Faculdade de Saúde Pública

VOLUME 34
NÚMERO 6
DEZEMBRO 2000
p. 631-35

Revista de Saúde Pública

Journal of Public Health

# Use of psychoactive drugs and related falls among older people living in a community in Brazil

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CHAIMOWICZ[a] Flávio, Teresinha de Jesus Xavier Martins Ferreira[b] and Denise Freire Assumpção Miguel[b] *Use of psychoactive drugs and related falls among older people living in a community in Brazil* Rev. Saúde Pública, 34 (6): 631-35, 2000 www.fsp.usp.br/rsp

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**Keywords**
Aged[#]. Accidental falls[#]. Psychotropic drugs[#]. Aging health. Mental health. Psychotropic drugs, therapeutic use.

**Abstract**

**Introduction**
Population aging in Brazil has increased the prevalence of neurodegenerative diseases (Parkinson's and Alzheimer's disease) and affective disorders (anxiety, depression), all common in old age. A retrospective study was carried out with the purpose of ascertaining if there is an association between falls and psychoactive medication use among older residents of a community in Brazil.

**Methods**
All residents aged 65+ (n=161) of one neighborhood of Campo Belo, Brazil (population of 48,000) were evaluated regarding the use of psychoactive drugs and the occurrence of falls in the 12 months preceding the study. Vision and hearing screenings were also performed.

**Results**
From the study population, 9.3% were taking prolonged half-life benzodiazepines, 4.4% anticonvulsants (mostly barbiturates), 2.5% antidepressants (all cyclics) and 8.1% α-methyldopa. No subject reported use of hypnotics, neuroleptics or drugs to treat Alzheimer's or Parkinson's diseases (except biperiden). As a whole, drugs that increase the risk of falls were used by 1/5 of this population. In the 12-month period preceding the study, 27 residents (16.8%) experienced falls and, of those, 4 (14.8%) had fracture(s). There was an independent association between psychoactive drug use and falls when variables such as age, gender, vision and hearing were controlled (p=0.02).

**Conclusions**
Although the population of this neighborhood must be considered young (only 4% are 65 years old or more), there are already problems related to the use of psychoactive drugs among people. Prescribed anxiolytics, anticonvulsants, antidepressants and antihypertensives are not appropriate for this age group and their use is associated with falls.

***Descritores***
*Idoso[#]. Acidentes por quedas[#]. Psicotrópicos, efeitos adversos[#]. Saúde do idoso. Saúde mental. Psicotrópicos, uso terapêutico.*

***Resumo***

***Introdução***
*O envelhecimento populacional no Brasil tem aumentado a prevalência de doenças neurodegenerativas (Parkinson, Alzheimer) e psiquiátricas (depressão, ansiedade), comuns em idosos. Realizou-se estudo retrospectivo com o objetivo de determinar*

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Submitted on 19/8/1999. Reviewed on 2/6/2000. Approved on 26/7/2000.

Rev Saúde Pública 2000;34(6):631-5
www.fsp.usp.br/rsp

*se há associação entre a utilização de medicamentos psicoativos em idosos (65+) residentes na comunidade e a ocorrência de quedas.*

***Métodos***

*Todos os idosos (n=161) residentes no Bairro Arnaldos (Campo Belo, MG – 48 mil habitantes), foram avaliados acerca da utilização de psicoativos e da ocorrência de quedas nos 12 meses precedentes e submetidos a exame clínico.*

***Resultados***

*Benzodiazepínicos de meia-vida longa eram utilizados regularmente por 9,3% dos idosos, anticonvulsivantes (a maioria barbitúricos) por 4,4%, antidepressivos (todos cíclicos) por 2,5% e α-metil-dopa por 8%, ou 1/6 daqueles tratando hipertensão arterial. Nenhum idoso utilizava hipnóticos, neurolépticos ou drogas para tratamento de Alzheimer ou Parkinson (exceto biperideno). Em conjunto, drogas que potencialmente podem provocar quedas eram utilizadas regularmente por 1/5 da população. Vinte e sete idosos (17%) informaram ter sofrido queda nos 12 meses que precederam o estudo, quatro ocasionando fratura. A ocorrência de quedas estava associada à utilização de psicoativos (p=0,05), mesmo quando as variáveis gênero, idade, visão e audição foram controladas em uma regressão linear múltipla (p=0,02).*

