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EVALUATION OF ANXIOUS AND DEPRESSIVE SYMPTOMS, SLEEP QUALITY AND COGNITION OF ELDERLY IN A GERIATRIC PSYCHIATRY OUTPATIENT CLINIC

AVALIAÇÃO DE SINTOMAS ANSIOSOS E DEPRESSIVOS, QUALIDADE DE SONO E COGNIÇÃO DE IDOSOS EM UM AMBULATÓRIO DE PSIQUIATRIA GERIÁTRICA

EVALUACIÓN DE SÍNTOMAS ANSIOSOS Y DEPRESIVOS, CALIDAD DE SUEÑO Y COGNICIÓN DE ANCIANOS EN UN SERVICIO AMBULATORIO DE PSIQUIATRÍA GERIÁTRICA

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ABSTRACT

Introduction: The older population increases concomitantly with increasing complaints of anxiety and depression, often associated with sleep disturbances and cognitive changes, impacting quality of life. This study aimed to evaluate anxiety and/or depressive disorders and relate them to sleep disturbances and cognitive decline in patients seen in the geriatric psychiatry outpatient clinic of Hospital São Lucas, affiliated with Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Brazil.

Methods: We conducted a cross-sectional study from March 2022 to November 2023 using screening tools for anxiety, depression, cognitive decline, sleep quality, and vulnerability in older adults.

Results: A total of 246 older people aged ≥ 60 years were investigated in this study. Those with depressive symptoms more frequently lived with others, were not in paid work, and had no caregiver. Moderate-to-high clinical-functional vulnerability increased the likelihood of depressive symptoms. High vulnerability was associated with anxiety symptoms. Cognitive changes were independently associated with depressive symptoms. Anxiety symptoms correlated with changes in the attention & orientation domain. Disturbed sleep increased the likelihood of anxiety symptoms, whereas poor sleep quality was associated with depressive symptoms.

Conclusion: Symptoms of anxiety and depression in older people are connected to poor sleep quality or disturbed sleep and cognitive decline, supporting targeted strategies to improve treatment and quality of life for this population.

Keywords: Aged; Anxiety; Cognitive Dysfunction; Depression; Sleep Quality.

RESUMO

Introdução: O aumento da população idosa cresce concomitante com as queixas de ansiedade e depressão, frequentemente associadas a problemas com a qualidade do sono e alteração cognitiva, impactando a qualidade de vida. O objetivo deste estudo foi avaliar transtornos depressivos e/ou ansiosos, relacionando-os a alterações de sono e declínio cognitivo em pacientes do ambulatório de Psiquiatria Geriátrica do Hospital São Lucas da PUCRS, Brasil.

Métodos: Estudo transversal de março de 2022 a novembro de 2023, utilizando instrumentos que rastreiam ansiedade e depressão, declínio cognitivo, qualidade de sono e vulnerabilidade em idosos.

Resultados: Foram investigados no estudo 246 idosos com 60 anos ou mais. Os idosos com

sintomas depressivos frequentemente viviam acompanhados; não exerciam atividade remunerada ou tinham cuidador. Moderada ou alta vulnerabilidade clínico-funcional aumentou as chances de sintomas depressivos; alta vulnerabilidade associou-se a sintomas de ansiedade. Alterações cognitivas estiveram independentemente associadas a sintomas depressivos; sintomas ansiosos correlacionaram-se com alterações no domínio de atenção e orientação. Distúrbios do sono aumentaram as chances de sintomas ansiosos, enquanto má qualidade do sono esteve associada a sintomas depressivos.

Conclusão: Os sintomas de ansiedade e depressão em idosos estão conectados a pior qualidade do sono ou distúrbio do sono e declínio cognitivo, fornecendo estratégias direcionadas de aprimoramento do tratamento e da qualidade de vida desse grupo.

Palavras-chaves: Ansiedade; Depressão; Disfunção Cognitiva; Idoso; Qualidade do Sono.

RESUMEN

Introducción: El aumento de la población anciana crece junto con las quejas de ansiedad y depresión, frecuentemente asociadas a problemas relacionados con la calidad de sueño y alteración cognitiva, suponiendo un impacto sobre la calidad de vida. El objetivo de este estudio fue evaluar los trastornos depresivos y/o ansiosos, relacionándolos con alteraciones del sueño y deterioro cognitivo en pacientes del servicio ambulatorio de Psiquiatría Geriátrica del Hospital São Lucas de la PUCRS, Brasil.

