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Prevalence of HIV among older adults at a reference center in Southern Brazil

Prevalência do HIV em pessoas idosas de um centro de referência no Sul do Brasil

Prevalencia del HIV entre personas mayores en un centro de referencia en el Sur de Brasil

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ABSTRACT: This study aimed to determine the prevalence rate of HIV in older adults. A cross-sectional study of 1,184 HIV-infected patients. In this group, 1,091 (92.15%) patients were aged < 60 years and 93 (7.85%) ≥ 60 years. The mean prevalence rate of HIV detected in the ≥ 60 years group was 1.66± 0.54 per 100,000 population (1.05± 0.43 in men and 0.61 ± 0.29 in women). The epidemiological profile of elderly patients with HIV was characterized by: males, low levels of schooling, white and heterosexual people.

Keywords: Aged; HIV; Epidemiology.

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***RESUMO**: Este estudo teve como objetivo determinar a prevalência do HIV em idosos. Estudo transversal com 1184 pacientes infectados pelo HIV. Neste grupo, 1091 (92,15%) pacientes tinham idade <60 anos e 93 (7,85%) ≥ 60 anos. A prevalência média de HIV detectada no grupo ≥ 60 anos foi de 1,66 ± 0,54 por 100.000 habitantes (1,05 ± 0,43 nos homens e 0,61 ± 0,29 nas mulheres). O perfil epidemiológico dos idosos com HIV foi caracterizado por: homens, baixa escolaridade, brancos, heterossexuais.*

***Palavras-chave**: Idosos; HIV; Epidemiologia.*

***RESUMEN**: Este estudio tuvo como objetivo determinar la prevalencia del VIH en las personas mayores. Estudio transversal de 1184 pacientes infectados con el VIH. En este grupo, 1091 (92,15%) pacientes tenían una edad <60 años y 93 (7,85%) ≥ 60 años. La prevalencia del VIH en la rama de ≥ 60 años fue de 1,66 ± 0,54 por cada 100.000 habitantes (1,05 ± 0,43 en hombres y 0,61 ± 0,29 en mujeres). El perfil epidemiológico de las personas de edad avanzada con el VIH se caracteriza por: los hombres, bajo nivel de educación, blancos, y heterosexuales.*

***Palabras clave**: Edad avanzada; HIV; Epidemiología.*

Introduction

Population aging is a global phenomenon that has regional traits, including specific differences with regard to gender, income, education and health service access (Silva, *et al*., 2015). Studies estimate there will be around two billion individuals aged 60 or older by 2050 globally, including in most developing countries (Brazil, 2007).

In Brazil, the prevalence rate of HIV detected in the elderly population has risen considerably over the last two decades. In 1996, the prevalence rate per 100,000 elderly population was 5.8 in men and 1.7 in women. By 2014, these figures had risen to 13.8 and 6.7, respectively (Brazil, 2008; Brazil, 2015).

This relative increase in the rate detected in older adults may be partially explained by the fact that the elderly population was not considered a high-risk group at the beginning of the epidemic. Consequently, few prevention campaigns targeted this demographic group. However, the few studies carried out have revealed that this group has low acceptance of and adherence to disease prevention measures (Andrade, Silva, & Santos, 2010).

In addition, the population of HIV-infected individuals has aged (Gomes, & Silva, 2009). Sociocultural changes have also been implicated as associated causes for the shift in the epidemiology of the disease (Serra, Sardine, Pereira, & Lima, 2013).

In Brazil, "elderly" status is defined as being aged 60 or older (Brazil, 2013b). A number of changes associated with HIV have occurred in this demographic group, including clinical evolution and epidemiological profile of infected individuals (Andrade, Silva, & Santos, 2010; Kearney, Moore, Donegal, & Lambert, 2010). The increasing number of new HIV infections in the elderly has prompted the need to define the epidemiological profile of this population, allowing the development of prevention and focused care interventions (Girondi, Zanatta, Bastiani, Nothaft, & Santos, 2012).

Such studies can inform future primary prevention campaigns on Sexually Transmitted Infections (STIs) specifically targeting individuals over 60 years of age, thereby allowing more timely and effective health interventions. The aim of this study was to investigate the epidemiological and laboratory profile of elderly patients with HIV at a Referral Center in Southern Brazil.

