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A Case-control Study of Factors Associated with HIV Infection on Southern Brazilian Elders

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Abstract

A case-control study assessed factors associated with HIV infection among cases (59 persons aged 50 years or older at HIV diagnosis) and controls (59 self-reported uninfected persons aged 50 years and older) from Southern Brazil. Participants answered a 142–item questionnaire that included queries on demographic characteristics, sexual behavior, substance use, and knowledge about HIV/AIDS. The participants' age ranged from 50 to 87 years and 75.4% were women. A multivariate analysis demonstrated that cases had higher odds of being male, having lower incomes, and reporting STDs. The study reinforces that HIV infection among the population aged 50 years and older is related to demographic characteristics and sexual behavior. Once mainly prevalent among younger persons, HIV/AIDS is now manifesting increasingly in older adults. This indicates the need for health care professionals to not overlook important aspects of older persons' lives. Sexuality, for example, is an important part of the life cycle. It cannot be ignored in this population.

Key words: HIV, Elders, AIDS prevention, Risk factors, Vulnerability.

Estudio de Casos Controles de Factores Asociados con la Infección de VIH en Adultos Mayores del Sur de Brasil

Resumen

Un estudio de caso-control evaluó factores asociados con la infección por VIH en casos (59 personas mayores de 50 años de edad al momento del diagnóstico del VIH) y controles (59 personas mayores de 50 años de edad, que se reportaron no infectadas por el VIH) de la región Sur de Brasil. Los participantes respondieron un cuestionario de 142 ítems, que incluyó preguntas sobre características socio-demográficas, conducta sexual, uso de sustancias y conocimiento sobre el VIH/SIDA. Los participantes tenían edades entre 50 y 87 años y 75.4% eran mujeres. Un análisis multivariado demonstró que los casos tuvieron mayor probabilidad de ser hombres, tener menos ingresos y haber tenido ETSs. Anteriormente había mayor prevalencia de VIH/SIDA entre la población joven, ahora se está manifestando cada vez más en los adultos mayores. Esto indica la necesidad de que los profesionales del cuidado de la salud no subestimen la importancia de ciertos aspectos de la vida de las personas mayores. La sexualidad es, por ejemplo, una parte importante del ciclo de vida. Lo que no puede ser ignorado en esta población.

Palabras clave: VIH, Adultos mayores, Prevención del SIDA, Factores de riesgo, Vulnerabilidad.

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Worldwide, the number of people infected with HIV aged 50 years and older has increased. However, the available numbers do not clearly show what factors led to this change. The main contributing factors are the longevity of patients treated with highly active antiretroviral therapy (HAART) and new cases of HIV infection among older adults (Paul, Martin, Lu & Lin, 2007; Smith, Delpech, Brown, & Rice, 2010). Differently from younger persons, for older adults HIV infection is associated with higher rates of morbidity and mortality due to a rapid progression of the disease. Late diagnoses are a major contributor towards higher mortality rates for persons aged 50 years or more. The study by Smith et al. (2010) indicates that late diagnoses were more common among older adults than younger ones. Furthermore, age itself is an important factor: older adults diagnosed late have higher odds of dying within a year as compared to younger adults in the same condition. Possible reasons for late diagnoses include: self-perception of risk; missed opportunities for an earlier diagnosis in general health care centers; and a lack of information about sexual health.

Although HIV/AIDS has a significant impact on the population aged 50 years or more, HIV sex-related risk behavior is still overlooked by health researchers (Zablotsky & Kennedy, 2003). According to Neundorfer, Harris, Britton and Lynch (2005), HIV risk factors for middle-aged and older women include sociocultural aspects (e.g., age and gender), individual conditions (e.g., drug and alcohol abuse and lacking information on preventing HIV), and HIV risk behavior (e.g., sharing needles and unprotected sex). Additionally, studies assessing knowledge of HIV (transmission) found that older persons tend to have less knowledge about HIV/AIDS and perceive themselves as less vulnerable than younger persons. The combination of these factors may put those aged 50 and more at risk of HIV infection (Zablotsky & Kennedy, 2003).

