Association between depression and sociodemographic characteristics, quality of sleep and living habits among the elderly of the north-east of Brazil: a cross-sectional population based study

Johnnatas Mikael Lopes[1]
Sabrina Gabrielle Gomes Fernandes[2]
Fábio Galvão Dantas[3]
Jovany Luís Alves de Medeiros[4]

Abstract

Introduction: Depressive disorders can be defined as episodes of depressed mood or loss of interest and pleasure in nearly all activities. Depression is considered a major mental disorder in the elderly, and may be related to quality of sleep and living habits as well as being influenced by sociodemographic factors. *Objective:* To determine the prevalence of depression among the elderly in the north-east of Brazil, and the relationship between the condition and socio-demographic profile, quality of sleep and living habits. *Method:* An epidemiological cross-sectional study was performed of the elderly population of the urban area of Campina Grande, Paraiba. The dependent variable presence of depression and the independent variables sociodemographic aspects, sleep quality, and living habits were investigated. Estimates of the prevalence of the variables were obtained and association measured using Poisson Regression. A 5% significance level was adopted for the estimates. *Results:* The study included 168 elderly patients with a mean age of 72.3 (±7.8) years, most of whom, 122 (72.6%), were women. Depression was identified in 72 elderly persons (42.9%). Elderly women were twice as associated with depression (PR=2.26) as men. A subjective quality of sleep of very good (PR=0.34), medium/high risk of sleep disturbance (PR = 4.08), taking sleeping medications once or twice (PR=5.21) and three times or more (PR=8.69) a week, daytime dysfunction once or twice (PR=14.40) and three times or more (PR=27) a week and poor quality of sleep on the Pittsburgh index were associated with depression in bivariate analysis, although there was no relationship following multivariable adjustment. *Conclusion:* The prevalence of depression was high in the studied population, being noticeably more frequent among elderly woman. However, it was not possible to detect an association between depression and living habits and sleep quality.

Key words: Elderly; Depression; Sex; Sleep; Body Mass Index; Motor Activity.

[1] Universidade Federal do Rio Grande do Norte, Centro de Ciências da Saúde, Programa de Pós-graduação em Saúde Coletiva. Natal, RN, Brasil.

[2] Universidade Federal do Rio Grande do Norte, Centro de Ciências da Saúde, Curso de Fisioterapia. Santa Cruz, RN, Brasil.

[3] Universidade Estadual da Paraíba, Centro de Ciências Biológicas e da Saúde, Departamento de Fisioterapia. Campina Grande, PB, Brasil.

[4] Universidade Estadual da Paraíba, Pró-reitoria de Pós-graduação e Pesquisa, Programa de Pós-graduação em Saúde Pública. Campina Grande, PB, Brasil.

Correspondence
Johnnatas Mikael Lopes
E-mail: johnnataslopes2@gmail.com

INTRODUCTION

According to the diagnostic manual of the American Psychiatric Association, depressive disorders are defined as episodes of depressed mood or loss of interest and pleasure in almost all activities, and can also include changes in appetite or weight, sleep and psychomotor activities, a reduction in energy, and feelings of worthlessness or guilt, among other negative effects.[1]

The World Health Organization (WHO) estimates that 151 million people suffer impairment of their activities of daily living and general health as a result of depression.[2] In several countries, including Brazil, depression is one of the mental disorders that most affect the health of individuals,[3] and is considered the most common psychiatric illness among the elderly.[4] According to Kaplan et al.,[5] the prevalence of depression among the elderly is 15%, with the figure among those living in communities approximately 2-14%, rising to almost double (30%) among institutionalized elderly individuals.

Zimerman[6] states that depression causes effects that impair the life of the elderly. In terms of intellectual capabilities, a sufferer may experience reduced mental capacity and memory disturbances, which hinder the learning process; in the social sphere, he or she may be excluded from groups and suffer abandonment and isolation; and from a somatic perspective, heart, lung and gastrointestinal problems may occur.[6]

Several worldwide studies have observed that gender, age and marital status are associated with depression.[7] A study by Minicuci et al.[8] in which 58% of older people with depression were female found that depression was more common among women. In Brazil, Nogueira et al.[9] also identified a higher incidence of depression among elderly women (around 35.9%) in a study in Porto Alegre (RS).