Methods

A cross-sectional study was conducted at a referral center for the diagnosis of HIV/AIDS located in in Cascavel, Paraná State, Brazil. The center is part of the 10th Health Region (10th RS) of Parana serving 25 cities. The population comprised 1,256 HIV-infected patients users of the public health service seen between January 2005 and December 2014. The population of the region was determined according to the National Institute of Geography and Statistics (IBGE, 2016).

Were collected from medical charts information on year of HIV diagnosis, age, gender, marital status, ethnicity, educational attainment, behavior, time since HIV diagnosis, number of partners in last 12 months, form of HIV infection, use of drugs and antiretroviral treatment. Serologic tests for HIV diagnosis were performed according to the Ministry of Health standards prevailing at the time of the examination. The latest results for CD4+ and CD8+ T lymphocyte counts and quantification of viral load for HIV-1 were also obtained from patients medical charts.

Data were stored in Microsoft Excel® and subsequently analyzed by the SAS (Statistical Analysis Software) version 9.4. The results were expressed as mean, standard deviation (± SD) or frequencies. The association between qualitative variables was assessed using the Chi-square or Fisher's exact tests. Quantitative variables were analyzed using the Wilcoxon test.

The study was approved by the Research Ethics Committee of the University Center of Assisi Gurgacz Foundation (Opinion n. 1397212 of 28/01/2016).

Results

Of the total 1,256 patients seen and diagnosed with HIV during the study period, 1,184 (94.27%) were living in the study area. Of this group, 1,091 (92.15%) were aged < 60 years and 93 (7.85%) ≥ 60 years. Among the ≥ 60 years group, 35 (37.63%) were women and 58 (62.37%) men.

The number of HIV-infected patients with aged ≥ 60 years detected in the study area fluctuated between 2005 and 2011, with increases and decreases in prevalence, while rates remained relatively stable during the 2012-2014 period (Figure 1).

The mean rate detected in the 2005-2014 period was 1.66± 0:54 per 100,000 population, with rates of 1:05± 0.43 and 0.61± 0.29 in men and women, respectively.

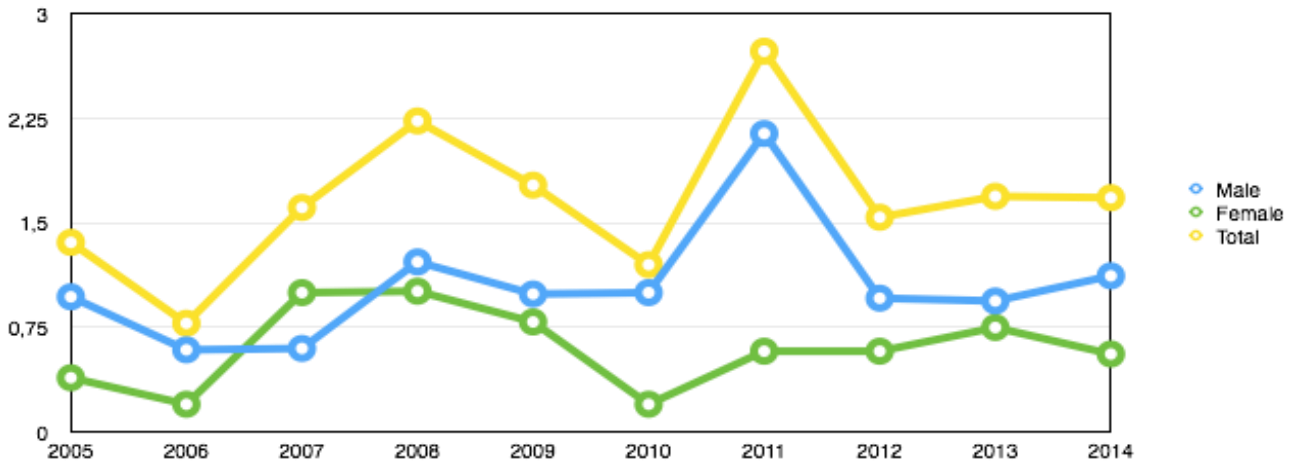

Figure 1. HIV prevalence rate per 100,000 population in erderly, by gender and year of diagnosis, in the 25 cities of the 10th Health Region of Parana state, 2005-2014

