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## Antidepressant use and associated factors among the elderly: the Bambuí Project

### Uso de antidepressivos e fatores associados em idosos: o Projeto Bambuí

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**Abstract** *This study examined the factors associated with antidepressant use among community-dwelling elderly individuals. Data collected from the Bambuí Project, a population-based study on aging and health with a cohort of 1,606 elderly individuals, were used. Gender, age, education, marital status, household income and cohabitation status were the sociodemographic characteristics investigated. Health conditions included self-reported health, number of chronic diseases, depressive symptoms, cognitive impairment and functional disability. Poisson regression with robust variance was used to test associations and to estimate prevalence ratios with 95% confidence intervals. The prevalence of antidepressant use was 8.4%. After multivariate analysis, antidepressant use was associated with the female gender (PR = 2.96; 95%CI 1.82-4.81), being single or divorced (PR = 0.48; 95%CI 0.25-0.91), cognitive impairment (PR = 0.44; 95%CI 0.24-0.84) and worse self-reported health (poor/very poor) (PR=1.86; 95%CI 1.11-3.10). The results are similar to those observed in several other studies conducted in higher-income countries and suggest that self-reported health in the elderly population of Bambuí is a key factor in the decision to use antidepressants.*

**Key words** Antidepressant, Elderly, Use of medication, Pharmacoepidemiology, Population-based study

**Resumo** *O estudo investigou os fatores associados ao uso de antidepressivos junto a população idosa residente em comunidade. Foram utilizados dados coletados de 1.606 integrantes da coorte idosa do Projeto Bambuí, um estudo de base populacional sobre envelhecimento e saúde. As características sociodemográficas incluíram sexo, idade, escolaridade, situação conjugal, renda familiar e coabitação. As condições de saúde incluíram autoavaliação da saúde, número de doenças crônicas, sintomas depressivos, disfunção cognitiva e capacidade funcional. O modelo de regressão de Poisson foi utilizado para testar as associações e estimar razões de prevalência e respectivos intervalos de confiança de 95%. A prevalência do uso de antidepressivos foi de 8,4%, sendo a amitriptilina o princípio ativo mais utilizado. Após a análise multivariada, o uso de antidepressivo foi associado ao sexo feminino (RP=2,96; 95%CI 1,82-4,81), ser solteiro ou divorciado (RP = 0,48; IC95% 0,25-0,91), disfunção cognitiva (RP = 0,44; IC95% 0,24-0,84) e autoavaliação da saúde (ruim, muito ruim) (RP=1,86; 95%CI 1,11-3,10). Nossos resultados mostraram-se semelhantes aos de estudos desenvolvidos em países de renda elevada e sugerem que a autoavaliação da saúde é o fator-chave na decisão do uso de antidepressivos na população idosa de Bambuí.*

**Palavras-chave** Antidepressivos, Idosos, Uso de medicamentos, Farmacoepidemiologia, Estudo de base populacional

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## Introduction

The consumption of antidepressants has increased around the world over the last three decades<sup>1-3</sup>. In some countries, antidepressants have become the most prescribed psychotropic drug<sup>4</sup>. This was due mainly to the introduction of new classes of antidepressants<sup>5</sup>, which are safer and have better tolerability profile<sup>6</sup>, and the expansion of the indications of these substances beyond psychiatric conditions<sup>7</sup>.

Previous epidemiological studies conducted in different countries showed that the prevalence of antidepressant use ranged between 2.4% and 11.5%<sup>2,4,8,9</sup>, with higher prevalence of use among the elderly<sup>8,10</sup>. Classes of antidepressant most commonly prescribed and the factors associated with the antidepressants prescription among the elderly were similar to those observed in the general adult population. Selective serotonin reuptake inhibitors (SSRIs) were the most widely used antidepressants<sup>3</sup>. Female gender, older age, negative self-evaluation of health, functional limitation, and past history of depression were the most consistent socio-demographic and clinical predictors of antidepressant use<sup>2,3,9,11,12</sup>.