It is evident also that a low level of physical activity, functional capacity, obesity and cardiovascular dysfunction generate a higher frequency of depressed elderly persons.[9,10] The influence of factors such as the level of schooling and marital status of the elderly individual on the onset of senile depression still causes disagreement in literature,[11] with some studies finding that people without a steady partner are at greater risk of depression than those living with a partner.[12]

In addition to these factors, sleep disturbances such as Obstructive Sleep Apnea Syndrome (OSAS), Excessive Daytime Sleepiness (EDS) and insomnia seem to be related to depressive symptoms among the elderly.[13] However, there is no evidence of how deep these connections are, or to what extent they are dependent factors.

In recent years depression has been considered the mental disorder most responsible for functional disability, and also the condition which leads to the worst general health conditions among populations in a number of different countries.[14] However, information on the sleep patterns and mental characteristics of the elderly population of regions with very particular cultural and socio-economic characteristics, such as the north-east of Brazil, an area which also contains marked internal variations, are incipient. Therefore, the aim of the present study was to investigate the prevalence of depression among the elderly in the north-east of Brazil, and its relationship with socio-demographic profile, quality of sleep and living habits.

METHOD

Study design

A cross-sectional population-based study was conducted of elderly residents of the urban area of the city of Campina Grande (PB), between June and September of 2010. This city is one of the largest in the interior of north-east of Brazil and is considered one of Brazil's industrial and technological hubs. Elderly people were considered to be those aged over 60 years.

Population and sample

The target population of the study consisted of approximately 40,000 elderly individuals resident in the urban area in 2010. To represent this population, an ideal sample was estimated using the following equation: $\{[z^2 \times p (1-p)] \times k\}/\varepsilon^2$, where z is the confidence level for a probabilistic error of 5% (z=1.96), p is the estimated prevalence of outcome (p= 20%), k is the sample correction coefficient (k=1.2), given that sampling is by cluster, ε is the margin of error estimation for the estimated prevalence (ε=6%). Thus, the estimated sample had 205 participants. In addition, the elderly population of the city of Campina Grande (PB) was considered as infinite for the prevalence estimated.

A complex sample was developed in which the first stage consisted of the random selection of clusters of basic health units (BHU) in the four urban health districts of the city. The sample was proportional to the elderly population in each health district. Streets in each UBS were covered from one end to the other, on both sides, moving forward nine houses from the corner chosen as a starting point. This systematic sampling of households was determined by the proportion of old people and houses to be visited in the city, and is similar to the strategy of the National Household Sampling Survey (PNAD, acronym in Portuguese). If there were no elderly persons in the household selected the next, or, if necessary, the previous, house was selected. If there was more than one elderly person at a location, data collection was performed for all individuals.

Study variables and data collection instruments

The outcome variable of the study was the presence of depressive symptomatology, which was diagnosed by the long Brazilian version of the Geriatric Depression Scale, a psychometric instrument for tracking elderly people with depression. The instrument contains 30 items, allocating points to elderly persons who provide a negative response. Elderly individuals with scores of up to 10 points are considered normal while those above that are considered depressive. Elderly persons with average scores between 11 and 20 are considered to have moderate depression, while those who score between 21 and 30 are categorized as severely depressed.[15]

The independent factors were socio-demographic data such as gender (male and female), age, marital status (with/without partner) and schooling, classified as illiterate or illiterate, low (primary education or equivalent) and high (high school/higher education) level of education.