Overall, patients were predominantly aged < 60 years, divorced or widowed, with heterosexual behavior and ≤ 8 years´ education (p <0.05) (Table 1). In the ≥ 60 years group, most patients had time since diagnosis > 5 years (51.61%), although 18.28% had a diagnosis time of < 2 years. Comparing genders, more women than men had a diagnosis time > 5 years (Table 2).

Table 1. Sociodemographic characteristics of HIV-infected patients according to age in the 25 cities of the 10th Health Region of Parana state, 2005-2014

Variables	Total n (%)	< 60 years n (%)	≥ 60 years n (%)	p-value
Gender				0.32
Female	504 (43.57)	469(42.99)	35 (37.63)	
Male	680 (57.43)	622 (57.01)	58 (62.37)	
Ethnicity				0.25
White	782 (67.24)	715 (66.76)	67 (72.83)	
Black	36 (3.10)	36 (3.36)	0 (0.00)	
Brown	340 (29.23)	315 (29.41)	25 (27.17)	
Other	5 (0.43)	5 (0.47)	0 (0.00)	
Time since HIV Diagnosis (years)				0.22
≤ 2	304 (25.68)	287 (26.31)	17 (18.28)	
2-5	339 (28.63)	311 (28.51)	28 (30.11)	
> 5	541 (45.69)	493 (45.19)	48 (51.61)	
Form of HIV infection				0.14
Sexual	1115 (97.72)	1029 (97.54)	86 (100,00)	
Others	26 (2.28)	26 (2.46)	0 (0,00)	
Marital status				<0.0001‡
Single	503 (44.40)	487 (46.60)	16 (18.18)	
Married	470 (41.48)	433 (41.44)	37 (42.05)	
Divorced	102 (9.00)	83 (7.94)	19 (21.59)	
Widowed	58 (5.12)	42 (4.02)	16 (18.18)	
Behavior				0.0008‡
Homosexual	139 (12.20)	137 (13.07)	2 (2.20)	
Heterosexual	956 (83.94)	867 (82.73)	89 (97.80)	
Bisexual	44 (3.86)	44 (4.20)	0 (0.00)	
Number of sexual partners in last 12 months				0.07
≤ 1	550 (58.89)	499 (57.89)	51 (70.83)	
2-5	133 (14.24)	128 (14.85)	5 (6.94)	
> 5	251 (26.87)	235 (27.26)	16 (22.22)	
Education				<0.0001‡
≤ 8 years	641 (56.37)	570 (54.44)	71 (78.89)	
> 8 years	496 (43.63)	477 (45.56)	19 (21.11)	
Drug user				0.01‡
Yes	125 (12.80)	123 (13.64)	2 (2.70)	
No	851 (87.20)	779 (86.36)	72 (97.30)	
Injecting drug user				0.98
Yes	13 (1.34)	12 (1.33)	1 (1.37)	
No	960 (98.66)	888 (98.67)	72 (98.63)	
Viral load				0.52
≤ 50 copies/mm^3	574 (55.67)	532 (55.36)	42 (60.00)	
>50 copies/mm^3	457 (44.33)	429 (44.64)	28 (40.00)	
HAART				0.44
Yes	877 (81.58)	810 (81.90)	67 (77.91)	
No	198 (18.42)	179 (18.10)	19 (22.09)	

Fisher's exact test and Pearson's Chi-square test for comparison between females and males. ‡ Statistically significant, p < 0.05; HAART, Highly Active Antiretroviral Therapy.

A higher prevalence of HIV-infection was found in women aged 60-69 years, white, widowed, with time since HIV/AIDS diagnosis > 5 years, heterosexual, and with ≤ 8 years´ education compared to men, but this difference was not statistically significant.

Also, there was a higher prevalence of HIV-infection in women ≥ 60 years, with one or no sexual partners in the last twelve months, who were widowed (p <0.05) (Table 2).