In the USA in 2009, the number of new HIV diagnoses in this population was estimated to be 5,200 with an estimated incidence rate of 5.5 per 100,000. However, the HIV diagnosis rate among individuals aged 50 years and over has remained stable in recent years: 6.2 in 2006, 6.6 in 2007, 5.3 in 2008 and 5.5 in 2009 (Prejean et al., 2011). The HIV context in the Brazilian population is different though. The number of new AIDS diagnoses in the population aged 50 years and old increased from 2,281 in 1999 to 5,998 in 2009. Among those aged 50-59 years, the incidence rate increased from 15.2 in 1999 to 24.9 (per 100,000 persons) in 2009 and from 4.6 to 8.4 among those 60 years or older (Brazilian Ministry of Health, 2010). Southern Brazil currently has the highest incidence rate of HIV/AIDS in older persons, 19.1 (per 100,000 persons) in 2007 as compared to 7.1 in 1996, and of mortality (Brazilian Ministry of Health, 2008). However, the increase witnessed in Southern Brazil may be due to underreporting and notification delays in other Brazilian regions (SUS Department of Informatics [IDB], 2009). This reveals weaknesses in the notification system. Although there is a mandatory federal notification system, new cases are registered by each health care center independently.

Despite common assumptions, sexual activity is maintained throughout life (Lindau et al., 2007; Myers, 2009). Findings from the Brazilian Population Sexual Behavior and Perceptions about HIV/AIDS bulletin (Berquó, 2000) reveal that 67%

of people between the ages of 50 and 59 and 39% of people aged 60 years or more report being sexually active. As for information about HIV/AIDS, studies show that persons aged 50 years and older lack knowledge about HIV transmission. For example, 41.4% of the sample believed that HIV could be transmitted by mosquito bites. Moreover, 36.9% of the participants believed that AIDS was mainly related to homosexual relations and drug use, suggesting that they have a low perception of personal risk of HIV infection (Lazzarotto et al., 2008). There is some data on HIV in middle aged and older adults in Brazil. Bertoncini, Moraes, and Kulkamp (2007) investigated sexual behavior among older persons infected with HIV. The study developed by Pottes, Brito, Gouveia, Araújo, & Carneiro (2007) compared demographic and clinical characteristics of older persons and young adults with HIV. Sousa, Silva, and Montarroyos (2007) described the changes in HIV/AIDS incidence rates among older persons before and after the introduction of drugs for erectile dysfunction in Brazil. However, few studies have examined factors associated with HIV infection in this population in Brazil.

This study aimed to provide more information on socio-demographic factors associated with HIV infection in the population aged 50 years or more. Although higher incidence rates have been reported for this population, older adults infected with HIV are still overlooked by researchers, policy makers, and health care providers. The current study adds important information that may help prevention programs reduce vulnerability to HIV among the population aged 50 years and older. Late diagnoses may also be reduced by informing health care providers the factors associated with HIV in older adults.

Method

In this case-control study, cases were persons 50 years and older being treated for HIV/AIDS in specialized health centers. Controls were persons aged 50 years and older who had been recruited from the community. This study design allows to determine which possible factors may account for the increased disease incidence in the case group (i.e., HIV patients). We stress that the controls self-reported the absence of HIV infection. No HIV serologic tests were made for screening and confirming HIV infection. However, 34% of the controls reported being previously tested for HIV with a negative result. Cases were recruited in Southern Brazilian public health centers specializing in the treatment of HIV/AIDS. They thus all had been previously diagnosed with HIV/AIDS. Controls were recruited in community centers for persons with more than 50 years of age.

Participants

We identified 59 patients diagnosed with HIV at age 50 or older out of 104 enrolled patients and matched them by city of origin to 59 controls. We recruited participants in Porto Alegre (n = 54), Rio Grande (n = 30), and Blumenau (n = 34). They were mainly women (75.4%) and had a median age of 57 years (range, 50 to 87 years).