Métodos: Estudio transversal realizado desde marzo de 2022 hasta noviembre de 2023, en el que se emplearon instrumentos que rastrean la ansiedad y la depresión, el deterioro cognitivo, la calidad del sueño y la vulnerabilidad en personas mayores.

Resultados: En el estudio se investigaron 246 ancianos de 60 años o más. Aquellos que presentaban síntomas depresivos frecuentemente vivían acompañados, no ejercían actividad remunerada o tenían cuidador. Una vulnerabilidad clínico-funcional moderada o alta aumentó las probabilidades de síntomas depresivos; una vulnerabilidad alta se asoció a síntomas de ansiedad. Las alteraciones cognitivas fueron independientemente asociadas a síntomas depresivos; los síntomas ansiosos fueron relacionados con alteraciones en el dominio de la atención y de la orientación. Los trastornos del sueño aumentaron la probabilidad de aparición de síntomas ansiosos, mientras que una mala calidad del sueño se asoció a síntomas depresivos.

Conclusión: Los síntomas de ansiedad y depresión en personas mayores están relacionados con una peor calidad del sueño o trastornos del mismo y con el deterioro cognitivo, proporcionando estrategias dirigidas a la mejora del tratamiento y de la calidad de vida de este grupo.

Descriptores: Anciano; Ansiedad; Calidad del Sueño; Depresión; Disfunción Cognitiva.

INTRODUCTION

Globally, it is estimated that the number of older people will reach 2 billion by 2050, accounting for more than 20% of the world's population[1], and the Brazilian population is aging rapidly and intensely, in line with global estimates. Brazil has maintained the aging trend of recent years, with 32.1 million older people in 2022, accounting for almost 16% of the country's total population[2]. One of the states with the largest older population, Rio Grande do Sul, has 20.2% of older people and, by 2050, it is estimated that 25.7% of the population will be over 60 years of age[1-2]. According to the latest national census, Porto Alegre, the capital of Rio Grande do Sul, has the highest percentage of older people (15% of the population), with a prevalence of older women, representing 62.3%[3].

Anxiety and depressive mood are the most prevalent psychiatric disorders in the general population worldwide, and are also the most commonly disorders seen in the older population[4]. In the geriatric population, anxiety and depression are often underdiagnosed, as older people may be less likely to identify symptoms, which are commonly relativized and correlated with aspects of physical illnesses[5].

Advanced age alone is a risk factor for developing sleep disorders. Consistent evidence shows an increased number of sleep complaints with advancing age[6]. Sleep disorders (insomnia and hypersomnia) are more common in patients diagnosed with depression alone or comorbid depression and anxiety, which is supported by the fact that insomnia and hypersomnia are part of the diagnostic criteria for depressive disorders found in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR)[7]. A study published in 2017 reported a very high rate of subjective sleep impairment and an association of sleep complaints with depression and, in particular, anxiety[8]. A study published in 2021, involving 2901 older people in China, concluded that sleep characteristics correlate with cognitive decline in older adults and can be influenced by multiple factors and lifestyle habits[9].

The basal cognitive process is affected by the natural course of aging, even in the absence of anxiety. However, it is crucial to consider any interactions with anxiety that go beyond the independent effects of aging[10]. The presence of more severe depressive symptoms adversely impacts cognitive performance in older adults, resulting in substantially reduced performance on neuropsychological assessment tests. A study published in 2010 suggests that the association between depression and cognitive impairment can be better understood by considering depression an emotional response to the perception of an early stage of cognitive deterioration[11].

Therefore, the present study aimed to evaluate older adults with anxiety and/or depressive mood episodes seen in the geriatric psychiatry outpatient clinic of a teaching hospital in the South of Brazil and investigate the association with sociodemographic and clinical factors, sleep quality, and cognitive decline.