Table 2. Sociodemographic characteristics of HIV- infected patient aged ≥ 60 years according to gender in the 25 cities of the 10th Health Region of Parana state, 2005-2014

Variables	Total n (%)	Female n (%)	Male n (%)	p-value
Age				0.25
60-69	58 (62.37)	31 (88.57)	46 (79.31)	
≥70	35 (37.63)	4 (11.43)	12 (20.69)	
Ethnicity				0.23
White	67 (72.83)	28 (80.00)	39 (68.42)	
Blown	25 (27.17)	7 (20.00)	18 (31.58)	
Time since HIV Diagnosis (years)				
≤ 2	17 (18.28)	6 (17.14)	11 (18.97)	0.20
2-5	28 (30.11)	7 (20.00)	21 (36.21)	
> 5	48 (51.61)	22 (62.86)	26 (44.83)	
Marital status				0.05‡
Single	16 (18.18)	5 (14.71)	11 (20.37)	
Married	37 (42.05)	11 (32.35)	26 (48.15)	
Divorced	19 (21.59)	7 (20.59)	12 (22.22)	
Widowed	16 (18.18)	11 (32.35)	5 (9.26)	
Behavior				
Homosexual	2 (2.20)	0 (0.00)	2 (3.57)	0.26
Heterosexual	89 (97.80)	35 (100.00)	54 (96.43)	
Number of sexual partners in last 12 months				0.02‡
≤ 1	51 (70.83)	27 (87.10)	24 (58.54)	
2-5	5 (6.95)	2 (6.45)	3 (7.32)	
> 5	16 (22.22)	2 (6.45)	14 (34.15)	
Education				0.84
≤ 8 years	71 (78.89)	28 (80.00)	43 (78.18)	
> 8 years	19 (21.11)	7 (20.00)	12 (21.82)	
Drug user				
Yes	2 (2.70)	0 (0.00)	2 (4.35)	0.26
No	72 (97.30)	28 (100.00)	44 (95.65)	
Injecting drug user				
Yes	1 (1.37)	0 (0.00)	1 (2.22)	0.43
No	72 (98.63)	28 (100.00)	44 (97.78)	

Fisher's exact test and Pearson's Chi-square test for comparison between females and males. ‡ Statistically significant, p < 0.05.

Analysis of the quantification of CD4 + T and CD8 + T cells revealed that the patients aged ≥ 60 years had lower levels for both cell lines compared to individuals aged < 60 years (p <0.05) (Table 3). The mean CD4/CD8 ratio in individuals < 60 and ≥ 60 years were 0.65 and 0.62, respectively, (0.55 in men and 0.72 in women), with these differences not reaching statistical significance. The evaluation of viral load in patients < 60 and ≥ 60 years revealed a high frequency of viral load < 50 copies/mm^3 in women and men, with no statistically significant difference between groups (Table 4).

Of the total patients with HIV ≥ 54 (58.06%) had up to two associated infections plus HIV, particularly among men, who accounted for 34 (36.56%) of these cases. The main coinfections found in patients aged ≥ 60 years were syphilis, toxoplasmosis and cytomegalovirus, whose prevalence was 41.10%, 24.20%, and 22.60%, respectively.

Table 3. CD4+ and CD8+ T lymphocytes count in HIV-infected patients aged < 60 or ≥ 60 years in the 25 cities of the 10th Health Region of Parana state, 2005-2014

Age group	CD4+ count (cells/mm³) median	p-value	CD8+ count (cells/mm³) median	p-value	CD4+ count (cells/mm³)			
					≤ 200 n(%)	200-500 n(%)	> 500 n(%)	p-value
< 60 years	590.26	0.01‡	1052.67	0.01‡	73 (8.74)	260 (31.14)	502 (60.12)	0.01‡
≥ 60 years	475.68		936.61		12 (17.91)	28 (41.79)	27 (40.30)	
Men ≥ 60 years	448.47	0.26	988.59	0.45	9 (23.68)	15 (39.47)	14 (36.84)	0.37
Women ≥ 60 years	511.34		856.9		3 (10.34)	13 (44.83)	13 (44.83)	

n, number of patients; Pearson's Chi-square and Wilcoxon rank-sum tests for comparison between groups. ‡ Statistically significant, $p < 0.05$.

