Prevalence and sociodemographic characteristics associated with benzodiazepines use among community dwelling older adults: The Bambuí Health and Aging Study (BHAS)

Prevalência e características sociodemográficas associadas ao uso de benzodiazepínicos por idosos residentes na comunidade: Projeto Bambuí

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Abstract

Objectives: To assess the prevalence and sociodemographic characteristics associated with benzodiazepine use among community-dwelling older adults. **Method:** *1606 subjects, aged ≥ 60 years, corresponding to 92% of the residents of Bambuí city, participated in this study. The information about medication use was obtained by means of a standard interview and the review of medication packaging. Substances were classified using the Anatomical Therapeutic Chemical Index.* **Results:** *The prevalence of benzodiazepine current use was 21.7% (26.7% among females and 14.0% among males). From these, 68.7% had been taking the medication for over one year, 31.3% for over five years and 53.2% were using long half-life benzodiazepines. The medication most frequently used was bromazepam (35.6%), followed by diazepam (22.5%), clonazepam (12.6%) and lorazepam (7.8%). After adjustment for confounders, female gender (RP = 1.93; CI95% = 1.51-2.46) was the only sociodemographic characteristic found to be independently associated with substance consumption.* **Conclusions:** *The prevalence of benzodiazepine use in the study population was high, but within the variation observed in developed countries. Chronic use of benzodiazepines and long half-life medications predominated.*

Descriptors: Elderly; Pharmacoepidemiology; Use of benzodiazepines; Cross-sectional studies; Anxiolitic agents

Resumo

Objetivos: Determinar a prevalência e características sociodemográficas associadas ao uso de benzodiazepínicos entre idosos residentes na comunidade. **Método:** *Participaram deste estudo transversal 1.606 indivíduos, que correspondem a 92% do total de residentes na cidade de Bambuí-MG com idade ≥ 60 anos. As informações sobre uso de medicamentos foram obtidas por meio de entrevista padronizada e verificação da embalagem. A classificação do princípio ativo foi baseada no Anatomical Therapeutic Chemical Index.* **Resultados:** *A prevalência do uso de benzodiazepínicos foi de 21,7% (26,7% entre as mulheres e 14,0% entre os homens); 68,7% faziam uso do medicamento há pelo menos um ano, 31,3% há pelo menos cinco anos e 53,2% faziam uso de benzodiazepínicos de meia-vida longa. O medicamento de uso mais comum foi o bromazepam (35,6%), seguido pelo diazepam (22,5%), clonazepam (12,6%) e lorazepam (7,8%). Após ajuste para variáveis de confusão, sexo feminino foi o único fator independentemente associado ao uso de benzodiazepínico (RP = 1,93; IC95% = 1,51-2,46).* **Conclusões:** *A prevalência do consumo de benzodiazepínicos na população estudada foi alta, mas dentro da variação observada em países desenvolvidos. O uso crônico e o uso de benzodiazepínicos de meia-vida longa foi predominante.*

Descritores: Idoso; Farmacoepidemiologia; Uso de benzodiazepínicos; Estudos transversais; Ansiolíticos

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Introduction

Fear or anxious apprehension are emotional responses to danger or threat. For thousands of years humans have used diverse substances to alleviate this negative emotional state. One of the first tranquilizers used, and which continues to be consumed until today, is alcohol; others followed, such as barbiturates, bromides and meprobamates.[1] Since they were released in the market in 1960, the benzodiazepines became the most prescribed drugs and the most used to combat anxiety and insomnia in the whole world.[2] This use stemmed from their efficiency, security, and lower potential to cause dependence, their tolerance as well as wide therapeutic applicability.[3]

Nonetheless, the use of benzodiazepines has been associated with several adverse effects, such as motor disturbances, falls, daytime sleepiness and cognitive decline. The modifications in metabolism which accompany the ageing process make the elderly an especially vulnerable age group to these undesirable medication effects,[3] which are even worse when long half-life benzodiazepines are used for prolonged periods, especially when not accompanied by an adequate clinical monitoring.[4]

The use of benzodiazepines is frequent among the elderly. Although a decrease in prescribing benzodiazepines for the elderly has been observed in some studies,[5,6] population-based studies continue to demonstrate high prevalences in the consumption of these medications in developed countries, and levels ranged from 20.0% in Canada[7] to 31.9% in France.[8] With respect to the type of benzodiazepines most used, there is a diversity of results in different countries.[8-10] It has been described that female gender is the sociodemographic characteristic most consistently found to be associated with the use of benzodiazepines among the elderly.[5,6,8,9,11]