There is little information on the prevalence of use of antidepressants in developing countries, e.g. Brazil, in particular from population-based studies. In a recent study, the prevalence of antidepressant use was of 6.9% among public employees from six different Brazilian cities<sup>13</sup>. Another study showed the prevalence of 9.3% of antidepressant use in medium-sized cities<sup>14</sup>. The most important characteristics associated to antidepressant use were female gender, higher socioeconomic level, unemployment, higher education, the presence of clinical comorbidities and psychiatric diagnostic<sup>13,14</sup>. Nonetheless, these studies did not specifically address the pattern of antidepressant use in older adults. The evaluation of the prevalence of antidepressant use and its associated factors in older adults is important given the high number of medical comorbidities, the risk of use of multiple drugs, and its negative consequences like drug interaction and severe adverse effects.

Thus, the present study aimed to investigate the prevalence and associated factors to antidepressant use in the elderly living in the community which constituted the baseline of Bambuí Cohort Study of Aging (BCSA), in 1997. Additionally, we aimed to identify the most widely used antidepressants, in terms of their pharmacological class and active principle.

## Material and Methods

### Area and study population

This study used data from the baseline of BCSA developed in the city of Bambuí (~15,000 inhabitants), a town in the Southwest of the State of Minas Gerais, Brazil. Life expectancy at birth was 70.2 years, with cerebrovascular accident (CVA), Chagas disease and ischemic heart disease being the leading causes of death among the elderly<sup>15</sup>. All city residents above 60 years old on January 1st 1997 were identified and used to constitute the baseline cohort. Of the 1,742 residents in the age group considered, 1,606 (92.2%) consented to participate in the baseline of this cohort and were included in this analysis. Participants signed an informed consent form, and the investigations were approved by the Ethics Committee of the Oswaldo Cruz Foundation (Fiocruz).

### Study variables and data collection

The dependent variable was the consumption of antidepressants, mentioned by participants and verified by inspection of the packaging and/or prescription. Participants were asked whether they had used any drug in the last 90 days, and if so, were asked the name and time of use. The drugs listed were identified, broken down into their active principles, and subsequently classified according to the Anatomical Therapeutic Chemical Index (ATC Index)<sup>16</sup>. This coding system classifies the drugs according to the anatomical site of action, the therapeutic action and pharmacological and chemical properties. All drugs identified in the ATC Index by the code N06A were considered antidepressants.

The sociodemographic variables included in this study were: gender, age, marital status (married/common-law marriage; widower; single/divorced), education (0-3 years, 4-7 years and 8 or more years), family income in number of minimum wages (1 MW = US\$ 120 at the time of baseline assessment), and living alone (yes/no). Variables related to health status included were: presence of depressive symptoms, self-reported health (very good/good, reasonable, poor), presence of cognitive impairment, number of chronic health conditions and functional disability. The presence of depressive symptoms was measured using the 12-items General Health Questionnaire (GHQ-12)<sup>17</sup>. In this population, the GHQ-12 showed a similar performance to the

GDS-30 for screening for depressive symptoms, using a cutoff equal to or greater than 5<sup>18</sup>. Cognitive impairment was assessed by an adapted and validated version of the Mini-Mental State Examination (MMSE)<sup>19,20</sup> using the cutoff point equal to or greater than 22<sup>21</sup>. Chronic conditions included were: hypertension, diabetes, coronary heart disease (angina and/or myocardial infarction), Chagas disease and arthritis/rheumatism, based on self-reported medical diagnosis. Functional disability was defined from the account of failing, without the help of another person, to perform at least one of the following basic activities of daily living (ADL): dressing, eating, lying down/getting up from bed and/or chair, use the bathroom and being able to move through the rooms of the house.

Data collection occurred through a standardized questionnaire, administered in households by a properly trained and calibrated collecting team. The data collectors were residing in the community and had completed 11 years or more years of education.

### Data Analysis

The prevalence of antidepressant use was calculated using the total number of respondents as the denominator. The proportion of pharmacological classes and most consumed active principles was calculated using the consumption of each class or active principle as the numerator and antidepressant consumption as the denominator.