METHODS

We conducted a prospective cross-sectional study. The study population consisted of people aged ≥ 60 years seen in the Geriatric Psychiatry Outpatient Clinic of the Department of Psychiatry of Hospital São Lucas, a tertiary care hospital affiliated with Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), located in the city of Porto Alegre, South of Brazil. The inclusion criteria were (i) age ≥ 60 years, (ii) medical-psychiatric evaluation at the hospital's geriatric psychiatry outpatient clinic, and (iii) a signed informed consent form. Patients were excluded if they had incomplete records or missing data on the institution's database regarding age, psychiatric diagnosis, or chief complaint. This study followed the reporting guidelines of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.

The patients were seen by psychiatry residents and third-year psychiatry students in the hospital's geriatric psychiatry outpatient clinic and by the multidisciplinary team, consisting of preceptors and pharmacists. During scheduled visits, sociodemographic data were collected using the General Questionnaire of the Aging and Mental Health Program (PESM for short, in Portuguese), including identification data, education (years of schooling), occupational status, and health status (chief complaint, medication use, diagnostic hypothesis, comorbidities, previous psychiatric hospitalization, examinations, and presence or not of a caregiver). The diagnoses were made by the treating physicians and classified according to the DSM-5-TR[7].

Screening tools for anxiety, depression, cognitive decline, sleep quality, and clinical-functional vulnerability were administered. Anxiety was assessed by the Geriatric Anxiety Inventory (GAI), a 20-item self-rated or examiner-administered scale with yes/no questions. The optimal cutoff score for identifying anxiety disorder is 10-11[12].

The Geriatric Depression Scale – Short Form (GDS-15) consists of 15 questions with a yes/no format that aim to assess how the person has felt over the past week. The optimal cutoff score for identifying depressive symptoms is 5[13].

Cognition was assessed using the Addenbrooke's Cognitive Examination – Revised (ACE-R). This tool has high sensitivity and specificity for detecting mild neurocognitive disorders and is particularly useful in differentiating Alzheimer's disease from frontotemporal dementia. The ACE-R includes the assessment of multiple cognitive domains, such as orientation & attention, memory, verbal fluency, language, and visuospatial ability. The scores for the 5 domains can be calculated individually, and the total sum represents the final score. The cutoff score for each domain is 17, 15, 8, 22, and 13, respectively, and the total score is 78. The Mini-Mental State Examination (MMSE), included within the ACE-R, has a cutoff score of 25[14].

Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), a scale that assesses patients' sleep quality over a 1-month period. The questionnaire consists of 19 self-rated questions and 5 questions that should be rated by the bed partner or roommate. The questions are categorized into 7 components, scored on a scale from 0 to 3. The components are subjective sleep quality (C1), sleep latency (C2), sleep duration (C3), habitual sleep efficiency (C4), sleep disturbances (C5), use of sleeping medication (C6), and daytime dysfunction (C7). The sum of the 7 component scores results in a global score, which ranges from 0 to 21. A global score of 0 to 4 indicates good sleep quality, of 5 to 10 indicates poor sleep quality, and above 10 indicates the presence of sleep disturbances[15].

The Clinical-Functional Vulnerability Index-20 (IVCF-20 for short, in Portuguese) is an instrument for rapidly identifying vulnerability in older adults that addresses multidimensional aspects of older people's health status. It consists of 20 questions divided into 8 sections (age, self-perceived health, functional disability, cognition, mood, mobility, communication, and multiple comorbidities). Each section has a specific score, and the scores are summed for a maximum score of 40. Higher scores indicate greater risk of clinical-functional vulnerability in older adults. The tool proved to be useful in identifying older people at risk, with highly reliable results, in addition to the advantage of being easy to use by any previously trained mid-level health provider[16].

Once the visit was completed, older patients were invited to a pharmacist-led medication review with a pharmacist from our research group, complementing the multidisciplinary evaluation.

Ethical considerations

The present study was approved by the ethics committee of the Institute of Geriatrics and Gerontology (approval number 2.823.737) and by PUCRS Research Ethics Committee, together with the PESM research project (CAAE: 89158218.5.0000.5336; approval number: 2.823.737; reporting date: 8/15/2018).

The older people were free to participate in the group being researched and their confidentiality was protected. All participants provided written informed consent. The printed material was stored in a room dedicated to confidential documents. The room is a place to store printed and digitized data or data in the form of a restricted access database called "Document Center," located in the Laboratory of Biochemistry and Molecular Genetics of the Institute of Geriatrics and Gerontology.