Brazilian epidemiological studies on the use of benzodiazepines among the elderly dealt with selected populations and/or investigated specific associations, such as the occurrence of falls.[12-15] Population-based studies on the consumption of these medications have been accomplished on younger individuals,[16,17] and the benzodiazepine consumption was investigated in a much wider context, which was the use of psychopharmacs.[18-20] The population-based studies showed benzodiazepines as the most commonly used psychopharmacs in the adult population,[17-20] and among these, Diazepam was the most used chemical substance.[16,18,19] In these studies, the consumption of benzodiazepines was higher among women,[16,17] among older subjects and among the wealthy.[17]

To our knowledge, there are no Brazilian studies on the profile of use of benzodiazepines among community-dwelling older adults. As the use of these medications among the elderly is more frequent and involves greater risks and taking into consideration the rapid aging of the Brazilian population,[21] it is important to investigate this question in greater detail in this country.

The present study has the following objectives: 1) to determine the prevalence of benzodiazepine use among community-dwelling older adults; 2) to assess the prevalence of the chemical substances most used; and 3) to examine the sociodemographic characteristics associated with benzodiazepine consumption.

Method

1. Study area and population

This study is part of the baseline of the Bambuí Health and Aging Study, which is a population-based cohort study carried out in the city of Bambuí, which is situated in the state of Minas Gerais, Southeastern Brazil. At the time of the study, the city of Bambuí had approximately 21,000 inhabitants, of which 15,000 lived in the urban area. Life expectancy was 70.2 years and the leading death causes among the elderly were cerebrovascular diseases, Chagas' disease and ischemic heart disease.[22]

All the city inhabitants aged 60 years or older on the first of January of 1997 were identified through census and selected to constitute the baseline of the cohort study. Of the 1,742 dwellers in the selected age group, 1,606 (92.2%) participated in the baseline study and were selected for the present study.

2. Variables

The data collection was performed at the participant's domicile, by means of a questionnaire applied by trained interviewers. If the selected older adult was not able to respond to the questionnaire due to health problems or cognitive deficit, a close relative or caregiver responded instead (5.6% of the interviews were answered by a proxy).[22]

The dependent variable of the study was the use of benzodiazepines. For its construction, information was obtained about the use of any medication in the last 90 days. In case of a positive answer, he/she was asked to report the name and the dosage of the medication, for how long it had been used and if it had been prescribed by a physician or not. The interviewee was then asked to show the prescription and/or the medication packaging for confirmation. Based on the name and dosage, the medications were identified, their principal active components were discovered and later classified according to the Anatomical Therapeutic Chemical Index (ATC Index), developed by the World Health Organization Collaborating Centre for Drugs Statistics Methodology.[23] This system of codification classifies medications according to the anatomical site where they act, their therapeutic action and pharmacological and chemical properties. The use of the ATC classification system is recommended to facilitate the international comparison of results.

The sociodemographic characteristics considered in this study were gender, age (60-69 years; 70-79 years e 80+ years), marital status (married/consensual union; widower; single/separated/divorced), educational level (number of complete schooling years) and monthly family income (in minimum wages applied at the time of the study).

3. Data analysis

Data analysis consisted of determining the prevalence of benzodiazepine use by age and gender. The use of these medications was characterized in relation to the quantity consumed, period of use, use of drugs with long half-lives, type of medication used, therapeutic function and principal active ingredient. Non-adjusted analysis for association among the variables was based on Pearson's chi-square test.

Crude and adjusted prevalence rates (PR) were used to examine the associations between the consumption of benzodiazepine and sociodemographic characteristics. The PR were estimated by Robust Poisson Regression.[24] Data analysis was developed using STATA® (version 7.0) software.

All the study participants signed a term of post-informed consent. The Bambuí Project was approved by the Ethics Committee of the Oswaldo Cruz Foundation (FIOCRUZ).

Results

Of the 1606 participants in the study, 964 (60.1%) were women and the average age was 69.3 years (sd = 7.4). The predominant age was 60-69 years (58.1%), followed by 70-79 years (30.6%) and 80 years or more (11.3%).