Unadjusted associations of antidepressant use with sociodemographic and health conditions were evaluated using the Pearson's  $\chi^2$  test and  $\chi^2$  tests for linear trend. Unadjusted and adjusted prevalence ratios (PRs) were estimated in Poisson regression with robust error variance to assess the association between sociodemographic and health conditions and antidepressant use<sup>22</sup>.

No statistical criterion was adopted for inclusion or deletion of variables in the multivariate models. The level of significance to consider a variable significantly associated with antidepressant use was 5% ( $p < 0.05$ ). The statistical software Stata, version 10 (Stata Corporation, College Station, USA) was used to analyze the data.

### Results

Characteristics of the sample and unadjusted analyses of factors associated with antidepressant

use are summarized in Table 1. Female gender, presence of depressive symptoms, cognitive impairment, poor/very poor self-reported health, and more number of chronic diseases were significantly associated with antidepressant use.

Tricyclic antidepressants (TCAs) were the most commonly used (76.4%) antidepressant, followed by serotonin reuptake inhibitors (SSRIs) (18.1%) and monoamine oxidase inhibitors (MAOIs) (6.8%) (Table 2). In terms of active principle, amitriptyline (34.7%) and imipramine (13.9%) were the most used among the TCAs, fluoxetine among SSRIs (18.1%) and moclobemide among the MAOIs (5.1%).

The unadjusted and adjusted prevalence ratios (PRs) for the associations between sociodemographic, depressive symptoms and other health variables and antidepressant use are shown in Table 3. Mutually adjusting the PR estimates for all sociodemographic variables (gender, age, schooling, marital status, monthly family income and living alone) and depressive symptoms (Model 2), whereas omitting other health conditions did not substantially alter the pattern of association between female, presence of depressive symptoms and antidepressant use. The extension of this model (Model 2) to include other health conditions (Model 3) indicated that only female, being single/separated, cognitive impairment and poor/very poor self-reported health remained independently significant associated with antidepressant use.

### Discussion

Our results showed a global prevalence of antidepressant use of 8.4%. Tricyclic antidepressants were the most used drug and amitriptyline the most consumed active principle. In this elderly population, female gender, and worse self-rated health were positively associated with antidepressants; being single/separated and having cognitive impairment were associated with lower consumption of antidepressants.

The current study is the first from South America to evaluate antidepressant use in an elderly population. Comparisons of our estimates of the prevalence of antidepressant use with other Brazilian studies are difficult because there are no similar studies as ours. In a Brazilian medium-sized city, a prevalence of 10.0% was found for consumption of antidepressants in the elderly population<sup>14</sup>. International studies have found varied prevalence: they had lower values

**Table 1.** Characteristics of study sample and unadjusted associations between covariates and antidepressants use.

Sociodemographic characteristics	Total (%) (n = 1,606)	Antidepressants Use (%) (n = 135)	No antidepressants Use (%) (n = 1,471)	P value
Gender*				
Male	39.9	3.9	96.1	<b>&lt; 0.001</b>
Female	60.1	11.4	88.6	
Age group (years)**				
60 - 69	58.1	8.7	91.3	0.889
70 - 79	30.6	7.9	92.1	
80+	11.3	8.2	91.3	
Schooling(years)**				
0 - 3	65.3	7.9	92.1	0.310
4 - 7	26.8	8.6	91.4	
8+	7.9	11.9	88.1	
Marital status				
Married/stable union	48.9	8.8	91.2	0.122
Widow	35.4	9.3	90.7	
Single/separated	15.7	5.2	94.8	
Monthly Family Income ( NMW)**				
< 2	30.2	6.9	93.1	0.287
2 - 2,9	37.8	9.5	90.5	
≥ 3	32.0	8.8	91.2	
Living alone*				
No	84.1	8.7	91.3	0.210
Yes	15.9	6.3	93.7	
Depressive symptoms (GHQ-12)*				
< 5	61.5	6.7	93.3	<b>0.006</b>
≥ 5	38.5	10.7	89.3	
Cognitive impairment (MMSE)				
< 22	19.5	3.7	96.3	0.002
> 22	80.5	9.3	90.7	
Self-reported of health**				
Very good/good	34.4	5.8	94.2	<b>0.008</b>
Reasonable	45.5	8.9	91.1	
Poor/very poor	20.2	11.7	88.3	
Number of chronic diseases**				
None	23.1	5.7	94.3	<b>0.035</b>
1	35.2	7.6	92.4	
2	27.1	10.1	89.9	
3 – 5	14.7	11.5	88.5	
Disability to perform at least one ADL*				
No	91.9	8.4	91.6	0.769
Yes	8.1	7.7	92.3	

