

Depression among the elderly: a population-based study in Southern Brazil

Depressão entre idosos: um estudo de base populacional no Sul do Brasil

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ABSTRACT: This study assessed the prevalence of depression and associated factors among Brazilian elderly in Arroio Trinta, Southern Brazil. During home visits, a questionnaire was administered to all people aged 60 or older living in the municipality in 2013. The Geriatric Depression Scale Short Form (GDS-15) was used. The χ^2 test was performed to compare proportions and Poisson regression with robust adjustment of variance in the multivariate analysis. The effect measure applied was the prevalence ratio. The prevalence of depression among 552 (out of 568) elderly studied was 20.4% (95%CI 17.3 – 23.8). An adjusted analysis conducted according to a predefined hierarchical model showed higher prevalence ratios of depression among females, single people, those with lower household income, smokers, and those who had been hospitalized in the 12 months preceding the interview. Engaging in leisure-time activities such as dances and religious activities or regular physical activity were protective factors for depression. Results from this study demonstrate the need of proper treatment and management of this condition at the community level.

Keywords: Depression. Aged. Prevalence. Health surveys. Risk factors. Observational study.

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Conflict of interests: nothing to declare – **Financial support:** Secretaria Municipal de Saúde de Arroio Trinta, Santa Catarina.

RESUMO: Este estudo mediu a prevalência e identificou fatores associados à ocorrência de depressão entre idosos em Arroio Trinta, Santa Catarina. Aplicou-se questionário domiciliar a todos aqueles com 60 anos ou mais de idade residentes nesse município em 2013. O desfecho foi avaliado pela Escala de Depressão Geriátrica Reduzida (EDG-15). Utilizou-se teste do χ^2 para comparar proporções e regressão de Poisson com ajuste robusto da variância na análise multivariável. A medida de efeito utilizada foi a razão de prevalências. A prevalência de depressão entre os 552 (de 568) idosos estudados foi de 20,4% (IC95% 17,3 – 23,8). Após análise ajustada conforme modelo hierárquico previamente definido, verificou-se maior razão de prevalências para depressão no sexo feminino, entre solteiros, de menor renda familiar, fumantes e que haviam sido hospitalizados nos 12 meses anteriores à entrevista. Participar de atividades coletivas de lazer, como baile e culto religioso, ou realizar atividade física regular mostraram-se protetores à ocorrência de depressão. Os resultados obtidos neste estudo revelam a necessidade e a possibilidade de tratamento e manejo dessa doença em nível coletivo.

Palavras-chave: Depressão. Idoso. Prevalência. Inquéritos epidemiológicos. Fatores de risco. Estudo observacional.

INTRODUCTION

The populational aging has increased the burden of diseases in the population, especially regarding psychiatric disorders, particularly depression¹. This is especially relevant in Brazil, once that it is estimated that in 2045 the number of elderly will be greater than the number of children in the country².

The prevalence of depression in the elderly population in the literature varies from slightly above 2 to 50%, depending on the scale used, the place where the study was conducted, and the age range included³⁻¹². The risk factors associated with their occurrence include being female, living alone, having low socioeconomic status, consuming alcohol in excess, having a chronic physical disorder, and referring to personal or family history of depression¹³. The occurrence of family grief, cognitive impairment, and loss of functional mobility are other factors strongly associated with depression^{13,14}. Among the protective factors, there are social support, performing of social activities, especially volunteering, physical activities, and participation in religious activities^{15,16}.

Most studies on depression in old age were carried out among elderly living in urban areas and large cities, where 85% of the Brazilian population lives. There are few studies on elderly living in small municipalities, especially in rural areas. Owing to the increased life expectancy, whether in small-, medium-, or large-sized municipalities, whether in rural or urban areas, it can be assumed that the elderly population will increase, as well as the prevalence of chronic noncommunicable diseases, such as depression, which is a chronic, recurrent, and incapacitating disorder which burdens the public health systems and changes the routine of families. In these municipalities, usually quite distant from large urban centers, the

difficulties to deal with this kind of problem will be even greater, not only by the lack of qualified professionals, but also by the lack of infrastructure of the public health services.

The objective of the present study was to measure the prevalence and to identify factors associated to the occurrence of depression among all people aged 60 years or more living in the municipality of Arroio Trinta, Santa Catarina, Southern Brazil.

METHODS

This study was conducted in Arroio Trinta, Santa Catarina, Southern Brazil, a municipality colonized by Italians with about 3,500 inhabitants, located in Midwest Santa Catarina and 425 km far from Florianópolis, the state capital.

