Original article

Factors influencing depression markers in elderly primary healthcare center patients in Maringá, Paraná, Brazil, 2017*

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Abstract

Objective: to analyze factors influencing depression markers in elderly patients at primary healthcare centers (PHC) in the city of Maringá, Paraná, Brazil, in 2017. Methods: this was a cross-sectional study carried out with elderly individuals at PHCs in Maringá city; we used a questionnaire comprising sociodemographic questions, the Geriatric Depression Scale (GDS) and the International Physical Activity Questionnaire (IPAQ); we analyzed associations and compared depression markers with sociodemographic variables and health conditions. Results: 645 elderly people took part in the study; those with the highest depression markers had lower income, poor health perception, a history of falls and three or more comorbidities; the physically active elderly had lower depression markers. Conclusion: monthly income and health conditions are factors that influence depression markers; doing light physical activities is associated with lower tendency of depression in the elderly.

Keywords: Motor Activity; Depression; Cross-Sectional Studies; Geriatrics; Aging.

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Introduction

Aging is a dynamic and progressive process, characterized by functional, biochemical, physiological, morphological and psychological changes.[1] These changes lead to gradual decrease in the capacity of the individual's body to respond and recover, when facing stressor agents, and also to adapt to the environment,[2] in such a way that the individual becomes more vulnerable and susceptible to diseases, injuries, disabilities and death.[2]

> *The PHC is the appropriate and ideal place to screen for depression and to know the socioeconomic and health profile of the elderly in the community covered.*

The increase in the number of years lived is undoubtedly an important achievement, especially in middle and low income countries.[3] Notwithstanding, living longer does not necessarily mean living better.[2] Aging may be associated with functional and cognitive decline, loss of autonomy and independence, loss of social role, unproductiveness, isolation, lack of affection, frustrations, feelings of guilt, uselessness and depression.[2] This may occur because this is the stage of life when, literally, the elderly think about their past choices and ponder about the years they have already lived and, at the same time, search for ways to deal with aging and the adverse conditions that may come with aging. In this context, depressive symptoms may appear.[1]

Depression has become common among the elderly population.[4] Worldwide, around 15% of the elderly present at least one depressive symptom.[4] According to the World Health Organization (WHO), depression is a Public Health problem.[4] It is characterized as a mood disorder, followed by progressive reduction of interest in social activities, irritation, apathy, decrease in the feeling of pleasure, pessimism and sleeping and appetite changes.[4]

Studies show that chronic diseases, being female, and loss of functional independence are factors that contribute to the increase of depressive symptoms in old age.[4] Moreover, there is evidence that lower educational levels and monthly income are associated with greater occurrence of depression, according to other studies carried out in Brazil.[5] All these factors are social determinants of health: socioeconomic and demographic characteristics and the lack of a social support network increase the risk of depression.[5]

Depression in the elderly is a challenge to the Brazilian National Health System (SUS), where health professionals should keep track of this disorder. It is SUS' responsibility to offer social, pharmacological and psychological support to the elderly.[5]

Within the public health system, the user's first contact with the health service takes place at the primary healthcare center (PHC). The objective of the PHC is to attend to 80% of the health problems of the population, avoiding referral to other services, such as emergency services and hospitals, to promote health and prevent diseases.[6] Therefore, the PHC is the appropriate and ideal place to screen for depression and to know the socioeconomic and health profile of the elderly in the community covered. In middle and low income countries, studies on depression in the elderly and associated factors are still scarce, thus justifying the need of more research exploring this theme.[7]

This study aimed to analyze factors influencing depression markers in elderly patients at Primary Healthcare Centers in the city of Maringá, Paraná, Brazil, in 2017.

Methods

This was an epidemiological, cross-sectional and population-based study, carried out between May and September, 2017.