NMW: National Minimum Wage (= US\$ 120 at the time), ADL: Activities of Daily Living; \* Pearson  $\chi^2$  test for differences between categorical variables; \*\* $\chi^2$  test for linear trend (1df). Bold values denote significant difference.

in the United States, ranging between 2.4% and 4.1%<sup>9</sup>, and in the Netherlands, ranging from 2.0% to 5.3%<sup>3</sup>. Our results are closer to those observed in Italy (9.5%)<sup>8</sup>, in England and Wales (10.7%)<sup>10</sup> and in Canada (11.5%)<sup>6</sup>.

Comparisons of prevalence in pharmacoepidemiological studies are hampered by several issues. The prevalence of medication use may

be influenced by the pattern of morbidity of the population, by the time the study was conducted, as well as by the recall period used in the question about medication use. It is possible that a higher prevalence of the use of medicines derived from longer recall periods. In the specific case of antidepressants, trend studies<sup>3,6</sup> have shown an increase in the prescribing and use of this drug

**Table 2.** Distribution of antidepressants consumed, according to the pharmacological class, active principle.

Antidepressant	n	%
Tricyclic (N06AA)	110	76.4
Amitriptyline (N06AA09)	50	34.7
Imipramine (N06AA 02)	20	13.9
Nortriptyline (N06AA 10)	14	9.7
Maprotiline (N06AA 21)	11	7.6
Clomipramine (N06AA 04)	8	5.6
Amineptine (N06AA 19)	7	4.9
The SSRI <sup>a</sup> (N06AB)	26	18.1
Fluoxetine (N06AB03)	19	13.2
Paroxetine (N06AB05)	5	3.5
Sertraline (N06AB06)	2	1.4
MAOI <sup>b</sup> (N06AF and N06AG)	8	5.6
Moclobemide (N06AG02)	6	4.2
Tranylcypromine (N06AF04)	2	1.4

<sup>a</sup> Serotonin selective recapture inhibitor. <sup>b</sup> Monoamine oxidase inhibitors.

class, and thus, older studies tend to have lower consumption rates than those observed in more recent studies.

Tricyclics were the most common antidepressant, followed by SSRIs and MAOIs. Among these classes of antidepressants mentioned, SSRIs are the most recently available in clinical practice and are gradually replacing the other antidepressants<sup>1,3,11</sup>. In this sense, our results probably reflect the situation at the time of data collection, unlike the most recent studies that attest the most common use of SSRIs<sup>10,13</sup>. Investigations closer to our timeline found, as in Bambuí, that the consumption of antidepressants were mainly tricyclic<sup>6,9</sup>.

Another factor that can influence the pattern of consumption of antidepressants is the therapeutic indication. SSRIs are preferably used in the management of major depressive disorders and anxiety disorders, whereas tricyclic has a broader spectrum of clinical indications. Its use in handling insomnia, chronic pain, urinary incontinence, among other indications, is common in medical practice<sup>12,23</sup>. However, our data do not allow us to evaluate whether the higher consumption of tricyclic antidepressants in this population was due to indications other than depressive disorders.

Female gender was the sociodemographic characteristic most strongly associated with the use of antidepressants, which is consistent with the results from studies conducted in other coun-

tries<sup>2,8,9,11,14</sup>, probably due to the higher prevalence of depressive symptoms among women than among men<sup>24</sup>, which was observed in Bambuí (43.5% versus 30.7%). Studies have shown that women also have a higher prevalence of health conditions and painful physical symptoms compared to men<sup>25</sup>. The higher use of these drugs by women could be partly explained by how antidepressants are used in other health issues other than depression. However, in this population, the association remained significant, even in the presence of these variables.