Procedures

We initially identified the main public health centers specializing in HIV/AIDS treatment in three Southern Brazilian cities: Porto Alegre (4 centers), Rio Grande (2 centers), and Blumenau (1 center). These three are on the list of 100 Brazilian cities with the highest incidence rates of AIDS (per 100,000 persons) (Brazilian Ministry of Health, 2010). Porto Alegre takes first place in Brazil with 172.1 cases in 2009. Rio Grande is in eighth place with 78.9 recorded cases that same year. Blumenau is in 85th place with 31.7 reported cases also in the year of 2009. We contacted service centers and explained to their directors the purpose of our study. Once we received permission to collect data, we visited the centers and invited all the patients aged 50 years or more to participate. We selected the controls in three community centers for persons aged 50 years and older (one in each city), following the same approach used in the health centers.

Participants were interviewed face-to-face by a trained professional. They answered a 142-item questionnaire including queries on demographic characteristics (e.g., age, gender, monthly income, and education); sexual behavior (e.g., age of first sexual intercourse, condom use, number of sexual partners within the last year, and Sexually Transmitted Diseases - STDs); substance use within the last year (e.g., tobacco, alcohol, and marijuana); and knowledge about HIV/AIDS (i.e., HIV transmission methods). Knowledge about HIV/AIDS was assessed through 16 yes/no items asking about correct transmission methods (unprotected sex, blood transfusions, sharing needles or syringes, and from mother to baby) and incorrect ones (protected sex, blood donations, bleeding cuts, mosquito bites, sweat/tears, kisses, sharing the bathroom, sharing clothes/towels, hugs, hand shaking, sharing cutlery, saliva, and hospitalization). We computed knowledge levels in the following manner: ≤5 correct answers represented a low level; 6 to 10 correct answers was a medium level; and ≥11 correct answers was a high level.

As per ethic standards, the Ethic Committee of the Federal University of Rio Grande do Sul (Institutional Review Board; protocol number: 2007/014), which is recognized by the Brazilian national health ethics council CONEP, approved this study. All the participants signed a Term of Informed Consent before we collected the data.

Statistical Analysis

The principle outcome variable was HIV status coded as cases (HIV+) and controls (self-reported negative status for HIV). We estimated descriptive statistics, including proportions and frequencies. To assess associations with the principle outcome variable, we performed bivariate and multivariate analyses. For the categorical variables, differences in proportions were calculated with the chi-squared test. For the continuous variables, we conducted the Mann-Whitney test for two independent samples because variables (e.g., education and age of first intercourse) were not normally distributed. We used multivariate logistic-regression analysis to estimate the odds ratios and the respective 95% confidence intervals (CI) associated with the outcome variable. Variables were entered into the model if the bivariate *p*-values were $p \leq .15$ and kept in if $p \leq .05$.

Results

Table 1 shows selected demographic characteristics of the 118 eligible participants. Cases and controls were similar in terms of age and work status, but cases were more likely to be male (35.6% vs. 13.6%, $p < .01$), single (16.9% vs. 3.4%, $p < .01$), have fewer years of education (5 years vs. 8 years, $p < .05$), and earn a lower monthly income (32.2% vs. 8.5% earned less than one Brazilian minimum wage per month, $p < .01$).

Table 1
Demographic characteristics among cases (n = 59) and controls (n = 59) 50 years and older from Southern Brazil, 2009