According to data obtained from the Maringá Municipal Health Department, the study target population was comprised of 42,258 elderly people in 2016. The study's initial sample was estimated considering a confidence level of 95% and an error margin of 4 percentage points, as well as an estimated prevalence of 50%, corresponding to 595 elderly people. After adding 10% for possible losses the final sample was comprised of 654 male and female elderly people. We used StatDisk version 8.4 to calculate the sample size.

The PHCs which offered services to the elderly patients interviewed were subdivided in four regions: East (7 PHCs), which concentrates 21.8% of the elderly population; North (8 PHCs), with 34.6%; West (8 PHCs), with 23.2%; and South (8 PHCs), with 20.4% of the total elderly population in the city. In each of these regions, we drew lots in order to select three PHCs to be evaluated (Figure 1).

After selecting the PHCs to be investigated, the proportion of elderly patients eligible to participate was

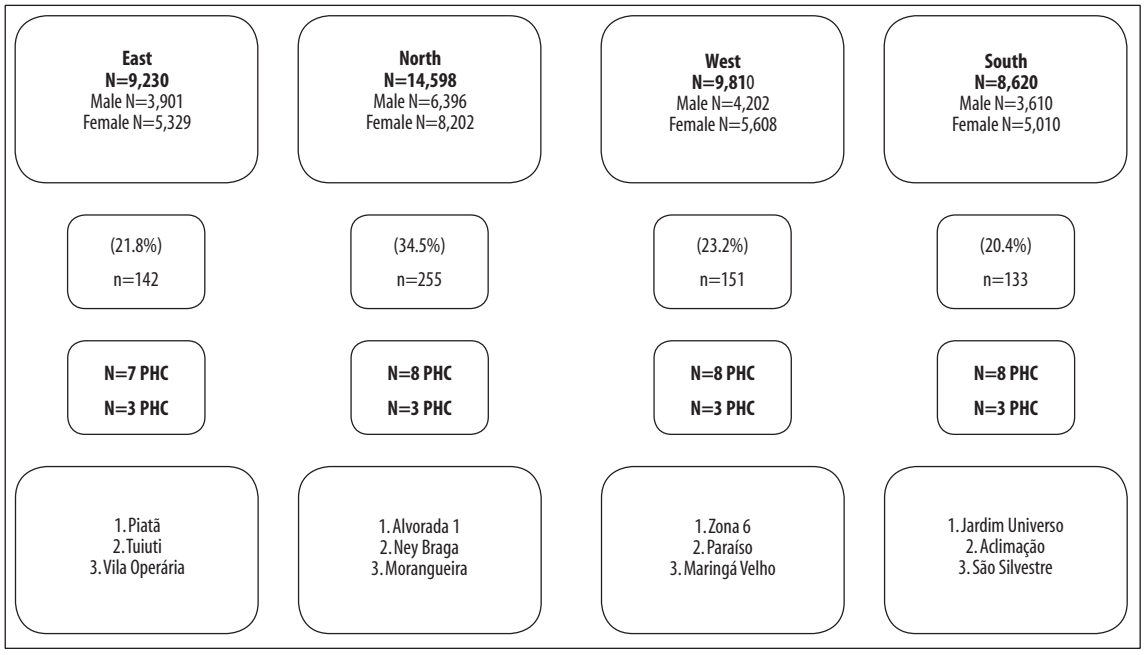
proportional to each one of the PHCs selected; in other words, the size of the group studied was proportional to the number of elderly patients registered with the PHCs, due to the importance of keeping the proportion of the elderly in the population in the sample. For the same reason, the calculations to obtain the final sample per PHC according to sex were also proportional to the population calculations.