We should also consider the possibility that the increased use of antidepressants by women can be due to the fact that women tend to complain more about depressive symptoms, diffuse and nonspecific feelings of psychological distress, recognize emotional problems more quickly and easily than men, and therefore seek psychiatric help and receive more often antidepressant treatment<sup>26</sup>. Among men, sociocultural barriers that inhibit or prevent the search for health services in the presence of emotional problems were identified. These barriers stem from socio-cultural constructs of masculinity and femininity, in which men and women perceive their own body and health issues differently<sup>27,28</sup>. Among the latter, health is perceived as emotional and social well-being, whereas men perceive their own body as a machine that requires little care to stay functioning. Thus, among men, the recognition of the disease and the search for help, represent a threat to their masculine identity, being associated with loss of control, and autonomy and dependence<sup>29</sup>. The consequence of this would be both underdiagnosis of depressive disorders among men and less use of medications to treat them.

In this study, single or separated elderly individuals used less antidepressant than the married ones. In Canada, a study conducted among the adult population observed less use of antidepressants among single people with a diagnosis of depression<sup>23</sup>. In Bambuí, unmarried and widowed elderly showed a similar prevalence of depressive symptoms (43.8% and 44.0%, respectively) higher than that observed among those who were married (33.0%). O'Brien et al.<sup>30</sup> highlight the importance of the partner (especially females) to stimulate the search for health services. This may help explain the lower antidepressant consumption by the elderly who are single.

The use of antidepressants was associated with depressive symptoms in univariate analysis. However, with the addition of the self-reported health variable in multivariate model, the asso-

**Table 3.** Results of the analysis of associations between use of antidepressants and sociodemographic characteristics, presence of depressive symptoms and other health conditions (unadjusted and adjusted prevalence ratios [PRs] estimated by Poisson regression).

Sociodemographic characteristics	PR (95% CI) Model 1 (Unadjusted)	PR (95% CI) Model 2 (Adjusted1)	PR (95% CI) Model 3 (Adjusted2)
Gender			
Male	<b>1.00</b>	1.00	1.00
Female	<b>2.92 (1.92 - 4.46)</b>	<b>3.53 (2.17 - 5.73)</b>	<b>2.96 (1.82 - 4.81)</b>
Age group (years)*			
60 - 69	1.00	1.00	1.00
70 - 79	0.92 (0.63-1.32)	0.84 (0.56 - 1.25)	0.88 (0.59 - 1.31)
80+	0.95 (0.56-1.61)	0.75 (0.39 - 1.43)	0.91 (0.48 - 1.74)
Schooling(years)*			
0 - 3	1.00	1.00	1.00
4 - 7	1.09 (0.75-1.57)	1.16 (0.78 - 1.72)	1.08 (0.72 - 1.61)
8+	1.50 (0.90-2.52)	1.62 (0.89 - 2.95)	1.69 (0.98 - 3.08)
Marital status			
Married/living together	1.00	1.00	1.00
Widow	1.06 (0.75-1.49)	0.81 (0.54 - 1.22)	0.87 (0.58 - 1.31)
Single/separated	0.59 (0.33-1.04)	0.47 (0.25 - 0.90)	<b>0.51 (0.26 - 0.97)</b>
Monthly Family Income (in NMW) <sup>a</sup>			
< 2.0	1.00	1.00	1.00
2.0 - 2.9	1.38 (0.92-2.09)	1.52 (0.93 - 2.46)	1.48 (0.91 - 2.41)
≥ 3.0	1.29 (0.84-1.99)	1.41 (0.82 - 2.41)	1.38 (0.81 - 2.35)
Living alone			
No	1.00	1.00	1.00
Yes	0.73 (0.44-1.21)	0.96 (0.54 - 1.72)	0.90 (0.50 - 1.62)
Depressive symptoms (GHQ-12)			
< 5	<b>1.00</b>	1.00	1.00
≥ 5	<b>1.60 (1.14-2.24)</b>	<b>1.53 (1.09 - 2.16)</b>	1.38 (0.97 - 1.99)
Cognitive impairment (MMSE)			
< 22	<b>1.00</b>		<b>1.00</b>
> 22	<b>0.40(0.21-0.73)</b>		<b>0.44(0.24-0.84)</b>
Self-reported of health			
Very good/good	<b>1.00</b>		1.00
Reasonable	<b>1.54 (1.02-2.31)</b>		1.31 (0.84 - 2.04)
Poor/very poor	<b>2.02 (1.29-3.17)</b>		<b>1.86 (1.11 - 3.10)</b>
Number of chronic diseases			
None	1.00		1.00
1	1.34 (0.81-2.23)		1.31 (0.74 - 2.33)
2	<b>1.79 (1.08-2.95)</b>		1.44 (0.77 - 2.66)
3 - 5	<b>2.02 (1.17-3.50)</b>		1.55 (0.82 - 2.94)
Disability to perform at least one ADL <sup>b</sup>			
No	1.00		1.00
Yes	0.91 (0.49-1.69)		0.49 (0.19 - 1.29)

