

CLINICAL SCIENCE

Vulnerability to AIDS among the elderly in an urban center in central Brazil

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OBJECTIVE: As the world population ages with an improved quality of life and sexual longevity, the prevalence of AIDS is rising among the elderly. The purpose of this study was to estimate the vulnerability to AIDS among individuals attending senior community centers in Campo Grande, Mato Grosso do Sul, Brazil.

METHOD: This descriptive, exploratory investigation included 329 subjects selected in a probabilistic manner. Individuals with scores on the Mini-Mental State Examination indicating cognitive impairment were excluded from the analyses. Barthel's and Lawton's functional assessment scales were applied. Interviews were conducted to evaluate the presence of cognitive and behavioral factors associated with HIV transmission.

RESULTS: Most subjects were non-dependent, fell within the 60- to 69-year age bracket and were female. A majority of individuals reported having knowledge about AIDS and were aware that the elderly are vulnerable to the disease. More than a quarter (26.9%) of the sample reported previous HIV testing. No participants reported drug use, homosexual orientation, or alcohol abuse. A minority of participants reported using medication for erectile dysfunction. Casual and multiple partners accounted for 12% and 34% of reported intercourse experiences, respectively. Condom use was reported by 14% of respondents.

CONCLUSION: Unprotected sex was the primary factor accounting for vulnerability to AIDS among the elderly.

KEYWORDS: Elderly; AIDS; Sexually Transmitted Diseases; Vulnerability; Sexuality.

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INTRODUCTION

An aging world population constitutes a major challenge for humankind. Individuals aged 60 years and older are expected to account for over 20% of the world population by 2050 (1).

This scenario has led to the formulation of policies addressing the provision of healthcare for the elderly and the promotion of social opportunities for this population, with consequent improvements in quality of life and sexual longevity (2). As the specificities of this growing population have been ignored by both the elderly themselves and their healthcare providers (3), the incidence of AIDS among individuals aged 60 years and older has concurrently been rising (4). Over the past decade, 47,437 new AIDS cases were reported among individuals aged 50 years and older, which corresponds to 9% of new AIDS diagnoses (5). From 1991 to 2001, the numbers of confirmed cases increased by 98% in men

and 567% in women (6). The incidence of AIDS has been steadily rising in many countries, including all regions in Brazil (5).

Although some factors have been hypothesized to explain this increased AIDS prevalence, few epidemiological studies have been conducted to identify specific risk behaviors among the population aged 60 years and over (7). Candidate risk factors include behaviors related to increased sexual longevity, including unprotected sex and the use of drugs for erectile dysfunction; the impact of these risk factors is heightened, given that AIDS vulnerability in this age range is not sufficiently acknowledged by its members (8), or by healthcare professionals (9). The purpose of this study was to estimate the vulnerability to HIV infection among elderly individuals who attend three senior community centers in Campo Grande, the capital city of Mato Grosso do Sul state, in Brazil.

METHOD

This exploratory, descriptive study employed a cross-sectional, quantitative design for primary data collection across three senior community centers in Campo Grande. In these centers, which the elderly can attend free of charge, individuals aged 60 years and older can pursue activities intended to promote health, social integration,

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and autonomy. Data were collected from August through September 2009.

The study was approved by the Universidade Federal de Mato Grosso do Sul (UFMS) Ethics Committee for Research on Humans (permit 1357, of June 2009). No financial support or compensation was provided to the participants.

Considering an HIV infection prevalence of 50% ($\pm 5\%$) with a 5% significance level and a 10% margin for any losses, the projected sample consisted of 329 subjects aged 60 years and over who were selected in a probabilistic manner from 1,356 attendees across the senior centers. Given the variation in sample size and gender distributions across each of the senior centers, a random sample of individuals, stratified by gender and population size, was selected for participation. Only individuals who agreed to sign an informed consent form were included in the study. Individuals with communicative limitations or cognitive impairment that might hinder their understanding of the interview questions and answers, as detected by the Mini-Mental State Examination (10), were excluded from the sample. No HIV testing was conducted as a part of this investigation.

All participants were interviewed by the same interviewer (M.D.), who was blind to the serological status of the respondents. Participants were tested to determine their cognitive status and underwent standard tests for evaluation of functional status, including Barthel's test for basic activities of daily living (11) and Lawton's test for instrumental activities (12). A semi-structured interview was conducted to gather sociodemographic data and to evaluate the participants' vulnerability to HIV infection, including an assessment of their knowledge about HIV transmission (using questions to elicit spontaneous, open-ended responses), self-reported history of HIV testing, perception of their vulnerability to infection, the presence of blood-related factors, (none of which were tested for as part of the present study), and indirect factors associated with HIV transmission (alcohol consumption assessed using the CAGE questionnaire (13) and history of incarceration) and sexual behavior. The use of evaluation instruments conformed strictly to recommended methods.