The prevalence of benzodiazepine use was 21.7% (348/1606), and was higher among females (26.7%) than among males (14.0%) - p < 0.01. Regarding the prescription, 98.5% of benzodiazepines used have been prescribed by a physician. Among the medication users, only 3.2% had seen a psychiatrist in the prior 12 months, while 94.5% had seen other specialists in the same period.

In Figure 1 the distribution of use of benzodiazepines by gender and age group is presented. Among males, the prevalence of the use of benzodiazepines increased with age, from 11.6% in the 60-69 years old group up to 13.5% in the 70-79 years group and 28.6% in the 80+ years group (p = 0.001). Among females, the use of the medication did not significantly differ between the three age groups considered (28.1%, 24.8% and 25.0%, respectively in the age group 60-69, 70-79 and 80+ years; p = 0.533).

Among the 348 benzodiazepine users, approximately two-thirds (68.7%) had used the medication for one or more years and one-third (31.3%) had used the medication for five years or more, as shown in Table 1. These percentages were similar for males and females (67.8% and 69.0% and 35.6 and 29.8%, respectively) - p = 0.453. In relation to age, the observed differences were not statistically significant (p = 0,384), but it is important to point out that there was a gradual decline in the prevalence of the prolonged use of benzodiazepines (5+ years) with the increase of age (from 34% to 29% and 25% for the age groups of 60-69, 70-79 e 80+ years old, respectively).

Long-half life benzodiazepines predominated (53.2%) among medication users. This consumption was similar among women (51.2%), when compared to men (58.9%) - p = 0.206. The prevalence of long half- life benzodiazepine use ranged from 37.5% (age group 80+ years) to 56.0% (age group 60- 69 years) and 55.0% (age group 70-79 years) - p = 0.064 (Table 2).

Considering their therapeutic function, the most commonly used benzodiazepine derivatives were anxiolytics (76.8%), followed by anticonvulsivants (12.6%) and hypnotics/sedatives (10.6%). In terms of chemical formulation, Bromazepam was the most common active ingredient (35.6%), followed by Diazepam (22.5%), Clonazepam (12.6%) and Lorazepam (7.8%) - Figure 2.

The results of the analysis of the sociodemographic factors associated with the use of benzodiazepines are presented in Table 3. In the non-adjusted analysis, female gender (PR = 1.90; 95% CI = 1.53-2.37) and being a widower (PR = 1.32; 95% CI = 1.08-1.61) presented positive and significant associations with the use of benzodiazepines. After adjustment for age, marital status, schooling and monthly family income, only female gender remained associated with the use of the medication (PR = 1.93; IC 95% = 1.51-2.46).

Discussion

The prevalence of benzodiazepines consumption in the studied population (21.7%) was similar to that observed in two studies conducted among elderly Canadians,[6,25] higher than the observed among elderly North Americans(10%)[5,9] and lower than that observed in a French community (31.0%).[8] Compared with other Brazilian studies, the use of benzodiazepines among older adults was higher than that
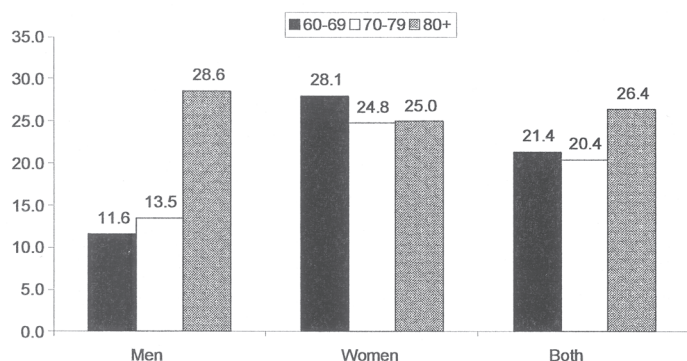
Table 1 – Baseline results of duration of benzodiazepines chronic use among older adults from the Bambuí cohort study

Gender and age	Duration of use						p value[a]
	< 1 year		1-4 years		5 and over		
	n	(%)	n	(%)	n	(%)	
Male	29	(32.2)	29	(32.2)	32	(35.6)	
Female	80	(31.0)	101	(39.2)	77	(29.8)	0.453
60-69 years	66	(33.0)	66	(33.0)	68	(34.0)	
70-79 years	28	(28.0)	43	(43.0)	29	(29.0)	
80 and over	15	(31.3)	21	(43.8)	12	(25.0)	0.384
Total	109	(31.3)	130	(37.4)	109	(31.3)	