Table 4. HIV viral load in HIV/AIDS patients aged < 60 or ≥ 60 years in the 25 cities of the 10th Health Region of Parana state, 2005-2014

Viral load (copies/mm³)	Patients < 60 years n (%)	Patients ≥ 60 years n (%)	p-value	Male ≥ 60 years n (%)	Female ≥ 60 years n (%)	p-value
< 50	528 (54.55)	41 (53.95)	0.06	24 (52.17)	17 (56.67)	0.39
50-1000	119 (12.29)	8 (10.53)		6 (13.04)	2 (6.67)	
1001-100,000	249 (25.72)	15 (19.74)		7 (15.22)	8 (26.67)	
> 100,000	72 (7.44)	12 (15.79)		9 (19.57)	3 (10.00)	

n, number of patients; Fisher's exact test and Pearson's Chi-square test for comparison between Groups.

Discussion

The incidence rate of HIV among the elderly in Brazil increased by 42.8% between 1998 and 2010 (Brazil, 2011). In 2014, the prevalence rate of HIV detected among the elderly was 9.9/100,000 population (13.8 in men and 6.7 in women) (Brazil, 2015).

A study of Brazil´s Federal District reported a HIV incidence rate of 3.61/100,000 elderly in 1999. However, this rate had risen to 24.6 cases/100,000 elderly by the following year and remained relatively steady at this level in 2009 (Oliveira, & Melo, 2013). Our study detected an average rate of HIV/AIDS in the elderly of 1.66/100,000 population over the 2005-2014 period, ranging from 0.78 in 2006 to 2.73 in 2011, a relatively low rate compared to Brazil as a whole (Brazil, 2015).

In this study, the number of older adults with HIV/AIDS was higher among men than women, with males accounting for 62.4% of cases. This result mirrors studies conducted in the states of Espírito Santo and Rio de Janeiro, Brazil, which reported that elderly males were the most affected with HIV/AIDS, representing 61.4% and 54.3% of cases in these states, respectively (Toledo, Maciel, Rodrigues, Tristão-Sá, & Fregona., 2010; Ultramari, *et al*., 2011). Other studies have reported that HIV-positive women are now reaching old age (Pottes, Brito, Gouveia, Araújo, & Carneiro, 2007; Araujo, Queiroz, & Tavares, 2007). Data analysis revealed no great difference between the number of elderly males (62.4%) and females (37.6%) living with HIV/AIDS, suggesting feminization of the epidemic (Manfredi, 2004). This observation is supported by the fall in the ratio of male/female infections in Brazil from 26:1 in 1985 to 1.9:1 in 2012 (Brazil, 2013b). This phenomenon has occurred worldwide and the cities belonging to the 10th Health Region appear to have the same pattern of male/female infections, having an average ratio of 1.66:1 (Manfredi, 2004).

Most (62.3%) of the older adults with HIV/AIDS belonged to the 60-69 years age group. This finding is consistent with a study conducted in the state of Ceará, Brazil, in which the 60-69 years age group was the most affected in both sexes (77.5%). Indeed, most elderly belong to this age bracket (Araújo, Queiroz, & Tavares, 2007). Brazilian research conducted in Belém (Pará State) and Belo Horizonte (Minas Gerais State) reported higher rates of HIV/AIDS in elderly of 95.7% and 81.56%, respectively (Ferreira Souza, & Junior, 2015; Melo, Pimenta, & Donalísio, 2016).

Regarding education, 71 (78.89%) of the elderly had < 8 years education. The low level of education among those affected by HIV/AIDS can be attributed to the fact that less time in education can lead to incomplete understanding of information, contributing to poorer knowledge on the disease, despite access to correct and reliable sources of information (Wong, & Carvalho, 2006). In other Brazilian regions (Passos, Minas Gerais State, and Teresina, Piauí State), most elderly only attended elementary school or had low education, respectively (Silva, Marreiros, Figueiredo, T.S., & Figueiredo, M.L.F (2011); Souza, *et al*., 2011).