The data were analyzed with Epi Info software (Centers for Disease Control and Prevention, Atlanta, Georgia, USA), version 3.5.1 (14), and subjected to descriptive and inferential statistics at a significance level of 5%. The Chi-squared and Fisher's exact tests were applied.

RESULTS

Among the 329 randomly selected subjects, 18 displayed signs of cognitive impairment in the Mini-Mental State Examination, and 6 refused to participate in the study. A final sample of 305 subjects was used for further analyses. Therefore, the attrition rate was less than predicted in the sample calculation.

Of these 305 subjects, 99.7% were capable of performing basic daily activities (indicated by a score of 100 on Barthel's scale) and 89.8% were capable of performing instrumental daily living activities (indicated by a score of 21 on Lawton's scale).

Most participants were female (76.4%) and were 60 to 69 years of age (56.1%).

The mean age of the participants was 69.6 ± 7.1 (SD) years (mean female age, 68.8 ± 6.6 years; mean male age, 72.3 ± 8.0

years). Females predominated only in the first and third age ranges (60-64 and 70-74 years of age; Table 1), whereas males predominated among octogenarians.

Most female participants did not live with a partner. The other variables investigated (i.e., education, income, and job status) did not differ significantly between genders.

The majority of participants reported less than seven years of formal education and had a *per capita* household income of less than two minimum wage salaries (i.e., less than approximately US\$ 600 at the time of testing). Most respondents (90.5%) did not hold paid jobs (Table 1).

Tables 2 and 3 present information regarding previous HIV testing, knowledge held about HIV transmission, and perceived HIV vulnerability. These variables did not differ significantly between genders.

With regard to factors associated with potential blood transmission of HIV, 22.3% of participants had undergone a blood transfusion. In this respect, no significant difference ($c2=0.12$, $p=0.733$) was found between males (20.8%) and females (22.7%). No participants reported use of injectable drugs or a history of tattoos (although 16 women had received permanent makeup), whereas 45.6% of the participants (139/305) reported sharing cutting/piercing objects (all 139 cases were women who shared cuticle or nail clippers).

Table 4 presents data describing the sexual behavior of the participants. No homosexual or bisexual relationships were reported. The frequency of sexual activity with casual and steady partners was higher among males.

Of the 194 sexually active participants, 14.5% (9.5-19.4%, 95% CI) reported using or, in the case of female respondents, having a partner who used erectile dysfunction medication.

Among the participants with a history of sexually transmitted disease (STD), 84.6% had contracted an STD only once, and 81.5% had contracted gonorrhea and/or syphilis. All participants with a history of STD reported acquiring the condition(s) more than 10 years earlier.

The STDs reported by males included gonorrhea (37.5%), syphilis (9.7%), hepatitis B (2.8%), and condyloma (1.4%). Females reported gonorrhea (8.2%), syphilis (3.4%), condyloma (1.7%), herpes (0.9%), and hepatitis C (0.4%). Gonorrhea ($c2=36.98$, $p<0.001$) and syphilis ($p=0.039$; Fisher's exact test) occurred more frequently in males.

Only 33.1% of the participants reported alcohol consumption, none of whom had scores on the CAGE questionnaire indicating alcohol dependence. A significant gender difference was found in alcohol consumption ($c2=8.47$, $p=0.004$), with 28.8% of females reporting alcohol consumption, compared with 47.2% of males. No participants reported a history of arrest.

DISCUSSION

The population of elderly participants addressed in this study demonstrated knowledge that sexual behavior is the primary mode of transmission of HIV, although other studies have shown that similar populations had poorer knowledge of the disease than did younger individuals (15,16). Compared with another study involving elderly individuals (17), the present investigation found a higher percentage (91.8%) of participants who cited sexual intercourse and a similar percentage (6.9%) who cited kissing and hugging as routes of HIV transmission. In a separate

Table 1 - Sociodemographic variables investigated in elderly individuals attending senior community centers in Campo Grande, MS, Brazil, 2009.