The target population of this study consisted of all those aged 60 years or more living in both the rural and urban areas of this municipality between the months of September and December 2013. The elderly who, due to physical or cognitive limitation, were unable to answer the questionnaire were excluded. Elderly who were traveling, hospitalized, or refused to take part in the study were accounted as losses.

This study was designed as a cross-sectional (or prevalence) study. This design is the most appropriate to quickly measure the occurrence of health or disease events at an acceptable cost at local level¹⁷.

The instrument applied consisted of a standardized and pre-coded questionnaire, which sought for information on demographic, environmental, behavioral, morbidity, and use characteristics of health services. The dependent variable (outcome) was built from the Geriatric Depression Scale Short Form (GDS-15). This scale presents a score which varies from 0 to 15 points. The cutoff point used in this study was 5 / 6 (no case / case). This cutoff point for the GDS-15 resulted, according to a previous study, in sensitivity rates of 85.4% and specificity ones of 73.9% for the diagnosis of greater depressive episode, according to ICD-10¹⁸.

In order to apply this questionnaire, 14 students from a single high school in the municipality were recruited. These students were trained over five consecutive days in order to apply these questionnaires in households. At the end of the training period, 10 of them were chosen to perform the interviews. Initially, the municipality was divided into microareas. In the urban area, the division was defined according to streets, whereas in the rural area it was based on villages, rivers, bridges, mountains, or secondary roads.

In each of the households visited, the interviewer asked the age of the people living there to an adult. The answer was written down on a printed spreadsheet (conglomerate sheet). If there was someone aged 60 years or more, the student explained the study and invited them to participate in the study. On this occasion, an Informed Consent was offered for the resident to sign. Upon the acceptance to participate in the study, and after signing this term, the interviewers applied the questionnaire, which was unique, standardized, and with nearly all questions closed.

At the end of each day of work, the interviewers reviewed the questionnaires applied and, the following day, they delivered them in at the project's headquarter, where they were

reviewed and had their open questions codified. Next, these questionnaires were typed in twice and compared using the Epidata 3.1¹⁹ and Epi Info¹⁷ softwares, respectively. Then, the data were analyzed in the statistical package Stata 11.2²⁰, with which the bivariate analysis was performed aiming to measure the level of association of the independent variables with the outcome (occurrence of depression according to the GDS-15). The χ^2 test was used to compare the proportions. The gross and adjusted analyses were performed using Poisson regression with robust variance²¹, according to the previously defined hierarchical model. Each set of variables of a certain level was included in the analysis, and all the variables whose p-value was ≤ 0.20 in relation to the outcome were kept in the model. The first level included the demographic and socioeconomic variables; the second level, the environmental variables; the third level included the variables related to health services utilization and to behavioral and morbidity aspects. This analysis model followed what was proposed by Victora et al.²². The statistical significance of each variable in the model was evaluated by the Wald's test of heterogeneity and trend, according to their type²³.

The research projects was submitted and approved by the Health Research Ethics Committee (*Comitê de Ética em Pesquisa na Área da Saúde – CEPAS*) of the *Universidade Federal de Pelotas* (Process 320.865 / 2013).

RESULTS

Among the elderly, 568 were identified in the municipality of Arroio Trinta. Of this total, 5 refused to participate in the study, 11 were not found in their households, and 8 were not able to respond to the GDS-15. The responding rate was 96% (552 of 568).

Table 1 shows that approximately two thirds of this population lived in an urban area and were aged between 60 and 69 years, slightly above half of them (54%) were females and, most of them (93%) had white skin color; at least 7 out of 10 were married, 10% did not know how to read nor write, 53% of their families had a monthly income of at least 3 minimum wages, and 96% of them received retirement benefits. Also, in the same table, it is possible to verify that 8% were smokers, that is, had smoked at least 1 cigarette a day for the last 30 days; 28% practiced some kind of physical activity in the last 7 days; and 81% reported having participated regularly in some kind of leisure activity. Finally, 78% reported using some kind of medication daily, two thirds had consulted a doctor within the last 3 months, and approximately 1 out of 4 had been hospitalized or had some kind of fall in the last 12 months. Approximately two out of three claim, according to the diagnosis made by the doctor, having hypertension, diabetes mellitus, and/or depression (Table 1). The prevalence of depression according to the GDS-15 in the population studied was 20.4%, with a confidence interval of 95% (95%CI) 17.3 – 23.8.