	Total *N* (%)	Cases *n* (%)	Controls *n* (%)	*p* value[a]
	118 (100)	59 (50.0)	59 (50.0)	
Demographic characteristics				
City				
Porto Alegre	54 (45.8)	27 (45.8)	27 (45.8)	
Rio Grande	30 (25.4)	15 (25.4)	15 (25.4)	
Blumenau	34 (28.8)	17 (28.8)	17 (28.8)	
Sex				
Male	29 (24.6)	21 (35.6)	8 (13.6)	**.005**
Age (years)				
50-60	73 (61.9)	36 (61.0)	37 (62.7)	
61-70	37 (31.4)	21 (35.6)	16 (27.1)	.26
> 70	8 (6.8)	2 (3.4)	6 (10.2)	
Marital Status				
Single	12 (10.2)	10 (16.9)	2 (3.4)	
Married/Cohabiting	46 (39.0)	16 (27.1)	30 (50.8)	**.008**
Divorced/Separated	30 (25.4)	19 (32.2)	11 (18.6)	
Widowed	30 (25.4)	14 (23.7)	16 (27.1)	
Education (per school year; median, IQR)[b,c]	6 (3, 10)	5 (3, 9)	8 (4, 11)	**.02**
Monthly Income (Brazilian minimum wage unit)				
<1	24 (20.3)	19 (32.2)	5 (8.5)	
1-3	54 (45.8)	28 (47.5)	26 (44.1)	**.001**
≥4	40 (33.9)	12 (20.3)	28 (47.5)	
Work Status[b]				
Currently working	44 (39.3)	18 (33.3)	26 (44.8)	.25

Note. a. Pearson chi-squared. b. Missing data of one participant. c. IQR: Interquartile Range.

With regard to the outcome variable, we tested four factor categories: demographic characteristics, sexual behavior, substance use, and knowledge about HIV/AIDS. As table 2 shows, HIV infection was associated with being male and single as well as having fewer years of education and a lower monthly income. As for sexual behavior, HIV infection was associated with starting sexual life earlier as well as having more sexual partners and casual partners within the last year. HIV infection was additionally associated with reporting condom use during the most recent sexual intercourse and self-reporting STDs (i.e., a history of Gonorrhea, Syphilis, and Viral Hepatitis). Tobacco use within the last year was associated with HIV infection. Similar percentages of cases and controls reported using alcohol (51.7% and 59.3%, respectively; odds ratio, 0.73; 95% CI, 0.35-1.53) and marijuana (4.0% and 1.9%, respectively; odds ratio, 2.17; 95% CI, 0.19-24.67).

Cases had increased odds of demonstrating a higher level of knowledge about HIV/AIDS. Although HIV infection was strongly associated with knowledge about HIV/AIDS, we did not include this variable in the multivariate model due to selection bias respecting controls. Given that the cases were HIV+ and attended health centers and that the controls were individuals from the community who did not frequent any health centers, the cases were expected to know more about HIV/AIDS than the controls.

Logistic Regression Model

HIV infection was associated with increased odds of sex, adjusted odds ratio (AOR) 3.89, 95% CI 1.24-12.17, monthly income, adjusted odds ratio (AOR) 31.20, 95% CI 5.91-164.73, and self-reported STDs, adjusted odds ratio (AOR) 12.69, 95% CI 2.18-73.92 (Table 3). Being infected with HIV was more common for those reporting earning less than one Brazilian minimum wage per month (US $300) as compared to those reporting earning more than four (US $1200). HIV infection was also more common among those self-reporting STDs as compared to those who did not. The odds of HIV infection were higher among males than females.

Table 3
Multivariate analysis: variables independently associated with HIV infection

Variable	Adjusted odds ratio	95% CI
HIV infection (*N* = 106)		
Sex		
Female	1.00	-
Male	3.89	1.24-12.17*
Monthly income (Brazilian minimum wage unit)		
<1	31.20	5.91-164.73***
1-3	7.02	1.79-27.47**
≥4	1.00	-
STD (ever)	12.69	2.18-73.92**

*$p < .05$; **$p < .001$; ***$p < .001$

Table 2
Demographic characteristics, sexual behavior, substance use and knowledge about HIV/AIDS among cases (n=59) and controls (n=59) 50 years and older from Southern Brazil, 2009