***Conclusões***

*Embora a população do Bairro Arnaldos possa ser considerada jovem (somente 4% tem 65+ anos), já se observam problemas relacionados ao emprego de medicamentos psicoativos em idosos. Os ansiolíticos, antidepressivos, anticonvulsivantes e anti-hipertensivos prescritos são inadequados para esta faixa etária e sua utilização está associada à ocorrência de quedas.*

## INTRODUCTION

As a result of the changing in mortality and fertility patterns in recent decades in Brazil, it is estimated that the population (65+) will grow from 2.7% in 1960 to 14.0% before 2050, an increase three-times faster than that seen in most developed countries.[4] The rising prevalence of chronic diseases and physical disability observed in those countries has also been verified in studies performed in large Brazilian cities.[6,12,15]

In this age group, neurodegenerative diseases (e.g. Parkinson's or Alzheimer's diseases) and affective disorders (e.g. anxiety, depression) cause a high prevalence of mental health problems, which leads to increased use of psychoactive drugs.[6,9,12,15] Signs and symptoms of these conditions in older people are often misinterpreted, sometimes leading to incorrect therapeutic approaches and the related adverse effects.[4,5,11]

The purpose of this retrospective study is to ascertain whether there is an association between falls and psychoactive medication use in older residents living in a community in Brazil. By including the entire population of one neighbourhood of a small municipality (population of 48,000), it is possible to assume that the conclusions drawn here may be valid for similar municipalities.

## METHODS

Between August and December 1998, using the records of the Family Health Program, all residents of the Arnaldos neighbourhood (Campo Belo, MG) were invited to the community health center to undergo a clinical evaluation. Residents unable to come to the clinic were evaluated in their homes.

A standardized questionnaire was administered, including the following questions:

1. What medications have you been taking lately?
2. Have you used these medications continuously?
3. Did a doctor prescribe these medications?
4. Have you fallen down in the last 12 months?
5. If yes, did you break any bones?

Answers were given by the older subjects themselves and with the aid of their caregivers when necessary.

The data were entered into the statistical program Epi Info 6, version 6.04b, 1997 and analyzed in Epi Info and Minitab for Windows, version 10.2, 1994.* Subjects were grouped according to the use of any psychoactive medication or use of specific agent classes (e.g. antidepressants, benzodiazepines, anticonvulsants). The comparison between dichotomous variables (falls) from independent groups (use of psychoactive medications) was performed using the

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two-tailed Fisher's exact test (since the expected number of elements in a cell of a 2x2 table was less than five). The relative contribution of intervening factors (gender, age, vision, hearing, and use of psychoactive medication) for a specific response (falls) was analyzed through multiple linear regression. The statistical significance level was established at 0.05.

## RESULTS

Among the 1,024 families of the Arnaldos neighbourhood (4,010 individuals; 8.3% of the municipality) there were 161 older people (4.0%), all of which were evaluated in the study (Table 1). Vision and hearing were considered adequate in 115 (71.4%) and 132 (82.0%) subjects, respectively. According to reports given by the subjects and their caregivers, in the 12-month period preceding the study, 27 (16.8%) experienced at least one fall and, of those, 4 (14.8%) had fracture(s).

**Table 1** - Demographic characteristics of elderly residents of the "Arnaldos" neighborhood, Campo Belo city (Brazil).

| Age group | Women n (%) | Men n (%) | Total n (%) |
|---|---|---|---|
| 65–74 | 66 (70.2) | 54 (80.6) | 120 (74.5) |
| 75–84 | 23 (24.5) | 13 (19.4) | 36 (22.4) |
| 85–94 | 5 (05.3) | - | 5 (03.1) |
| Total | 94 (58.4) | 67 (41.6) | 161 (100) |
| Average age (years) | 71 | 71 | 71 |

Table 2 lists the psychoactive medications used regularly by the study subjects. Among the 161 older people, 21 (13.0%) regularly used prescribed anxiolytics, antidepressants and/or anticonvulsants. This number increased to 32 (19.9%) when the central-acting antihypertensive α-methyldopa was included, to 41 (25.5%) when cinnarizin and flunarizin were also considered and totalled 42 (26.1%) when codergocrine was included.