| Variables | Male (n = 72) | | Female (n = 233) | | Total (n = 305) | | p-value |
|---|---------------|------|------------------|------|-----------------|------|---------|
| | N | % | N | % | N | % | |
| Age group | | | | | | | |
| 60-64 | 13 | 18.0 | 72 | 30.9 | 85 | 27.9 | |
| 65-69 | 22 | 30.6 | 64 | 27.5 | 86 | 28.2 | |
| 70-74 | 6 | 8.3 | 48 | 20.6 | 54 | 17.7 | <0.001 |
| 75-79 | 19 | 26.4 | 36 | 15.4 | 55 | 18.0 | |
| ≥80 | 12 | 16.7 | 13 | 5.6 | 25 | 8.2 | |
| Formal education (years) | | | | | | | |
| <1 | 29 | 40.3 | 70 | 30.0 | 99 | 32.5 | 0.404 |
| 1-3 | 7 | 9.7 | 31 | 13.3 | 38 | 12.5 | |
| 4-7 | 22 | 30.6 | 76 | 32.6 | 98 | 32.1 | |
| ≥8 | 14 | 19.4 | 56 | 24.1 | 70 | 22.9 | |
| Cohabitation with spouse or partner | | | | | | | |
| No | 32 | 44.4 | 168 | 72.1 | 200 | 65.6 | <0.001 |
| Yes | 40 | 55.6 | 65 | 27.9 | 105 | 34.4 | |
| Per capita household income (minimum salaries*) | | | | | | | |
| <1 | 19 | 26.4 | 63 | 27.0 | 82 | 26.9 | 0.788 |
| 1-2 | 34 | 47.2 | 123 | 52.8 | 157 | 51.5 | |
| 2-3 | 10 | 13.9 | 22 | 9.4 | 32 | 10.5 | |
| 3-4 | 4 | 5.6 | 14 | 6.0 | 18 | 5.9 | |
| 4-5 | 1 | 1.3 | 4 | 1.8 | 5 | 1.6 | |
| ≥5 | 4 | 5.6 | 7 | 3.0 | 11 | 3.6 | |
| Paid occupation | | | | | | | |
| No | 63 | 87.5 | 213 | 91.4 | 276 | 90.5 | 0.322 |
| Yes | 9 | 12.5 | 20 | 8.6 | 29 | 9.5 | |

Note: Chi-squared test, significance level of $p \leq 0.05$.

*One minimum salary was equivalent to approximately US\$ 300 at the time of this study.

study, 41.1% of elderly respondents were found to believe that HIV can be transmitted by mosquito bites (18).

Nearly all of the subjects in the present investigation perceived themselves to be vulnerable to HIV infection, a finding corroborated by a previous study of individuals aged 50 years and older conducted in São Paulo (19). However, numerous investigations have revealed that most people, regardless of age, see themselves as unlikely to contract HIV, despite displaying behaviors associated with risk for transmission. This phenomenon is more evident among individuals aged 50 years and over (15,20,21).

Improved knowledge about the sexual transmission of HIV as well as the perception of vulnerability to transmission may have increased following awareness campaigns carried out at senior centers by public health agencies and

through campaigns run by the Ministry of Health in 2008 and 2009 aimed at the population aged 50 years and over. This achievement may represent an important initial step in coping with the new face of the AIDS epidemic. However, although the majority of the present study population perceived themselves as vulnerable to HIV, only a small proportion had undergone HIV testing.

The literature indicates that a low perceived vulnerability to infection is a factor associated with disinterest in undergoing HIV testing (21). An estimated 7% to 45% of individuals aged 50 years and older have undergone HIV testing (7,15,20,21,22), although these rates are believed to be reduced among subjects aged 60 years and older. Rates of HIV testing remain lower among seniors aged 50 and older compared to younger individuals exposed to the same risk

Table 2 - Knowledge about HIV/AIDS, previous HIV testing, and perceived vulnerability in elderly individuals attending community centers in Campo Grande, MS, Brazil, 2009.

| Variables | Male (n = 72) | | Female (n = 233) | | Total (n = 305) | | p-value |
|--|---------------|------|------------------|------|-----------------|------|---------|
| | N | % | N | % | N | % | |
| Believes that his/her knowledge about AIDS is sufficient | | | | | | | |
| Yes | 50 | 69.4 | 160 | 68.7 | 210 | 68.9 | 0.901 |
| No | 22 | 30.6 | 73 | 31.3 | 95 | 31.1 | |
| Has undergone HIV testing | | | | | | | |
| No | 51 | 70.8 | 172 | 73.8 | 223 | 73.1 | 0.617 |
| Yes | 21 | 29.2 | 61 | 26.2 | 82 | 26.9 | |
| Views the elderly as vulnerable to HIV/AIDS | | | | | | | |
| No | 8 | 11.1 | 25 | 10.7 | 33 | 10.8 | 0.927 |
| Yes | 64 | 88.9 | 208 | 89.3 | 272 | 89.2 | |

Note: Chi-squared test, significance level of $p \leq 0.05$.