We included in the study elderly people of both sexes, aged 60 or more, capable of speaking and hearing, so they could answer the questionnaire. We used the Mini Mental State Examination (MMSE), in order to exclude elderly patients with relevant cognitive deficit. The MMSE is comprised of questions grouped in seven categories: (i) time orientation (maximum score: 5); (ii) spatial orientation (maximum score: 5); (iii) registration of three words (maximum score: 3); (iv) attention and calculation (maximum score: 5); (v) recall of the three words – remembering (maximum score: 3) ; (vi) language (maximum score: 8); and (vii) level of sensorium (maximum score: 1)

The greater the score in each domain, the better the respective cognitive state.[8] The minimum scores used for exclusion by the MMSE were: 17 for the illiterate; 22 for elderly people with an education level of 1 to 4 years of study; 24 for those with education level of 5 to 8 years; and 26 for those with 9 years of study or more. These minimum scores were based on the criteria set by Brucki et al.[9] and correspond to the average obtained by these authors for each education level, less a standard deviation. Elderly patients classified below the specific cut-off point for their education level were excluded.

In order to characterize the sociodemographic and health profile of the elderly patients, we used a semi-structured questionnaire to collect the following data:

a) age (in years: 60 to 69; 70 to 79; 80 or more);
b) sex (male; female);
c) marital status (married [or living with a partner]; single; divorced/separated/widowed);
d) ethnicity/skin color (white; black; other);



PHC: Primary Healthcare Center.

Figure 1 – Sampling Diagram for elderly patients of Primary Healthcare Centers, Maringá, Paraná, 2017

e) monthly income (in monthly minimum wage [MW] of reference in the year 2016, R$ 880.00: 1 to 2 MW; 2.1 to 3 MW; more than 3 MW);
f) retirement pension (yes; no);
g) education level (no schooling; incomplete elementary education; complete elementary education; complete high school; higher education);
h) self-perception of health condition (poor; regular; good; very good);
i) amount of medication used (none; 1 to 2; more than 2);
j) history of falls or almost falling in the last semester (yes; no); and
k) comorbidities (none; 1 to 2; 3 or more)

We evaluated the elderly patients' physical activity level using the short version of the International Physical Activity Questionnaire (IPAQ). This questionnaire is comprised of seven open questions and its data allow estimation of the time spent per week/per day/per minute in different dimensions of physical activity (walks and moderate and intensive physical exertion) and physical inactivity (sitting position). Physical activity level was classified in four strata:

(i) **Sedentary** – elderly person who did no physical activity for at least 10 continuous minutes during the week.
(ii) **Irregularly active** – elderly person who did physical activity, however not enough to be classified as active because they did not meet recommendations regarding the frequency and duration of this activity.
(iii) **Active** – elderly person who did at least three days of intense physical activity, for at least 20 minutes; or 5 days or more of moderate activity or walking for at least 30 minutes; or at least 5 days and 150 minutes a week of any type of physical activity.
(iv) **Very active** – ielderly person who did intense activities for at least 5 days a week, 30 minutes per session; or at least three days a week of intense activity, at least 20 minutes per session, plus moderate activities or walks, for at least 5 days a week and 30 minutes per session.

Sedentary behavior was evaluated by the average time spent sitting on a weekday, and on one day of the weekend.[10]

We used the short version of the Geriatric Depression Scale (GDS) tool to detect depression marker scores. GDS has 15 yes/no questions and a score of 5 or more points is a depression marker.[11]

The physiotherapist who was the researcher responsible for the project trained, one month beforehand, three researchers who carried out data collection. Training included a pilot study with 30 elderly people who did not participate in the main study. We approached elderly volunteers who were in the PHC waiting room. We opted for direct interviewing to apply the questionnaire because of possible difficulties in reading, seeing and understanding the questions. The PHCs did not change their usual form of service delivery while the study was carried out there; the only condition was that elderly patients should be interviewed before being attended to. The interviews lasted 15 minutes on average.

Initially, we verified data normality using the Kolmogorov-Smirnov test. As data did not present normal distribution, we used the median (Md) and the interquartile range as descriptive measurements. When comparing depression markers according to sociodemographic and health condition variables, we used the Kruskal-Wallis and the Mann-Whitney "U" tests. The correlation between physical activity level and depression marker was done using the Spearman coefficient. A significance level of $p<0.05$ was adopted. We carried out all the analysis using the Statistical Package for the Social Sciences (SPSS) version 22.0.