Table 2 shows the prevalence of depression according to the category of the variable included in the model and the gross and adjusted analyses. The prevalence of depression in this population varied from 8.3%, among those who did not use any kind of medication

Table 1. Characteristics of elderly living in the municipality of Arroio Trinta, Santa Catarina, Southern Brazil, 2013.

Characteristic	n	%
Residential area		
Urban	370	67.0
Rural	182	33.0
Age of elderly (complete years)		
60 to 69	326	59.1
70 to 79	169	30.6
80 or more	57	10.3
Gender		
Male	251	45.5
Female	301	54.5
Color of skin (self-reported)		
White/Caucasian	513	92.9
Brown	37	6.7
Black	2	0.4
Marital status		
Married	396	71.7
Separated/widowed	126	22.8
Single	30	5.4
Schooling (complete years)		
None	52	9.4
1 to 3	196	35.5
4	222	40.2
≥ 5	82	14.9
Family income in minimum wage(s)		
Up to 1.9	35	6.4
2.0 to 2.9	222	40.2
≥ 3	295	53.4
Receive retirement benefit	530	96.0
Smoker	46	8.3
Practice of physical activity (last 7 days)	157	28.4
Participation in religious events (last 30 days)	424	77.4
Regular participation in leisure activities	449	81.3
Daily use of medication	432	78.3
Medical consultation (last 3 months)	369	66.8
Hospitalization (last 12 months)	140	25.5
Fall within the last 12 months	156	28.3
Individuals with hypertension, diabetes mellitus, or depression (previously diagnosed)	360	64.7
Prevalence of depression according to the GDS-15 (n = 544)	111	20.4
Total	552	100.0

GDS-15: Geriatric Depression Scale Short Form

daily or who did not take part in at least 3 leisure activities regularly, to 64.0%, among single elderly. In the gross analysis, almost all the variables in the model were proven significantly associated to the outcome, except for age, number of residents per household, and place of medical consultation. The adjusted analysis showed that the prevalence ratio (PR) for depression is substantially higher among women, among singles, the ones with lower family

Table 2. Crude and adjusted analysis for factors associated with the occurrence of depression, according to the Geriatric Depression Scale Short Form among elderly in Arroio Trinta, Santa Catarina, Southern Brazil, 2013 (n = 544).

Nível	Variable	Prevalence of depression	PR (95%CI)	
			Gross	Adjusted
I	Gender		p-value = 0.003	p-value = 0.027*
	Male	14.6	1.00	1.00
	Female	25.2	1.73 (1.2 – 2.48)	1.49 (1.05 – 2.13)
	Age of the elderly (complete years)		p-value = 0.062	p-value = 0.614**
	60 to 69	17.0	1.00	1.00
	70 to 79	25.4	1.49 (1.05 – 2.13)	1.17 (0.82 – 1.68)
	80 or more	25.0	1.47 (0.88 – 2.45)	1.22 (0.73 – 2.03)
	Schooling (complete years)		p-value = 0.041	p-value = 0.249**
	0 to 3	24.5	1.00	1.00
	4	19.5	0.79 (0.56 – 1.12)	0.83 (0.59 – 1.16)
	5 or more	11.0	0.44 (0.23 – 0.86)	0.62 (0.33 – 1.17)
	Marital status		p-value < 0.001	p-value ≤ 0.001*
	Married	15.0	1.00	1.00
	Separates/widowed	28.6	1.90 (1.32 – 2.74)	1.57 (1.05 – 2.36)
	Single	64.0	4.26 (2.92 – 6.21)	3.63 (2.32 – 5.70)
	Family income in minimum wage(s)		p-value < 0.001	p-value = 0.003**
	≥ 3	14.5	1.00	1.00
2 to 2.9	25.0	1.72 (1.20 – 2.47)	1.79 (1.27 – 2.54)	
Up to 1.9	40.0	2.75 (1.68 – 4.51)	1.69 (0.95 – 3.02)	
II	Numbers of residents per household		p-value = 0.086	p-value = 0.034**
	1	29.8	1.00	1.00
	2 or 3	18.3	0.61 (0.39 – 0.96)	1.70 (0.91 – 3.18)
	4 or more	23.1	0.77 (0.45 – 1.32)	2.34 (1.22 – 4.49)

Continue...

Table 2. Continuation.