The living habits of the elderly persons were also considered, with planned physical activity, nutritional status and cardiovascular risk taken as predictors. Planned physical activity was classified by asking whether the elderly person dedicated at least 30 minutes daily to exercise, with a positive or negative response. Body mass index (BMI) served as an indicator of nutritional status, with elderly individuals with BMI≤24.9 kg/m^2 classified as underweight/normal and those with BMI>25 kg/m^2 considered overweight/obese.[16] Height was measured through a Wiso® brand portable stadiometer and mass determined by means of a digital scale accurate to 100 g. The risk of cardiovascular dysfunction was determined by waist circumference, with 94 cm or more a risk factor for men and 80 cm or more a risk factor for women. An inelastic tape measure was used for this measurement.[17]

Sleep quality was assessed by the presence of insomnia and the application of the Pittsburgh Sleep Quality Index, which measures various features of sleep. Insomnia was identified as "present" or "absent" based on the findings of difficulty falling and staying asleep or waking up early for no apparent reason.[18] A positive response for any of these conditions represented insomnia.

The Pittsburgh Sleep Quality Index obtains information about the subjective quality of sleep (very bad, fairly bad, good and very good), sleep latency (more than 60 minutes, between 31 and

60 minutes, between 16 and 30 minutes, less than 15 minutes), sleep duration (less than five hours, between five and six hours, between six and seven hours and more than seven hours), habitual sleep efficiency (less than 85%, between 75% and 85%, between 65% and 74%, less than 65%), sleep disturbance (no risk, low risk and high risk), use of sleep medications, and daytime dysfunction (not during the last month, less than once a week, once or twice a week, three or more times a week). The Pittsburgh Quality of Sleep Index also provides an objective measure of the quality of sleep.[19]

Statistical method

All variables were classified as categorical, including age, which was transformed into age range, an ordinal variable. To estimate the prevalence of depression, the number of cases of depression was divided by the total sample and a confidence interval of 95% was determined. Analysis of the relationship between a depressed state and sociodemographic variables, lifestyle and sleep quality was carried out by means of a Generalized Linear Model (GLM) and Poisson regression based on data distribution. A significance level of 5% was used in order to minimize type I error. The SPSS software package version 20.0 was used for analysis.

Ethical procedures

The present study was approved by the Ethics Research Committee of the Universidade Estadual da Paraíba, CAAE 0299.0.133.000-09, based on Resolution nº 196/96 of the National Health Council. The participants in the study signed a Free and Informed Consent Form.

RESULTS

A total of 168 elderly persons took part in the study, a number which represented more than 80% of the estimated sample. The average age of the group was 72.3 (±7.8) years, and the majority of its members, 122 (72.6%), were female. A total of 72 elderly persons were identified as depressive [42.9% (CI95%:39.1-46.7%)].

Table 1 shows that twice as many women had depressive symptoms (PR = 2.26) as men, a fact made clear after adjustment for the other sociodemographic variables. It was also noted that age group, marital status and educational level did not correlate with the outcome of depression. There was also no association between planned physical activity, BMI and cardiovascular risk and depression (table 2).

Table 1. Relationship between sociodemographic characteristics and depression among the elderly living in the community. Campina Grande, PB, 2010.

Sociodemographic characteristics	Risk of depression among the elderly		
	n (%)	Unadjusted PR (CI95%)	Adjusted PR (CI95%)
Gender			
Male	15 (20.8)	1	1
Female	57 (79.2)	1.81 (0.89-3.69)	2.26 (1.04-4.90)*
Age range			
60-69 years	72 (42.9)	1	1
70-79 years	59 (35.1)	0.92 (0.59-1.43)	0.97 (0.63-1.51)
80 years or older	36 (21.4)	1.44 (0.97-2.15)	1.41 (0.94-2.13)
Marital status			
Without partner	19 (26.4)	1	1
With partner	53 (73.6)	0.68 (0.33-1.42)	0.56 (0.26-1.22)
Level of schooling			
Illiterate	23 (31.9)	1	1
Low educational level	38 (52.8)	0.54 (0.26-1.11)	0.57 (0.26-1.26)
High educational level	11 (15.3)	0.63 (0.23-1.70)	0.61 (0.21-1.77)

*$p<0.05$.