The study project was approved by the Research Ethics Committee of the Centro Universitário de Maringá (CEP/UniCesumar): Report No. 1,626,966/2016. At the PHC, the elderly patients were approached by the lead researcher or by the researchers' team, informed about the study justification, objectives and proceedings, in accordance with the recommendations for research on human beings contained in National Health Council (CNS) Resolution No. 466, December 12, 2012. Service users who agreed to participate in the interview signed a Free and Informed Consent form.

Results

Of the 654 elderly patients evaluated, most were female (56.0%), married (61.3%), aged 60 to 69 (59.2%), had monthly income of 1 to 2 monthly minimum wages (70.0%), had never smoked (56.6%), were of White ethnicity/skin color (81.0%) and were

retired (75.0%). Regarding education level, we found that most of the elderly patients had incomplete elementary education (43.0%).

In relation to health profile, 48.5% perceived their health as good, 44.8% sought the PHC for a medical appointment, 43.9% took 1 to 2 medications regularly, 83.7% had no history of falls and 79.7% said they almost fell six months before the interview. A larger proportion of elderly patients, (60.7%), were physically active or very active. The majority reported 1 to 2 associated morbidities (50.5%) and did not have depression markers (70.6%). In general, the elderly patients' median depression score was 3.0 (Q1=1.0;Q3=6.0), indicating a low depression marker (Table 1).

We only found statistically significant difference for monthly income (p=0.001), which indicates that the elderly patients with monthly income of more than three monthly minimum wages had lower depression markers than those with lower income (Table 1).

When we compared the elderly patients' depression markers according to health conditions (Table 2), we found a significant difference for self-perception of health condition (p=0.001), use of medication (p=0.001), history of falls (p=0.003), physical activity level (p=0.027) and associated comorbidities (p=0.001). These findings showed that the elderly patients who perceived their own health as poor and who took more than 2 medications regularly had higher depression markers than those who perceived

Table 1 – Comparison of depression markers in elderly patients of Primary Healthcare Centers according to sociodemographic variables, Maringá, Paraná, 2017

Variables	Depression marker	p
	Median (Q1;Q3)	
Sex [a]		
Male	3.0 (1.0;6.0)	0.134
Female	3.0 (1.0;6.0)	
Age group (in years) [b]		
60-69	2.0 (1.0;6.0)	
70-79	3.0 (1.0;6.0)	0.085
≥80	3.0 (0.0;5.0)	
Marital status [b]		
Married	3.0 (1.0;6.0)	0.249
Single	2.0 (1.0;7.0)	
Divorced/separated/widowed	3.0 (2.0;7.0)	
Monthly income (in monthly minimum wages [MW]) [b]		
1 to 2 MW	3.0 (1.0;6.0)	
2.1 a 3 MW	3.0 (1.0;6.0)	0.001[c]
More than 3 MW	1.0 (0.0;3.0)	
Retirement pension [a]		
Yes	3.0 (1.0;6.0)	0.255
No	3.0 (1.0;7.0)	

a) Mann-Whitney "U" test.
b) Kruskal-Wallis test: Age group – More than 3 MW, 1 to 2 MW and 2.1 to 3 MW.
c) Significant difference: p<0.05.

their health as regular and good and who took less medication (none; 1 to 2).

We also highlight that elderly patients with a history of falls and with three or more associated comorbidities had higher depression markers compared to those with no history of falls and with fewer associated comorbidities (none; 1 to 2). Regarding physical activity level, elderly patients who were physically active or very active had lower depression markers than those who were irregularly active.

We found (Table 3) significant ($p<0.05$) and reverse correlation between depression markers and days of walks per week ($r = -0.18$) and minutes walking per day ($r = -0.12$). These findings may indicate that light physical activities are associated with depression marker reduction.