Nível	Variable	Prevalence of depression	PR (95%CI)	
			Gross	Adjusted
III	Practice of physical activity (last 7 days)		p-value = 0.004	p-value = 0.083*
	No	23.8	1.00	1.00
	Yes	12.1	0.51 (0.32 – 0.80)	0.64 (0.41 – 1.06)
	Smoker		p-value < 0.001	p-value = 0.026*
	No	18.7	1.00	1.00
	Yes	39.1	2.09 (1.40 – 3.14)	1.67 (1.06 – 2.64)
	Use of alcohol (last 30 days)		p-value = 0.010	p-value = 0.344*
	No, never	22.7	1.00	1.00
	No, but used to	35.0	1.54 (0.83 – 2.89)	0.93 (0.56 – 1.53)
	Yes, did use	12.1	0.54 (0.33 – 0.87)	1.45 (0.85 – 2.46)
	Participation in religious events (last 30 days)		p-value < 0.001	p-value = 0.029*
	No	35.2	1.00	1.00
	Yes	15.9	0.45 (0.33 – 0.63)	0.70 (0.50 – 0.96)
	Number of leisure activities performed		p-value < 0.001	p-value = 0.004**
	None	42.9	1.00	1.00
	1	23.8	0.55 (0.37 – 0.82)	0.66 (0.41 – 0.98)
	2	18.3	0.43 (0.28 – 0.66)	0.63 (0.21 – 0.97)
	3 to 5	8.3	0.19 (0.11 – 0.33)	0.37 (0.21 – 0.65)
	Hospitalization (last 12 months)		p-value < 0.001	p-value = 0.001*
	No	15.6	1.00	1.00
Yes	34.5	2.22 (1.61 – 3.06)	1.55 (1.12 – 2.14)	
Medical consultation (last 3 months)		p-value = 0.001	p-value = 0.020**	
None	15.2	1.00	1.00	
One	16.1	1.05 (0.64 – 1.72)	1.11 (0.71 – 1.72)	
Two or more	28.6	1.88 (1.24 – 2.83)	1.66 (1.12 – 2.45)	

PR: prevalence ratio; 95%CI: confidence interval of 95%; *heterogeneity test; **linear trend test. Adjustment variables according to the hierarchical model of analysis: level I, adjusted for gender, age, marital status and family income; level II, adjusted for gender, marital status and family income, who they live with and number of residents in the household; level III, adjusted for gender, marital status, family income and number of residents in the household, practice of physical activity, smoking, consumption of alcohol, participation in religious events and leisure activities, hospitalization in the last 12 months and medical consultation in the last 3 months.

income, smokers, and the ones hospitalized in the last 12 months. This same adjusted analysis showed that the practice of physical activities in the last seven days, the participation in religious events and the performing of regular leisure activities acted out as protective factors against the occurrence of depression among elderly living in the municipality of Arroio Trinta, Santa Catarina, Southern Brazil.

DISCUSSION

One out of five elderly in Arroio Trinta suffers from depression, according to GDS-15. The greater risks for this condition were observed among those who were females, singles, with lower family income, smokers, and who consulted with a doctor and were hospitalized in the last 3–12 months prior to the interview, respectively. Taking part in religious events and performing some kind of physical and/or leisure activity regularly granted protection against the occurrence of depression.

Twenty percent of the elderly included in this study suffer from depression according to the scale used. The prevalence of depression among elderly depends on the scale and cutoff points used and the sociodemographic characteristics of the population studied. National studies which used the GDS-15 showed prevalences ranging from 21 to 50%^{7,9-12}. The studies which used ≥ 6 as a cutoff point for the outcome reached the highest prevalences (38 and 50%)^{9,12}. Although this study found a lower prevalence compared to the others — which may be due to differences related to the socioeconomic and demographic characteristics — the high prevalence of this disease is evident. It is, therefore, a common disease which requires proper management at individual level, but above all, at populational level.

Practicing physical activities in the seven days preceding the interview granted protection against the occurrence of depression in the population studied with PR = 0.62 (95%CI 0.40 – 0.97). There is enough evidence of beneficial effects of physical activities on depression in the elderly people. This protection may result from the psychological well-being caused by this interaction of the formation of affective relationship networks provided by this practice²⁴. A randomized controlled study showed that, when the individual feels less depressed, he or she would be more willing to remain physically active and, by doing so, the chance of the depressive symptoms to return is reduced²⁵.

The PR for depression among elderly who are smokers compared to non-smokers was 1.75 (95%CI 1.11 – 2.77). This association has already been studied in different designs. Cohort studies show bidirectionality in this relation, meaning, depression may lead to smoking as well as this may lead to depression²⁶. The fact is that, in Arroio Trinta, smoking and depression are strongly associated, and, as they are both undesirable to individuals, they must be fought against.