<sup>a</sup>NMW: National Month Wage( = US\$ 120.00 at the time). <sup>b</sup>ADL: activities daily living.

Model 1: Unadjusted. Model 2: adjusted for sociodemographic characteristics (gender, age group, schooling level, marital status, family income and living alone) and depressive symptoms. Model 3: adjusted for sociodemographic characteristics and depressive symptoms and other health conditions (self-reported of health, number of chronic diseases and disability). Bold values denote: significant difference.

ciation did not remain significantly associated. The plausible explanation for this is the possible use of antidepressants by those who report they have poor health, in the management of other health conditions such as migraine, fibromyalgia,

irritable bowel syndrome<sup>12,23</sup>, which underline the adverse impact of these disorders on quality of life. A similar result was observed among the Australian<sup>11</sup>, the French<sup>2</sup> and the American elderly<sup>9</sup>. Self-reported health is a subjective measure



of health status of the individual and increases information about the health status of an individual's life<sup>31</sup>. It incorporates judgments about the severity and evolution of health status and possibly captures symptoms of undiagnosed disease in the subject<sup>31</sup>. In addition, the reduction of prescription of antidepressant in subjects with cognitive impairment may be due to the fact that general physicians usually do not recognize depressive symptoms in this group of subjects. Moreover, the risk of prescribing antidepressants in older adults with cognitive impairment, such as worsening of cognition with tricyclic antidepressants, may also hamper its use in this population.

The current results should be viewed in light of some study limitations. Data collection was carried out in 1997 and the findings need to be interpreted in this context<sup>6,9</sup>. This study was done in a small countryside community from Brazil and the pattern of use antidepressants may not reflect the pattern of use in other populations. On the other hand, the study has many advan-

tages, such as its population-based nature, the high response rate (92%), the use of validated instruments for data collection, as well as adequate standardization of the procedures and highly trained interviewers.

In summary, our results are similar to those observed in several other studies conducted in higher-income countries, demonstrating that a high prevalence of antidepressant use in the elderly population was positively associated with female gender, poor self-reported health and inversely associated with cognitive impairment. When poor self-reported health is included as a variable in the analysis, this is an important factor in the prevalence of antidepressant use. This suggests that in an elderly population the subjective assessment of health is a key factor in their decision to use antidepressants. Given that the elderly are the population strata that consume more medication and that this consumption is potentially more harmful among them, further studies are needed to increase the understanding of this phenomenon.

## Collaborations

ART Vicente, AI Loyola-Filho and E Castro-Costa contributed toward the conception and design, data analysis, interpretation of data, and writing of the manuscript. BS Diniz contributed advising and supervising the psychogeriatric aspects, interpretation of data, and writing of the manuscript. JOA Firmo and MF Lima-Costa contributed to the data collection, interpretation of data, and critical revision of the manuscript.

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