Table 2 – Comparison of depression markers in elderly patients of Primary Healthcare Centers according to health conditions, Maringá, Paraná, 2017

Variables	Depression marker	p
	Median (Q1;Q3)	
Perception of their own health[a]		
Good	2.0 (1.0;4.0)	
Regular	3.0 (1.0;6.0)	0.001 [d]
Poor	6.0 (2.0;9.0)	
Reason for going to PHC [a]		
Medical appointment	2.0 (1.0;6.0)	
To get medication	3.0 (1.0;7.0)	0,.58
To have examinations/tests	3.0 (1.0;5.0)	
Use of medication [a]		
None	2.0 (1.0;3.8)	
1 to 2	2.0 (1.0;5.0)	0.001[d]
More than 2	4.0 (2.0;7.0)	
History of falls [b]		
Yes	4.0 (2.0;7.0)	0.003[d]
No	3.0 (1.0;6.0)	
History of almost falling [b]		
Yes	3.0 (1.0;6.0)	0.322
No	3.0 (1.0;6.0)	
Physical activity level		
Very active/active	3.0 (1.0;6.0)	
Irregularly active	3.0 (0.0;5.0)	0.027[d]
Sedentary	3.0 (1.0;7.0)	
Associated comorbidities [a]		
None	2.0 (1.0;4.0)	
1 to 2	2.0 (1.0;5.0)	0.001[d]
More than 3	5.0 (2.0;7.0)	

a) Kruskal-Wallis test: Perception of own health condition – Poor with good and Regular –; Use of medication – More than 2, with none and 1 to 2 –; Associated comorbidities – More than 3, with none and 1 to 2; Physical activity level – Very active/active, with irregularly active.
b) Mann-Whitney "U" test.
d) Significant difference: $p<0.05$.
PHC= Primary Healthcare Center.

Table 3 – Correlation between physical activity level and depression markers for elderly patients of Primary Healthcare Centers, Maringá, Paraná, 2017

Variables	Physical activity level									Depression
	1	2	3	4	5	6	7	8	9	10
1.		0.56[a]	0.77[a]	0.23[a]	0.14[a]	0.18[a]	-0.06	-0.08	-0.07	-0.18[a]
2.			0.89[a]	0.26[a]	0.31[a]	0.28[a]	0.02	0.01	0.01	-0.12[a]
3.				0.26[a]	0.26[a]	0.30[a]	0.02	0.01	0.01	0.03
4.					0.86[a]	0.93[a]	0.47[a]	0.47[a]	0.47[a]	-0.02
5.						0.94[a]	0.50[a]	0.53[a]	0.53[a]	0.09
6.							0.51[a]	0.53[a]	0.53[a]	0.05
7.								0.98[a]	0.98[a]	0.06
8.									0,99[a]	0.08
9.										0.07
10.										
11.										

a) Significant correlation: $p<0.05$.

Note: 1. = days walking per week; 2. = minutes of walking per day; 3. = minutes of walking per week; 4. = days with moderate activity; 5. = minutes of moderate activity per day; 6. Minutes of moderate activity per week; 7. Days with intense activity; 8. = minutes of intense activity per day; 9. = minutes of intense activity per week; 10. = depression.

Discussion

The main findings of this study show that monthly income and health condition are factors that influence depression markers in elderly patients. When patients practiced regular physical activity, they had lower depression markers than those who did it irregularly, and the longer they did physical activity, the lower the depression markers. As far as we could verify, the results of this study are unprecedented regarding factors influencing depression markers of PHC elderly patients in a municipality in the north of the Brazilian state of Paraná.