All anxiolytics (except buspirone in one case) were intermediate or long-acting benzodiazepines and were used regularly by 15 (9.3%) individuals. Antidepressants (tricyclics and tetracyclics) were used regularly by four study participants (2.5%), and anticonvulsants by five (3.1%). No subject or caregiver reported use of neuroleptics or drugs to treat Alzheimer's or Parkinson's diseases (except one case of biperiden). The antihypertensive α-methyldopa was used by 13 (8.0%) subjects.

To assess the occurrence of falls, use of cinnarizin, flunarizin and/or codergocrine was excluded from the analysis. There was an association between falls and the use of psychoactive medications (two-tailed Fisher's exact test: p=0.05, Table 3). Multiple linear regression analysis between the response *falls* and the variables *age*, *gender*, *vision*, *hearing* and *psychoactive drug use* revealed that, of all the variables, only *psychoactive drug use* was independently associated with falls (t=2.45; p=0.02). An independent association was also observed between falls and the variable *use of benzodiazepine* (t=1.97; p=0.05) or the variable *use of benzodiazepine and/or antidepressant* (t=2.23; p=0.03). However, no association was found between falls and the variable *use of α-methyldopa*, when the above-mentioned variables were controlled.

**Table 2** – Psychoactive drug usage of elderly residents of the "Arnaldos" neighborhood, Campo Belo city (Brazil).

| Medication | n | % |
|---|---|---|
| Cinnarizin | 9 | 5.6 |
| Diazepan | 7 | 4.4 |
| Bromazepan | 6 | 3.7 |
| Flunarizin | 3 | 1.9 |
| Maprotiline | 3 | 1.9 |
| Phenobarbital | 3 | 1.9 |
| Carbamazepine | 3 | 1.9 |
| Codergocrine | 2 | 1.2 |
| Clorazepate | 1 | 0.6 |
| Cloxazolan | 1 | 0.6 |
| Buspirone | 1 | 0.6 |
| Amitriptyline | 1 | 0.6 |
| Biperiden | 1 | 0.6 |
| Phenytoin | 1 | 0.6 |
| Anxiolytics | 16 | 9.9 |
| Flunarizin, cinnarizin, codergocrin | 13 | 8.0 |
| Anticonvulsants | 5 | 3.1 |
| Antidepressants | 4 | 2.5 |
| α-methyldopa | 13 | 8.1 |
| Total* | 42 | 26.1 |

*Some subjects used more than one drug.

**Table 3** – Use of psychoactive drugs* and falls.

| | | Use of psychoactive drugs | | |
|---|---|---|---|---|
| | | + | - | Total |
| Falls | + | 7 | 20 | 27 |
| | - | 14 | 120 | 134 |
| | | 27 | 140 | 161 |

Two-tailed Fisher's exact test: p=0.05.
*Excluding α-methyldopa, cinnarizin, flunarizin and codergocrin

## DISCUSSION

### Prevalence of neuropsychiatric disorders in older Brazilians

Some studies have shown that in Brazil, as well as in many other countries, the population aging process has been associated with an increase in the prevalence of mental and affective disorders.[9]

In one municipality of the State of S. Paulo, the prevalence of dementia almost reached 40% in the

85+ age group.[8] In a random sample (n=625) of older people in a municipality of the State of Minas Gerais,[6] 33% of the sample participants complained of "anxiety", whereas 32% reported "depression". Other large community-based studies also revealed a high prevalence of these disorders among random samples of older people. In Rio de Janeiro, the prevalence of "mild depression" ranged between 20% and 35%[15] and in S. Paulo 23% of the women studied were considered possible cases of "psychiatric disorders".[12]

Sleep disorders are also highly prevalent among older people (41% in one study mentioned above),[6] not only because of their association with dementia, anxiety and depression, but also due to age-related co-morbidities and changes in sleep patterns.[9] Delirium episodes in older people are provoked by diverse causes, such as erysipelas or heart failure and frequently are not diagnosed.[5] Psychotic symptoms such as agitation, delusions, hallucinations and aggressive behaviour often prove to be extremely difficult for families to cope with and are among the most common causes of institutionalization.