Table 2. Relationship between living habits and depression among the elderly living in the community. Campina Grande, PB, 2010.

Living habits	Risk of depression among the elderly		
	n (%)	Unadjusted PR (CI95%)	Adjusted PR (CI95%)
Planned physical activity			
No	35 (71.4)	1	1
Yes	14 (28.6)	0.52 (0.24-1.16)	0.62 (0.26-1.45)
MBI			
Underweight/normal weight	20 (30.3)	1	1
Over weight/obesity	46 (69.7)	1.28 (0.64-2.56)	1.28 (0.48-3.35)
Waist circumference			
No risk	10 (14.3)	1	1
Increased/ substantially increased risk	60 (85.7)	2.00 (0.88-4.53)	1.73 (0.51-5.89)

In relation to sleep characteristics, there was a negative association between the subjective quality of sleep of "very good" and depression among the elderly (PR=0.34), where 66% of elderly persons described having very poor sleep. This relationship was confirmed in the adjusted model. Depression was four times more prevalent (PR=4.08) in elderly persons with a medium/high risk of disturbed sleep than in those with no or a low risk of disturbed sleep. However, this association was not confirmed following adjustment.

Older people who took one or two sleeping medications a week (PR=5.21) and those who took such drugs three or more times a week (PR=8.69), were more likely to display depressive symptoms. Similarly, elderly persons with more than one daytime dysfunction had a higher incidence of depression, along with those classified as having poor sleep quality by the Pittsburgh Index (PR=3.03). However, these associations were not confirmed in the adjusted model (Table 3).

Table 3. Relationship between sleep characteristics and depression in community-dwelling elderly. Campina Grande, PB, 2010.

Sleep characteristic	Risk of depression among the elderly		
	n (%)	Unadjusted PR (CI95%)	Adjusted PR (CI95%)
Insomnia			
No	12 (16.7)	1	1
Yes	60 (83.3)	0.85 (0.36-1.97)	1.71 (0.46-6.23)
Subjective quality of sleep			
Very bad	14 (23.7)	1	1
Fairly bad	1 (1.7)	0.57 (0.03-10.43)	1.53 (0.36-6.36)
Good	2 (3.4)	0.57 (0.06-4.87)	0.35 (0.01-13.54)
Very good	42 (71.2)	0.34 (0.13-0.89)*	0.59 (0.12-2.93)
Sleep latency			
>60 min	12 (20.3)	1	1
31-60 min	9 (15.3)	0.75 (0.22-2.49)	1.13 (0.22-5.79)
16-30 min	12 (20.3)	0.57 (0.19-1.72)	1.41 (0.30-6.55)
<15 min	26 (44.1)	0.61 (0.23-1.59)	2.51 (0.58-10.81)
Sleep duration			
<5h	12 (20.7)	1	1
5-6h	8 (13.8)	0.83 (0.29-3.02)	1.13 (0.22-5.79)
6-7h	14 (24.1)	0.35 (0.12-1.00)	0.51 (0.12-2.13)
>7h	24 (41.4)	0.83 (0.30-2.29)	0.99 (0.22-4.46)