[a] Pearson's chi- square test

observed in the adult population of the city of Pelotas-RS[17] and similar to that verified among the elderly population of a social center in Rio de Janeiro.[13]

Regarding prescription, it is important to highlight that only 3% of benzodiazepine users had seen a psychiatrist in the prior year, while 95% had seen another specialist in the same period, suggesting that most of the prescriptions had been prescribed by non-psychiatrist physicians. The predominance of prescriptions of benzodiazepine by other specialists had also been observed in a cohort of elderly Americans.[5]

The most commonly used benzodiazepine by older adults of Bambuí was Bromazepam. In the study population predominated the use of benzodiazepine with therapeutic anxiolytic action, as well the use of long half-life medications. The predominance of Bromazepam use was paralleled by another Brazilian study,[13] but is not consistent with that observed in developed countries.[7-9] Of note, the use of benzodiazepines with long half-lives is considered inappropriate for the use in older adults since the risks are higher than the possible therapeutic benefits.[26,27] With the metabolic alterations of an aging organism such as decrease of renal excretion and hepatic metabolism, fall in the albumin serum level and in the volume of body fluids, decrease of the muscle mass and increase of fat, there is an increase of the plasmatic levels and of the half-life of many drugs.[12,28] Thus, the effect of the medication, which is already of slow elimination, is exacerbated, causing possible daytime sleepiness, falls and cognitive deficit.[29]

The use of benzodiazepines observed in this study presented a pattern which is compatible with chronic use (approximately two-thirds of the older adults have been using the medication for at least 12 months). Even though the present study has

Figure 1 – Baseline results of benzodiazepines use prevalence (%) among participants of the Bambuí cohort study

Table 2 – Baseline results of long half-life benzodiazepines use among older adults from the Bambuí cohort study

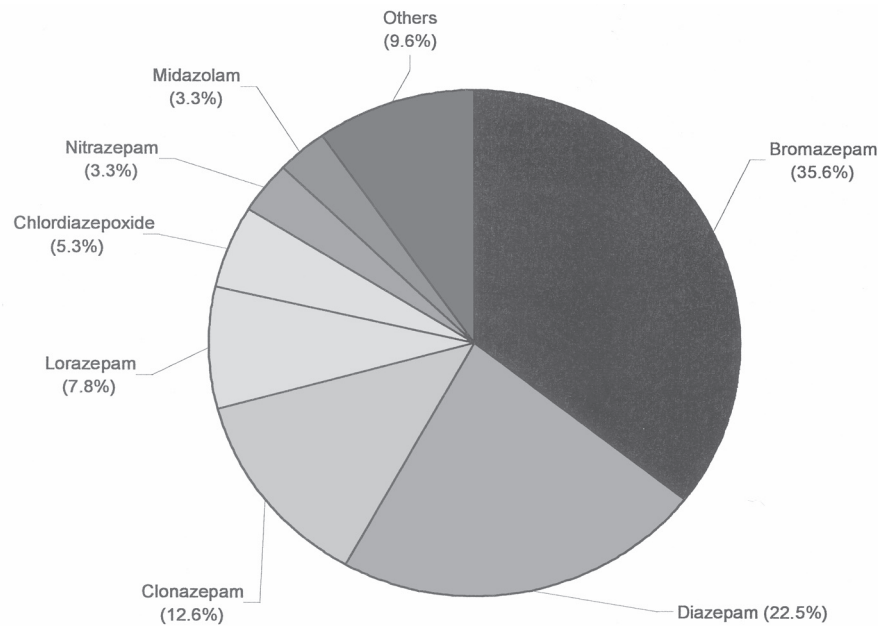| Gender and age	Use of long half- life benzodiazepines				p value[a]
	No		Yes		
	n	(%)	n	(%)	
Male	37	(41.1)	53	(58.9)	
Women	126	(48.8)	132	(51.2)	0.206
60-69 years	88	(44.0)	112	(56.0)	
70-79 years	45	(45.0)	55	(55.0)	
80 and over	30	(62.5)	18	(37.5)	0.064
Total	163	(46.8)	185	(53.2)	

[a] Pearson's chi- square test

Figure 2 – Baseline results of benzodiazepines distribution among older adults from the Bambuí cohort study

not considered the number of daily doses and the dosage of benzodiazepines, this result is worrisome. The chronic use of these medications, in itself, is not recommended for older adults as it increases the risks of side-effects, such as dependence and cognitive dysfunction.[3,30]