Elderly people who practiced regular physical activity had lower depression markers. Elderly people who had longer walks (in minutes) also had low depression markers. These data are similar to those found by another study, according to which the time spent doing physical and everyday activities is strongly related to depression:[12] elderly people who spent more time per week doing a physical activity and those who were more active in everyday activities had lower depression markers than those who did physical activity for less time or did not do it at all. In a study with 1,563 elderly people in the city of São Paulo, Barcelos-Ferreira et al.[7] showed that physically active elderly people keep functioning healthily for longer than sedentary ones, probably because of physical function improvement and strengthening of psychological well-being.

A history of falls, presence of three or more comorbidities and use of two or more medications were associated with higher depression markers. Comorbidity represents a predisposing factor for the occurrence of falls.[13] Risk of falling increases with age and it results in negative outcomes for elderly people, such as depression. In an epidemiological study with 316 elderly Brazilian people, Brito et al.[14] observed that individuals with depressive symptoms were 87% more likely to fall than those without these symptoms.

From the opposite point of view, depression may also increase the possibility of falling when depression is a side effect of medications used for treatment, especially drugs such as serotonin and selective benzodiazepine reuptake inhibitors.[14] In the study by Moraes et al.,[15] constant falls are associated with significant increase of comorbidities and depression, suggesting increase in use

of medication, decrease in physical and everyday activities, and tendency of less social participation, these being factors that may lead to depression.

In addition, we found that those who perceived their own health as poor, together with the use of two or more regular medications, had more depressive symptoms among the elderly people we studied. Clearly, use of medication does indeed suggest a worsening health condition, justifying their perception of poor health; however, when associated with depression markers, medication use shows how much poor health impacts on the elderly person's quality of life, having the potential to create negative psychological symptoms.

Monthly income of up to three monthly minimum wages negatively affected depression markers. Although this study did not investigate the participants' family arrangement, the literature has shown, especially in low-income families, the central importance of the elderly person's contribution to the family economy. According to a study by Rabelo and Neri,[13] among the 134 elderly people studied, 41% lived with descendants, 23% with a partner and descendants, 17.9% lived alone, 9.7% lived in other types of family arrangements, while only 7.5% lived with a partner. Of all the elderly analyzed, 72.4% played the role of head of household, contributing totally (49.2%) or partially (44%) to supporting their immediate family.[16]

Considering that the main, if not the only, family income of Brazilian elderly people is their retirement pension or pension for death of partner, the amount of public social security benefit received becomes the only or the main income source of these families.[17] Restriction of financial resources leaves the elderly in a situation of social vulnerability, risk of diseases, escalation of pre-existing diseases and conditions and difficulties in managing their health condition, due to lack of money to buy medication not provided by the popular pharmacy.[17] A context of poverty may also create chronic stress and affect a person's physical and cognitive domains, especially in the case of the elderly.

Notwithstanding its important results, this study does have limitations. It is important to be careful when extrapolating the findings to the general population, since the sample is comprised of individuals living in areas covered by the PHCs of just one municipality, and it does not entail generalizations for the Brazilian population as a whole. Finally, the fact that it is a cross-sectional study hampers the evaluation of direct causal relationships between the variables studied. We suggest that similar research be done in other Brazilian municipalities with elderly PHC patients, as well as with elderly people not using PHCs, in order to compare results.

The findings of this work indicate that monthly income and health conditions are factors that influence depression markers in elderly patients. We highlight that elderly people with higher purchasing power and better health conditions have a lower tendency to have depression, and that practicing light physical activity, such as walking, is associated with low tendency of depression in old age.

Authors' contributions

Oliveira DV contributed to the conception and design of the study, data collection, writing and critical review of the manuscript. Pivetta NRS contributed to writing the manuscript. Oliveira GVN and Silva DA contributed to data collection, writing and critical review of the manuscript. Nascimento Junior JRA participated in data analysis and final correction of the manuscript. Cavaglieri CR contributed with overall guidance on the research and final correction of the manuscript. All authors have approved the final version of the manuscript and declare themselves to be responsible for all aspects of the study, ensuring its accuracy and integrity.

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