Sleep characteristic	Risk of depression among the elderly		
	n (%)	Unadjusted PR (CI95%)	Adjusted PR (CI95%)
Habitual sleep efficiency			
>85%	34 (59.6)	1	1
75-85%	3 (5.3)	0.55 (0.13-2.22)	0.61 (0.09-4.14)
65-74%	3 (5.3)	2.20 (0.35-13.91)	2.31 (0.15-35.23)
<65%	17 (29.8)	1.78 (0.77-4.09)	1.21 (0.28-5.07)
Sleep disorder			
No/low risk	25 (42.4)	1	1
Medium/high risk	34 (57.6)	4.08 (1.98-8.40)*	1.84 (0.07-4.88)
Sleep medication			
Not during the last month	42 (71.2)	1	1
Less than once week	1 (1.7)	1.73 (0.10-28.51)	2.39 (0.06-87.38)
Once or twice a week	6 (10.2)	5.21 (1.01-27.01)*	2.12 (0.28-16.05)
Three or more times a week	10 (16.9)	8.69 (1.81-41.56)*	3.44 (0.50-23.57)
Daytime dysfunction			
None	2 (3.4)	1	1
Less than once a week	35 (59.3)	2.42 (0.49-11.83)	1.82 (0.30-10.96)
Once or twice a week	16 (27.1)	14.40 (2.30-89.94)*	6.73 (0.81-55.88)
Three or more times a week	6 (10.2)	27.00 (1.97-368.38)*	6.05 (0.32-114.50)
Pittsburgh Index			
Good quality of sleep	22 (37.9)	1	1
Bad quality of sleep	36 (62.1)	3.03 (1.50-6.13)*	1.53 (0.36-6.36)

*$p<0.05$.

DISCUSSION

A high prevalence of elderly patients with depression was identified in the present study, well above that of findings in literature. While depression was more associated with older women, there was no association with the other sociodemographic factors or living habits. Following adjustment for confounding factors, there was no association between depression and very good subjective quality of sleep, a medium/high risk of disturbed sleep, taking sleep medication once or more a week, daytime dysfunction once or more a week, and poor objective quality of sleep.

Depression, a disease with multiple causes, is one of the most common psychiatric disorders among elderly persons.[20] While common in all stages of life, it is more prevalent among the elderly than in younger people. Furthermore, approximately 40% of cases of depression in old age are not diagnosed.[21] According to Batistoni et al.,[22] studies that seek to identify which factors are related to the incidence of depressive symptoms.

Barcelos-Ferreira et al.[23] reviewed scientific literature about depression in community-dwelling elderly persons in Brazil and identified a prevalence of depression of 7%, and a rate of depressive symptoms of 26%. A study of community-dwelling elderly persons in Canada found a prevalence of depression of between 1.3% and 18.8% in women and between 0.9 and 7.9% in men.[24] It remains difficult to say with exact precision why more women suffer from depression than men, although some psychosocial assumptions have been suggested.[24] The prevalence of depression in the present study was much higher than in other Brazilian and international surveys, perhaps due to the peculiarity of the study population.

Baptista et al.,[25] found that women have a greater tendency to internalize stressful events, have different rights and status than males, are victimized in a number of societies and suffer various types of violence, resulting in a higher risk of depression. Studies have indicated a number of reasons for the higher prevalence of depression among women, including: a) the frequent presence of factors such as low income and low level of schooling; b) the fact that they are more emotionally effected by events such as widowhood, abandonment and loneliness; and c) a connection with hormonal functioning caused by fluctuating estrogen levels during the childbearing phase of a woman's life.[25-27] For Angold & Worthman,[28] biological variables are considered important in the issue of gender and depression. Suicide attempts are more common in premenstrual periods than at other times, probably due to the hormonal fluctuations and mood changes that occur during a woman's life.

A study by Oliveira et al.[29] described a greater predominance of depression among women, with 29.9% of 167 women interviewed classified as having moderate or severe depression. It was found that the greatest trauma reported by elderly persons was the loss of a companion. Unmarried elderly individuals suffer more from loneliness than married elderly persons. Symptoms of depression were associated with widowhood not just because of the pain of loss, but also by the social isolation suffered by the individual,[29] a finding which contradicts with those of the present study, in which marital status was not related to the depressive state, casting doubt over the importance of cultural aspects related to dealing with loss.

Minicuci et al.[30] studied elderly persons with five years or more of schooling and found an approximately 30% greater prevalence of depressive symptoms than among those with less than five years of education. According to Maciel & Guerra,[31] unfavorable social conditions are reflected in low levels of schooling and income, making the individual more susceptible to mental health problems such as depression. These authors also commented on the high levels of illiteracy in Brazil and ratified the idea of an inefficient social services network, reflected in areas such as housing, culture, income and health. According to Oliveira et al.,[29] the close relationship between education and health is a concern, as it has been observed that educationally disadvantaged people are not particularly concerned with healthy living habits. In contrast, the present study found no association between educational level and geriatric depression.