HIV/AIDS infection in Brazil first emerged in the higher educated social strata. However, over time, the epidemic has increasingly affected low-educated individuals of both genders across all regions (Fonseca, *et al*., 2000).

Heterosexual behavior was high in the elderly patient group (97.8%), akin to results found by a study in Pernambuco, Brazil (Pottes, Brito, Gouveia, Araújo, and Carneiro, 2007). Heterosexual transmission is the key feature of the dynamic of the epidemic, and was marked in all regions. This mode of transmission has significantly increased in Brazil over the years (Brito, Ayres, Castilho, & Landmann, 2001).

Regarding number of sexual partners, 34.15% of elderly men had more than 5 partners in the past 12 months whereas 87.10% of women had none or only one sexual partner. A study in João Pessoa, Paraíba State, Brazil, reported that 66.7% of HIV-positive women had intercourse only with their steady partners (Sousa, Suassuna, & Costa, 2007). This result suggests that most women maintain or have maintained some sort of relationship with men who have a confirmed diagnosis of HIV/AIDS. Thus, these women are believed to have acquired their infection through unprotected sexual intercourse with their steady partner, who in turn contracted HIV outside the marriage.

Analysis of CD4+ and CD8+ T lymphocyte levels showed that patients aged ≥ 60 years had lower median cell levels compared to individuals aged < 60 years. This finding is probably due to the fact that immunity becomes impaired with advancing age (Aw, Silva, & Palmer, 2007). Another key finding is that 82.09% of the elderly had CD4 + T lymphocyte levels > 200 cells/mm^3, probably due to high adherence to HAART (Highly Active Antiretroviral Therapy). Early diagnosis of HIV/AIDS in the elderly is critical, since this group have more rapid disease progression and/or increased risk of progression, where CD4+ T lymphocyte levels rapidly decline to below-recommended levels, rendering the immune system weak at the start of treatment. Thus, the elderly may have a slower response to antiretroviral therapy (Brañas, & Serra, 2009), while HIV accelerates the progression of morbidity among the elderly (Gebo, & Justice, 2009).

There was no significant difference in viral load between the patient groups aged < 60 and ≥ 60 years or between men and women. Most of the elderly (53.95%) had a HIV viral load < 50 copies/mm^3, probably due to the high adherence of this population to HAART, contributing to a reduction in virological levels and better long-term immune response (Longo, Camoni, Boros, & Suligoi, 2008). In a case-control study comparing 21 patients aged ≥ 55 years against 84 younger patients, no significant relationship between age and virologic response to HAART was found (Manfredi, & Chiodo, 2000).

There is a consensus in the literature that STIs and HIV in older adults are usually either diagnosed late or never diagnosed. One reason is the lack of knowledge by the elderly about

transmission of HIV and other STIs, reducing requests for these tests in the mistaken belief they are not at risk of infection (Peate, 2007). The most frequent coinfections identified in this study were syphilis, toxoplasmosis and cytomegalovirus. However, a study conducted in Ribeirão Preto, São Paulo, Brazil, showed that the main pathologies related to low immunity due to HIV/AIDS infection were oral candidiasis, pneumonia, esophageal candidiasis and neurotoxoplasmosis (Ultramari, *et al*., 2011).

For epidemiological surveillance, monitoring the temporal and spatial development of the disease, infections, risk behavior, risk groups and forms of contagion can represent a powerful objective component to guide actions. Characterizing the population and the disease can help inform new care plans and allow the adoption of effective policies with respect to transmission, diagnosis and treatment (Melo, Pimenta, & Donalísio, 2016).

Conclusion

The prevalence of HIV in older adults was lower than the national average rate. However, this scenario may be masked by the difficulty defining the diagnosis in this population. For both genders, patients in the ≥ 60 years group were predominantly heterosexual and low-educated, reflecting the increasingly heterosexual and low-income profile of the epidemic in this demographic group. Finally, several findings of this study warrant further investigation such as vulnerability to HIV infection in the elderly and the universality of the diagnosis in this population, in a bid to reduce morbidity and mortality from HIV/AIDS in this demographic group.

Conflict of interest

The authors have no conflicts of interest to declare.

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