	Cases *n* (%)	Controls *n* (%)	OR	95% CI
Demographic characteristics				
Sex				
Female	38 (64.4)	51 (86.4)	1.00	-
Male	21 (35.6)	8 (13.6)	3.52	**1.41-8.81**
Marital Status				
Single	10 (16.9)	2 (3.4)	5.71	**1.07-30.63**
Married/Cohabiting	16 (27.1)	30 (50.8)	0.61	0.24-1.56
Divorced/Separated	19 (32.2)	11 (18.6)	1.97	0.70-5.54
Widowed	14 (23.7)	16 (27.1)	1.00	-
Education (per school year; median, IQR)	5 (3, 9)	8 (4, 11)	0.88	**0.81-0.97**
Monthly income (Brazilian minimum wage unit)				
<1	19 (32.2)	5 (8.5)	8.87	**2.68-29.29**
1-3	28 (47.5)	26 (44.1)	2.51	**1.06-5.95**
≥4	12 (20.3)	28 (47.5)	1.00	-
Sexual behavior				
Age at first intercourse (years; median, IQR)	16 (14, 18)	18.5 (16, 21)	0.89	**0.80-0.98**
Number of sexual partners within the last year				
0	22 (37.3)	29 (49.2)	1.00	-
1	19 (32.2)	26 (44.1)	0.96	0.43-2.17
≥2	18 (30.5)	4 (6.8)	5.93	**1.76-20.03**
Steady sexual partners within the last year[a]				
Yes	28 (47.5)	30 (50.8)	0.87	0.42-1.80
Casual sexual partners within the last year[a]				
Yes	18 (30.5)	4 (6.8)	6.04	**1.90-19.19**
Use of condom (last sexual intercourse)				
Yes	31 (53.4)	15 (25.4)	3.37	**1.54-7.35**
Sexually attracted to…				
persons of the opposite sex	52 (88.1)	58 (98.3)	1.00	-
persons of the same sex	7 (11.9)	1 (1.7)	7.81	0.93-65.60
Importance of sex				
Important	28 (47.5)	31 (52.5)	0.82	0.40-1.68
Unimportant	31 (52.5)	28 (47.5)	1.00	-
People my age are less likely to be infected by HIV				
Disagree	40 (67.8)	36 (61.0)	0.62	0.19-2.01
Agree	10 (16.9)	18 (30.5)	0.31	0.08-1.18
Neither agree nor disagree	9 (15.3)	5 (8.5)	1.00	-
STD[b] (ever)	18 (30.5)	3 (5.1)	8.19	**2.26-29.68**
Substance use within the last year				
Tobacco	20 (37.7)	10 (18.2)	2.73	**1.13-6.59**
Alcohol	30 (51.7)	35 (59.3)	0.73	0.35-1.53
Marijuana	2 (4.0)	1 (1.9)	2.17	0.19-24.67
Knowledge about HIV/AIDS				
Ways of HIV transmission (level of knowledge)				
Low	2 (3.4)	14 (23.7)	1.00	-
Medium	2 (3.4)	14 (23.7)	1.00	0.12-8.13
High	55 (93.2)	31 (52.5)	12.42	**2.65-58.26**

Note. a. Among those who reported being sexually active. b. STD: Sexually Transmitted Disease (self-reported history of Gonorrhea, Syphilis and Viral Hepatitis).

Discussion

This study found that HIV infection among older adults is independently associated with sex, monthly income, and self-reported STDs (i.e. self-reported history of gonorrhea, syphilis, and viral hepatitis). Multivariate analyses demonstrated that cases had higher odds of being male, earning lower incomes, and reporting STDs.

Myers (2009) addresses the epidemiology and risk behaviors related to HIV among older adults, pointing out that as compared to young persons, those aged 50 and older tend to become infected by sexual transmission, with a higher prevalence for males. As this present study observes, higher odds of HIV infection was associated with sex; that is, with being male. Gender may affect this tendency. More specifically, gender roles determine what it means to be a man or a woman. Gender-based expectations influence individual vulnerability to HIV. Masculinity determines that men should be tough and take more risks (Fernandes, 2009). Taking sexual risks is linked to this social perception of men, thus increasing their vulnerability to HIV and discouraging them from seeking testing and treatment. HIV prevention programs should therefore not overlook gender roles. Within this context, it is important to develop preventative and educational strategies focusing on changing men's attitudes towards sexual behavior so as to protect them and their partners from HIV infection (World Health Organization [WHO], 2007).