One feature of depressive disorders is a loss of interest and/or motivation in participating in cultural, leisure and physical activities. A total of 71.4% of individuals interviewed in the present study did not take part in planned physical activity. However, no association between physical inactivity and depression was identified. There is evidence that planned physical activity among the elderly encourages social interaction and provides a greater sense of control over events and challenges.[29] A reduction of symptoms of anxiety and depression through physical exercise can be explained by an increase in the release of catecholamine hormones such as ACTH, vasopressin, β-endorphin, dopamine, serotonin, the activation of specific receptors, and decreased blood viscosity, providing a calming and analgesic effect, giving a relaxing feeling after exercise.[32]

Despite the lack of a connection between obesity/overweight in the present study, there

is evidence of this association in a number of other works. Depression and obesity can increase the risk of disability, reduce quality of life, and increase mortality and morbidity.[33] An increased risk of cardiovascular events has also been described as being related to depression in literature.[34,35]

The consequences of insomnia for mental health have still not been fully investigated, but it has been found that the condition can increase the risk of depression.[18] In a study of 196 subjects aged 62 to 65 Yokoyama et al.[18] found an association between depression and sleep disturbance, and identified a bidirectional relationship between the two. Sleep disturbances are a hallmark of the depressive disorder, with approximately 80% of patients with depression complaining of a deterioration in the quantity and quality of sleep.[18] Lopes et al.[36] also identified an association between depression and excessive daytime sleepiness, a manifestation of sleep dysfunction during wakefulness, and found that men with depression were more associated with this dysfunction.

The *Diagnostic and Statistical Manual of Mental Disorders* describes disturbed sleep as an important factor in the diagnosis of depression,[1] as well as the use of sleeping medications, such as anxiolytics, which are commonly used in Brazil.[37] The present study identified an association with some characteristics such as objectively and subjectively measured quality of sleep, the use of sleep medication and daytime dysfunction. However, this relationship was no longer found after adjustment of the predictive model, perhaps due to the limitations of the present study.

The first of these was the impossibility of developing a general predictive model including groups of sociodemographic, living habit and sleep characteristic variables. This was because the large number of variables prevented the construction of an explanatory model, in view of the sample size. This may explain the lack of association for some bivariate associations in the final model. It was also noted that the elderly persons experienced difficulty when answering simple questions during data collection. Low accuracy of understanding was possible when answering questions regarding insomnia, when it was asked whether the individual experienced difficulty when falling or remaining asleep or woke up early for no apparent reason. This situation may reflect the low educational level of the population studied. Another limitation identified was the highlighted contrasts with existing literature, which may be related to the cultural characteristics of the north-east of Brazil, which are notably different from other regions of the country.

There are a number of possible strategies that could be used to improve the evidence of the elderly population of the north-east, such as stratifying the sample by socioeconomic or educational level, factors that are closely linked to access to health and social support, identifying chronic morbidities that affect the elderly, such as hypertension, diabetes, and types of medication used, as well as the neurological and chronic musculoskeletal conditions that lead to disability. Sleep could also be objectively measured with an Actimeter, which is an easy to use and low cost instrument, or even polysomnography samples.

CONCLUSION

The present study found that there was a high prevalence of depression among the elderly population of the north-east of Brazil, and that the condition was more common among women. No relationship was found, however, between living habits, characteristics of sleep quality and the presence of depressive symptoms.

Investigations of the living habits and quality of sleep of the elderly in specific populations should be encouraged, as joint strategies to tackle modifiable and minimize non-modifiable risk factors could reduce levels of depression among the elderly, and have a major positive impact on public health. It should also be noted that the prevalence of cardiovascular and cerebrovascular and sleep disorders, and the indiscriminate use of medication, is growing among the elderly population, contributing to an increase in depressive symptoms.

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