The PR for depression among women was 1.49 (95%CI 1.05 – 2.13) in relation to men. This finding is consistent to the ones found in other studies, according to which this higher risk of depression is due to an overload of women's functions, especially the ones related to

family (as a wife, mother, caretaker of the sick, educator, among others), to a higher widowhood rate, higher survival rate, social withdrawal, and estrogen deprivation^{27,28}.

Reaching old age as a single granted a PR = 3.63 (95%CI 2.32 – 5.70) for depression in relation to the ones who married at this age. Being single nearly always implies living alone and, therefore, loneliness, a condition associated to depression¹³. Those who are married have, invariably, in addition to their partners, other family members as a result of this union. This leads to continuous interaction, dialog, and the exercise of living together, which contribute for the maintenance of the active individual and prevent introspection, which is a common condition in a depressive state⁸.

Elderly with income lower than 3 minimum wages showed approximately 70% higher PR for depression compared to those with higher income. Aging, particularly after the age of 60 years, leads to greater prevalence of degenerative chronic diseases and, therefore, greater expenses with health, especially medication. Furthermore, in Brazil, due to retirement, there is a substantial loss of purchasing power. The increase of expenses and the decrease of earnings lead to anxiety and concern among this population, which may contribute to both the onset and the maintenance of the depressive condition. This relation between family income and depression was evidenced in the National Household Sample Survey — *Pesquisa Nacional por Amostra de Domicílios* — (PNAD, 1998), which showed that 1% increase in *per capita* family income will decrease in 4% the risk of depression²⁹.

Among the elderly who were identified as having depression according to the scale used, the PR for medical consultation in the last 3 months and hospitalization within the last 12 months was 1.66 (95%CI 1.12 – 2.45) and 1.55 (95%CI 1.12 – 2.14) times higher in relation to others, respectively. The PNAD revealed that the rate of hospitalization among the ones who claimed having depression was about 3 times higher in relation to others (18.0 *versus* 6.6%)³⁰. This may be a reflex of the chronic condition of the disease, with a consequent use of health services³¹.

Among the elderly in Arroio Trinta, taking part in a religious event decreases the risk of depression with PR = 0.69 (95%CI 0.51 – 0.96). Religiosity seems to act as an extremely important psychosocial factor for mental health. Having a religion, as well as attending churches, favors the preaching of solidarity, improving self-esteem, and the potential for resilience³².

The regular participation on leisure activities decreases the risk of depression in the studied population. For the elderly who participated in three or more leisure activities in the last 30 days, the protection reached 62% (PR = 0.38; 95%CI 0.20 – 0.69). It is widely known that taking part in a group (dance, games, trips, among others) for leisure is extremely positive, once it stimulates social integration, communication, exchange of experiences, and recreation. These activities help breaking down prejudices, decrease discrimination in relation to elderly and improve self-esteem, which positively influences the mood.

CONCLUSION

The occurrence of depression in the municipality of Arroio Trinta is a common condition among the elderly studied. Despite not having identified a new risk or protection factor,

this study corroborated the findings in great urban centers. In addition to that, it should be highlighted that this is a census with minimum losses, a rare event in other studies on the matter. These factors certainly need to be individually treated during medical consultation. However, promoting group activities actually seems indispensable, as the protection factors for depression are related to the interaction among the elderly. In this context, leisure activities should be prioritized, as beneficial effects are more evident in this type of activity. This is even more important in a municipality located far from a great urban area, which, by having an infrastructure focused only on basic care, does not provide, at local level, specialized care in this field and will hardly do so in the future. Finally, the need to assess the hypothesis raised on this study by means of a longitudinal design should be highlighted, in order to definitively solve this temporality limitation and, thus, permanently eliminate the bias of reverse causality which so much affects the approach of this problem in elderly population.

ACKNOWLEDGMENT

To the interviewers and elderly who participated in this study and to the Municipal Health Bureau (*Secretaria Municipal de Saúde*) of Arroio Trinta, Santa Catarina, Southern Brazil, for the logistical and financial support. Authors would also like to thank the comments of professors Juvenal Soares Dias da Costa from *Universidade do Vale do Rio dos Sinos* (UNISINOS) and Raul Mendoza-Sassi from *Universidade Federal do Rio Grande* (FURG).

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Received on: 09/01/2015

Final version presented on: 06/04/2016

Accepted on: 09/08/2016