had undergone invasive procedures, of which 65.8% claimed that the procedure was not performed by a professional in a suitable location. Notably, three of the individuals who tested positive for HIV possessed piercings or had tattoos performed in inappropriate locations.

The inmate population represents an opportunity for public health system agents to reach individuals who have a high incidence of HIV infection and risk factors for these infections. The high prevalence of HIV infection among prison inmates represents a serious public health problem. Prisons often lack adequate health services and have difficulty in transporting infected individuals to external health facilities[15]. Preventive measures have been recommended by international public health agencies, of which the main recommendation is to conduct screening tests for HIV[14].

The study population, which was made up of male inmates in the Florianópolis State Penitentiary, predominantly consisted of young people with low incomes and education levels.

Furthermore, they exhibited important risk behaviors for HIV infection, including sharing drug-injecting equipment, engaging in unprotected sex, and undergoing invasive procedures.

The present study demonstrated that the study population had a higher prevalence of HIV infection compared with the general population. However, it was not possible to relate this high prevalence to a specific behavioral variable. Patients with positive HIV serological markers will be assessed by the medical staff of the health unit of Florianopolis State Penitentiary.

The findings of the present study suggest that public policies related to the prevention and treatment of HIV infection should be upheld in penal institutions.

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Conflict of interest

The authors declare that there is no conflict of interest.

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