**Use of psychoactive drugs and falls**

Since older people are more vulnerable to adverse effects of psychoactive drugs,[1,11] their use requires accurate diagnosis and knowledge of age-related pharmacokynetics and pharmacodynamics. However, underdiagnosis of mental and affective disorders in older people is as common as their inadequate diagnosis and treatment.[5,9]

As presented in Table 4, many of the psychoactive drugs used by older residents of Arnaldos neighbourhood increase the risk of falls[11] by acting on the cardiovascular system (orthostatic hypotension) or the central nervous system (impairment of vision, proprioception, balance, coordination and cognition, lethargy, psychomotor slowing, ataxia and delirium). This study demonstrated that, controlling variables such as age, gender, vision and hearing, the use of these drugs is independently associated with falls.

The incidence of falls increases with age. Approximately one-third of the older subjects living in the community suffer a fall each year, and nearly 5% of those suffer fractures – 20% to 40% of which occur in the femur.[2] After a femur fracture, 25% of them die within six months; two-thirds of those surviving experience persistent leg pain or swelling and only a minority regain pre-fracture functional levels. So there is an increasing risk of institutionalization.[2] In this study, the incidence of falls was less than expected (16.8%) while that of fractures was more than expected (14.8% of those who had fallen). This is partly explained by memory bias: retrospective studies can underestimate the incidence of falls — but not of fractures — by 13% to 32%, depending on the elapsed time.[2]

The data gathered here suggest that improper prescription practices may be common. The drugs of choice to treat chronic anxiety disorders and sleep disorders in older patients are azapirones and short-acting benzodiazepines, respectively[1,10] but all except one resident (a buspirone user) were being prescribed long-acting benzodiazepines. Antidepressants, besides being apparently underutilized, belong to agent classes that do not represent the best options for older individuals.[7]

Drugs of disputed therapeutic efficacy (cinnarizin, flunarizin and codergocrine), some of that may cause secondary parkinsonism,[3] were widely prescribed, even though the only drug used to treat Parkinson's disease is not appropriate for older patients. Since no antipsychotic drugs or drugs to treat Alzheimer's disease were being used by this population, it is important to consider whether the psychiatric manifestations of these common conditions were being treated with benzodiazepines or even barbiturates.

The population of Arnaldos neighbourhood must be considered a young population since older residents account for less than 4% of the total. However, it seems that some of the public health problems characteristic of aged populations are already present in this community. The increasing prevalence of neu-

**Table 4** – Potential adverse effects of psychoactive drugs used by elderly residents of the "Arnaldos" neighborhood.*

| Classes and drugs | Adverse effects* |
|---|---|
| Long acting benzodiazepines | Lethargy, psychomotor slowing, cognitive and coordination difficulties, delayed reaction time, ataxia and falls[1,10,11] |
| Cinnarizin, flunarizin | Secondary parkinsonism[3] |
| Tricyclic antidepressants | Anticholinergic effects, cardiovascular toxicity, orthostatic hypotension, lethargy, falls[7] |
| Tetracyclic antidepressants | Convulsions not related to serum levels[7] |
| Phenobarbital, phenytoin | Ataxia, double or blurred vision, lethargy, confusion, falls[13] |
| Carbamazepine | Sedation, ataxia, diplopia[13] |
| Biperiden | Blurred vision, lethargy, delirium and hallucination[11] |
| α-methyldopa | Orthostatic hypotension, lethargy, confusion, depression[4] |

*The exponents number mentioned refer to the authors citation.

ropsychiatric problems related to aging, coupled with the difficulties in accurately diagnosing and correctly treating these conditions may be responsible for the high level of psychoactive drug use.

The retrospective nature of this study does not allow causal inferences, but evidence of the independent association between use of psychoactive drugs and falls has been consistently demonstrated in studies performed in so-called "aged populations".

By Studying the entire population of older residents of the Arnaldos neighbourhood the findings reported here have a significant external validity. Addressing the problems of Campo Belo and other similar municipalities should not only be cost-effective – considering the high costs of treatment and rehabilitation of fractures – but, more importantly, should contribute to improving the disability-free life expectancy and quality of life of the older population.

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