Table 3 - Knowledge about modes of HIV transmission in elderly individuals attending senior community centers in Campo Grande, MS, Brazil, 2009.

| Reported mode of transmission* | Male (n = 72) | | Female (n = 233) | | Total (n = 305) | | p-value |
|--------------------------------|---------------|------|------------------|------|-----------------|------|----------|
| | N | % | N | % | N | % | |
| Unprotected sexual intercourse | 63 | 87.5 | 217 | 93.1 | 280 | 91.8 | † 0.128 |
| Blood transfusion | 9 | 12.5 | 44 | 18.9 | 53 | 17.4 | † 0.212 |
| Injectable drugs | 9 | 12.5 | 28 | 12.0 | 37 | 12.1 | † 0.913 |
| Kissing | 7 | 9.7 | 14 | 6.0 | 21 | 6.9 | ‡ 0.290 |
| Contaminated instruments | 2 | 2.8 | 19 | 8.2 | 21 | 6.9 | ‡ 0.180 |
| Ignored | 1 | 1.4 | 15 | 6.4 | 16 | 5.2 | ‡ 0.130 |
| Other | 6 | 8.3 | 1 | 0.4 | 7 | 2.3 | ‡ <0.001 |

Note: † Chi-squared test and ‡ Fisher's exact test, significance level of $p \leq 0.05$. *More than one answer allowed.

factors (15,22). AIDS symptoms are similar across young and elderly populations, but in the latter group, they can be attributed to other diseases that commonly affect this age group. This lack of symptom specificity can retard AIDS diagnosis for up to 10 months (23,24), resulting in delaying antiretroviral treatment (25). Unfortunately, signs of improved risk perception (19), have not translated into frequent investigation of serostatus by physicians or to an increased interest of the elderly in undergoing HIV testing.

At the beginning of the AIDS epidemic in 1980, blood transfusions were the principal risk factor for HIV transmission in individuals aged 60 and older (6). This trend changed in 1985, with the availability of laboratory tests for routine screening of blood donors and in response to efforts to find alternatives to transfusion (26). The elderly population has received updated education about the risks involved with blood transfusions; however, most respondents in the present study did not cite transfusion as a route of HIV transmission. Elderly women may expose themselves to HIV by sharing cuticle or nail pliers, and they may be unaware of

other forms of transmission through blood contact. The low percentage of individuals who cited blood transfusion and contaminated instruments as suspected transmission routes may have resulted from recent awareness campaigns that have focused attention on needle sharing (among injectable drug users) and sexual activity as transmission routes.

Although drug use was not reported by the participants in the present study, a number of investigations have shown that this age group is not exempt from this potential form of HIV transmission given the infection rates of 1.2% to 29% reported for drug users aged 50 and over (3,9,18,20,27,28). Because of the common belief that this age group does not indulge in this type of risk behavior (29), drug use is ignored during routine medical visits (23). The low rate of drug use in the present sample may also suggest that risk factors vary across specific elderly populations, as drug users do not typically attend community centers for senior citizens. Furthermore, the potential roles of sharing sharp objects and receiving permanent makeup in HIV transmission have been insufficiently addressed in the literature.

Table 4 - Sexual behavior variables investigated in elderly individuals attending senior community centers. Campo Grande, MS, Brazil, 2009.