This study indicated an association between HIV infection and low income. Other studies have also shown an association between cases and poverty. For example, the study by Krueger, Wood, Diehr and Maxwell (1990) supported the hypothesis that the impoverished are at risk of HIV infection due to the physical and social circumstances caused by their poverty. An earlier case-control study conducted in Southern Brazil by Silveira, Santos, and Victora (2008) found that both HIV and AIDS were more common among women with lower incomes. The link between HIV infection and socioeconomic status is complex and multifold. However, some social aspects are worth emphasizing. Examples include the lack of access to education and poor public health facilities. As for education, its relation to the prevalence of HIV was shown in a study by Kayeyi, Sandoy and Fylkesnes (2009). Their results showed that those living in neighborhoods with low education attainment were more likely to be infected with HIV. Social and economic inequity is a key element within the context of HIV/AIDS (Perry, 1998). On the one hand, an individual's socioeconomic status (SES) may affect his/her likelihood of becoming infected with HIV. On the other hand, the individual's SES may affect the quality of life of those living with HIV, due to their limited treatment options and social resources (American Psychological Association [APA], 2011).

Self-reporting STDs were independently associated with HIV infection. Previous studies have reported the interrelations between STDs and HIV infection (Fleming & Wasserheit, 1999; Montano et al., 2005; Szerlip, Desalvo & Szerlip, 2005; Wasserheit, 1992). Accordingly, individuals with STDs have an increased susceptibility to HIV infection. At the same time, individuals infected with HIV and another STD have higher odds of transmiting HIV (Fleming & Wasserheit, 1999; Wasserheit, 1992). Due to this “epidemiological synergy” it is vital that HIV prevention and STD control programs focus on (1) the early detection and

treatment of STDs and (2) HIV testing for those diagnosed with a STD (Centers for Disease Control and Prevention [CDC], 2011).

While smoking was not independently associated with HIV infection, it did show an association in the bivariate logistic regression analysis, indicating that cases were more likely to smoke. This is of interest. Other studies have shown that smoking is highly prevalent amongst those living with HIV (Crothers et al. 2005; Niaura et al. 2000). Overall, HIV positive patients have a higher risk of cardiovascular disease (e.g., Myocardial Infarction, MI) due to the HIV infection and the effects of combination antiretroviral therapy (ART) (Friis-Moller et al., 2003; Friis-Moller et al., 2007). Among older adults, this risk may be intensified by the combination of an already compromised immune system due to problems or health issues related to age, HIV infection, and ART (Kramer, Lazzarotto, Sprinz & Manfroi, 2009). Thus, the management of complications and co-morbidities should aim at reversible risk factors like smoking. It is important that health care providers discuss with their patients the benefits of changing behaviors for their life quality. This includes smoking cessation and other health-related behaviors that may interfere with the long-term quality of life for adults living with HIV.

There were limitations to this study. The sample selection was biased, given that controls were selected from a different study-base as compared to the cases. Differently from cases, controls did not come from a health-based context, so they could be less sensitive to and informed of health subjects (e.g., prevention and disease-related knowledge). For example, the increased odds of a higher HIV/AIDS knowledge level may be due to the HIV infection itself and to often visiting health services. Another sampling limitation in this study was not testing controls for HIV. However, the ethical and medical issues associated with an HIV diagnosis did not permit testing for HIV serology.

Despite these limitations, this study provides important information about HIV/AIDS among the population aged 50 years and older. In a context where demographic changes in the HIV epidemic creates challenges for health care providers and policy makers, information must be generated on how the older population deals with the disease. It is also relevant to explore which behaviors they maintain that can either protect them or increase their risk of HIV infection. Findings may help health professionals understand important characteristics of older age that are frequently overlooked, such as sexuality.

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