Studies of older adults in developed countries have consistently presented a positive and independent association between female gender and the use of benzodiazepine,[5,6,8,9,11] although this association has not been observed by all the authors.[7] The results

of the present study are consistent with previous observations regarding a positive association between female gender and the use of benzodiapines. This finding persisted after adjustment for other relevant sociodemographic characteristics. The hypotheses formulated to explain this association are related to health conditions and the use of health services, including issues of doctor-patient relationship. Because women live longer than men, they suffer more strongly and more frequently than men from the psychological effects of aging,[30] and from health problems linked to psychic

Table 3 – Baseline results of benzodiazepine use and its association with sociodemographic characteristics among older adults from the Bambuí cohort study

Sociodemographic characteristics	Benzodiazepine use		Prevalence Rates (PR) [a]	
	Yes (n = 348) %	No (n = 1,258) %	Crude	Adjusted [b]
Gender				
Male	14.0	86.0	1.00	1.00
Female	26.7	73.3	1.90 (1.53-2.37)	1.93 (1.51-2.46)
Age group (years)				
60-69	21.4	78.6	1.00	1.00
70-79	20.4	79.6	0.95 (0.77-1.18)	0.95 (0.77-1.17)
80+	26.4	73.6	1.23 (0.94-1.62)	1.19 (0.90-1.58)
Marital status				
Married	19.8	80.3	1.00	1.00
Widowed	26.0	74.0	1.32 (1.08-1.61)	1.03 (0.82-1.29)
Single/Separated	17.9	82.1	0.90 (0.67-1.22)	0.82 (0.60-1.11)
Schooling (Years)				
Illiterate	20.3	79.7	1.00	1.00
1-3	23.2	76.8	1.15 (0.91-1.44)	1.17 (0.93-1.48)
4 +	21.6	78.4	1.07 (0.84-1.34)	1.14 (0.89-1.45)
Monthly family income [c]				
< 2	20.3	79.7	1.00	1.00
2-3	24.1	75.9	1.19 (0.95-1.49)	1.20 (0.96-1.51)
≥ 4	20.4	79.6	1.01 (0.79-1.29)	1.03 (0.79-1.33)

[a] Prevalence Rates (95% confidence interval) were estimated by Robust Poisson Regression
[b] Adjusted by all variables included in the model (1.590 subjects participated in final analysis)
[c] In Brazilian minimum wages (each = US$ 120.00)

disorders.[11,30] Also, women have more contact with health care services,[11,30] they talk about their health problems more easily during consultations to their physicians, they express their desire for a prescription more clearly and they demonstrate a greater acceptance of psychopharmacs (among which are included the benzodiazepines).[30]

In the present study, being a widow was positively associated with the use of benzodiazepines in the univariate analysis, but the association disappeared after adjustment for confounders, which was also observed in other studies.[11] Since, in this population, the female gender and being a widow were strongly correlated, the association between the latter and the use of benzodiazepines was confounded by gender.

Some advantages as well as limitations of the study deserve further discussion. The present paper was conducted among community-dwelling older adults. Population-based studies are less prone to selection bias than studies conducted in selected populations. Another advantage in this study was the high response rate, assuring its internal validity. The cross-sectional design adopted in the study is adequate to prevalence assessment, but it does not allow establishing temporal relationships between the sociodemographic characteristics investigated and the use of benzodiazepines, which is one of the limitations of the present study. It is important to note that the information about benzodiazepine use was obtained by means of interviews, focusing on the use of medications in the prior 90 years. This period is longer than that usually adopted in pharmaco-epidemiological studies. Nonetheless, this fact might not have influenced the comparability of our results because 1) the report of medication use was confirmed by the medication packaging and/or medical prescription; 2) the chronic use of the medication predominated among the participants of the study.

In summary, the prevalence of benzodiazepines in the study's population was high, but within the variation observed in developed countries. Chronic use and long-half life benzodiazepines were predominant. Although this use has decreased in the oldest group (80+ years old), which might possibly reflect greater caution in the prescription of benzodiazepines, this pattern is considered inadequate even for younger elderly. The results of this paper point out to the need of further investigation in order to verify if the results reflect characteristics which are peculiar to the area studied or if they are generalizable for other populations of older adults of this country.

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