| Variables | n | Male | | Female | | Total | | p-value |
|--|-----|------|-------|--------|-------|-------|-------|----------|
| | | Nº. | % | Nº. | % | Nº. | % | |
| Sex partners (previous year) | 305 | | | | | | | |
| No | | 15 | 20.8 | 143 | 61.4 | 158 | 51.8 | * <0.001 |
| Yes | | 57 | 79.2 | 90 | 38.6 | 147 | 48.2 | |
| Sexual orientation (previous year) | 194 | | | | | | | |
| Heterosexual | | 68 | 100.0 | 126 | 100.0 | 194 | 100.0 | - |
| Homosexual/bisexual | | - | - | - | - | - | - | |
| Type of sex partner (previous year) | 147 | | | | | | | |
| Steady | | 36 | 63.2 | 81 | 90.0 | 117 | 79.6 | * <0.001 |
| Casual | | 10 | 17.5 | 8 | 8.9 | 18 | 12.2 | |
| Both | | 11 | 19.3 | 1 | 1.1 | 12 | 8.2 | |
| Condom use (previous year) | 147 | | | | | | | |
| No/sometimes | | 51 | 89.5 | 76 | 84.4 | 127 | 86.4 | * 0.386 |
| Yes | | 6 | 10.5 | 14 | 15.6 | 20 | 13.6 | |
| Lifetime history of STD(s) | 305 | | | | | | | |
| No | | 41 | 56.9 | 199 | 85.0 | 239 | 78.4 | * <0.001 |
| Yes | | 31 | 43.1 | 34 | 15.0 | 66 | 21.6 | |
| Partner who has multiple partners | 194 | | | | | | | |
| No | | 49 | 72.1 | 78 | 61.9 | 127 | 65.5 | * 0.156 |
| Yes | | 19 | 27.9 | 48 | 38.1 | 67 | 34.5 | |
| Condom use during intercourse with partner who has multiple partners | 67 | | | | | | | |
| No | | 12 | 63.2 | 39 | 81.3 | 51 | 73.1 | ‡ 0.202 |
| Yes | | 7 | 36.8 | 9 | 18.7 | 16 | 26.9 | |

Note: * Chi-squared test and ‡ Fisher's exact test, significance level of $p \leq 0.05$.

Elderly individuals tend to remain sexually active throughout their lives given the opportunity for partnership (15). The percentage of sexually active seniors in this study corroborates previously published findings. One investigation found that 65% of 60- to 70-year-old subjects remained sexually active (29), whereas other studies have reported rates of 47% to 72% (7,22,28), albeit with a decrease in the frequency of intercourse with age (23,30). Among HIV carriers aged 50 and older, rates of sexual activity range from 38% (30). to 95.5% (9). Elderly men tend to remain more sexually active than elderly women, a contrast that can be explained by factors such as relationships between elderly men and younger women, new patterns of remarriage, and earlier death in males compared with females (30). Sexual activity in elderly women is associated with specific age-related changes, including decreased vaginal lubrication and thinning of the vaginal wall secondary to decreased estrogen levels. These physiological changes may predispose elderly women to local tissue microtrauma during intercourse, thereby facilitating HIV transmission and consequently increasing the risk of infection (23,29).

Although most of the sexually active study respondents reported having a steady partner (79.6%), the percentage of individuals with casual partners or both casual and steady partners (20.4%) highlights the risks affecting seniors involved in more than one relationship. Even greater proportions of sexually active individuals aged 50 years and older who only have casual partners (12%) or have both steady and casual partners (24%) are reported in the literature (7,31). In the present investigation, the percentage of individuals with occasional partners or two simultaneous partners was higher in males compared to females. Taking the subjects' cultural backgrounds into account, infidelity and multiple sexual partners are assumed to be the result of standard cultural expectations in men belonging to the generation currently aged 60 and over (32). Contemporary factors, such as technology, pose additional risks, given that sex partners can be found on the Internet and through the practice of sex tourism (22). Elderly HIV carriers tend to fit into one of two classic profiles: married men who become infected by younger women and widows who rediscover sex (32). Given that community centers provide the elderly with new opportunities for relationships, authorities at these centers should assume the responsibility of informing their members about the safe habits now required for a healthy sex life.

Condom use is not a common habit among the elderly. Studies investigating sexual behavior in elderly individuals have suggested that this population is less aware of HIV risk factors and prevention strategies (33), making unprotected sex a common route of HIV transmission in this age group (27). In fact, a study revealed that 83.1% of elderly males had not used condoms during their most recent intercourse experiences (19). AIDS is a relatively new disease that has heightened the need to engage in protected sex, and older individuals may experience difficulty using condoms, as this was not a standard practice associated with their cultural background. (19). In men aged 50 years and older who exhibit high-risk sexual behavior, condom use is six times lower than among young males (16). The low probability of pregnancy in older women also contributes to lower condom use in this age group (29). In addition, elderly men often avoid using condoms for fear of losing an erection, and many also believe that this form of protection

is only required for intercourse with sex workers (32). Similarly, older women have greater difficulties than younger women in negotiating safe sex (19). Investigations of condom use by elderly HIV carriers have found that none of these individuals used condoms before being infected and that approximately half of them still avoided using this protection at the time of survey (9,34). In the present study, however, awareness of the mechanisms of sexual transmission of HIV did not lead to behavioral adherence to condom use, which reflects the existence of a dissociation between feeling vulnerable to HIV, knowing how to avoid HIV infection, and practicing safe sex.

All respondents identified as heterosexual. Although heterosexual intercourse has been the most frequently reported category of exposure responsible for AIDS cases among the elderly (4,9,16), the occurrence of high-risk homosexual/bisexual exposure has been found to range from 11% to 50% (2,4,9,16,24). Research on sexual orientation in elderly populations remains scarce, and the inherent difficulties in obtaining sexuality data from elderly individuals may lead to the underreporting of homosexuality/bisexuality (24). The lack of accurate information on sexual orientation in the elderly suggests that potential high-risk groups may fail to be identified.

The proportion of sexually active elderly males in the present investigation who reported using erectile dysfunction drugs was comparable to the estimate of 22.4% found in a previous study of 103 males (14.3-30.4%, 95% CI) (33). The popularity of sexual performance-enhancing drugs has been described as a factor associated with increased sexual transmission of HIV among the elderly (15), but few studies have investigated the impact of this type of medication on the sexual behavior of users (35). After a new drug is made available, a period of at least ten years is required to analyze its effect on the AIDS epidemic among individuals aged 50 and over (36). Therefore, it has been suggested that drugs for erectile dysfunction may have a delayed effect on the increase in AIDS cases among the elderly because HIV infection reporting is not mandatory in Brazil. However, it has been argued that drugs for erectile dysfunction can make sex safer by improving the quality of erections, thereby encouraging condom use (36). Overall, information on the relationship between performance-enhancing drug use and transmission is still lacking. The desire to use these drugs is accompanied by fears that they can be harmful.

In the present study, none of the respondents reported a recent history of STD, which can increase vulnerability to HIV infection. A positive STD history was more frequent among males than among females, probably because the men's early years of sexual activity were characterized by expectations of male sexual freedom. In one study (19), 90% of elderly subjects were able to cite examples of STDs, including syphilis, gonorrhea, herpes, HPV, hepatitis, and particularly AIDS (a relatively recent illness in this age group). This high level of STD awareness constitutes a positive finding, as the ability to recognize these diseases can be viewed as a first step towards preventive education.

The risks posed by unprotected sex are compounded in the case of multiple partners. Women usually find it more difficult to report their sexual needs, which is even more true in the case of older women, for whom this may be taboo. Men have fewer barriers, regardless of age or relationship status, related to reporting sex with multiple partners (23). A study of male subjects aged 50 and older

found that 17% had engaged in intercourse with sex workers in the previous six months (31).

Alcohol consumers are at greater risk of acquiring HIV because alcohol use may be associated with unprotected sex and promiscuity (29). The low rate of alcohol intake found in the present study may be attributable to the profile of the sample, which was predominantly composed of women and individuals who seek health-promoting activities and healthier living practices.

One limitation of this study is related to the generalizability of the sample characteristics, such as that the majority of the participants live without a partner and that they all attend a senior center that encourages improvements in the quality of life and access to information. These sample characteristics may preclude extrapolation of the current findings to the elderly community as a whole. The finding of this study that access to information about HIV transmission and AIDS as well as awareness of vulnerability to infection did not translate into the behavioral measure of engaging in protected sex among the subjects in this sample is cause for concern. Future studies on this population should address the reasons underlying the refusal to use condoms, so that measures can be proposed to increase the effectiveness of habit-changing campaigns.

Among the elderly individuals investigated in this study, the vulnerability to HIV is multifactorial. This population's awareness of greater opportunities for relationships and of the risks of acquiring AIDS should be associated with more proactive interest in information about risk behaviors, more frequent HIV testing, and protected sex behaviors. Awareness campaigns should take into account gender-specific cultural differences in sexual behavior.

It is detrimental for healthy, sexually active individuals who are likely to achieve non-dependent longevity to exercise behaviors that can expose them to an incurable infectious disease. The findings of the present study strongly emphasize the need to implement more effective measures to discourage unprotected sex, which is the primary vulnerability factor for HIV infection in this population.

AUTHOR CONTRIBUTIONS

Driemeier M was responsible for the manuscript writing and intellectual and scientific content of the study. Andrade SMO was responsible for the methodology applied and critical revision. Pontes ERJC was responsible for the statistical analysis. Paniago AMM was responsible for the revision regarding clinical aspects of AIDS. Cunha RV was responsible for the critical revision.

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