Statistical analysis

The database was digitized and processed in an Excel spreadsheet, and the data were subsequently analyzed using SPSS version 29. Variables were expressed as frequencies or means (SD). Associations between categorical variables were analyzed using Pearson's chi-square test with adjusted residual analysis. In specific cases, the chi-square test for linear trend was used (ordinal variables with few categories). To control for confounders and independence of variables, multivariate analysis was performed using a hierarchical Poisson regression model with robust variance. The most distal block consisted of sociodemographic variables, followed by clinical variables, while the most proximal block consisted of the ACE-R and PSQI instruments. The variable entry criterion in the multivariate model was set to $P < 0.100$ in the bivariate analysis.

RESULTS

A total of 263 patients were evaluated in the study, with ages ranging from 60 to 90 years. The mean patient age was 70.78 (SD, 8.02) years, where the 60- to 69-year age group was predominant (48.3%). Most participants were women (76.0%), had completed 9 to 12 years of education (36.0%), had a partner (51.0%), lived with a partner, family member, or caregiver (76.4%), were retired (77.6%), were not in paid work (84.1%), and did not have a main caregiver (77.2%).

Analysis of clinical data showed that a large proportion of patients had anxiety (69.2%) and depressive symptoms (78.5%).

Table 1↗ shows data from participants with anxiety and depressive symptoms, based on their responses on the GAI and GDS-15 scales, in relation to sociodemographic variables. Participants in paid work more frequently had anxiety symptoms, whereas those living with a partner, family member, or caregiver and those not engaging in paid work more frequently had depressive symptoms.

Table 2↗ presents the association with the clinical variables of participants with anxiety and depression. A statistically significant association was found for high clinical-functional vulnerability both in patients with anxiety and in those with depression.

Table 3↗ shows the relationship of anxiety and depressive symptoms with sleep quality in older adults. The components that showed a significant association in participants with anxiety symptoms were poor sleep quality, sleep latency above 30 minutes, and greater daytime dysfunction. In patients with depressive symptoms, the components with a significant association were bad or very bad subjective sleep quality, more frequent use of sleeping medication, and greater daytime dysfunction.

Table 4↗ presents the association of anxiety and depressive symptoms with cognitive changes. There was greater impairment in attention & orientation in participants with anxiety symptoms, and in attention & orientation and memory in those with depressive symptoms.

Table 5↗ shows the results of the multivariate analysis of older people with anxiety and depressive symptoms and the variables that remained significantly associated, representing independent risk factors. Older people with anxiety or depressive symptoms more frequently lived with a partner, family member, or caregiver, whereas those with depressive symptoms more frequently had no paid work or caregiver. Older people with moderate-to-high clinical-functional vulnerability were more likely to have depressive symptoms, whereas those with high clinical-functional vulnerability were more likely to have anxiety symptoms. Participants with an abnormal ACE-R total score more frequently had depressive symptoms. Older people with anxiety symptoms more frequently had changes in the attention & orientation domain. Regarding sleep, participants with poor sleep quality or disturbed sleep were more likely to have depressive symptoms, whereas those with disturbed sleep were more likely to have anxiety symptoms.

DISCUSSION

The present study evaluated older patients with symptoms of anxiety and depression based on the correlation between sociodemographic and clinical variables, sleep quality, and cognitive changes, which have proven to be important and significant for the aging process.

A systematic review published in 2023 showed that anxiety and depression were positively correlated with each other and negatively correlated with quality of life[17]. The present study showed that older adults classified as having anxiety or depressive symptoms are the ones who most often live with a partner, family member, or caregiver, whereas those classified as having depressive symptoms are the ones who most need a caregiver. Existing literature demonstrates that anxiety disorders can range in frequency and severity from mild to severe symptoms, which can also lead to mild-to-severe functional disability in older adults[18]. The present findings are in line with these data, and it is also important to note that the participants in the study sample may be frailer and more dependent on specific care. In the geriatric population, functional disability in activities of daily living favors depressive behaviors, since older people see themselves as not capable. However, even with functional limitations, older people need to be encouraged to exercise and strengthen their daily activities, aiming to improve self-confidence, rehabilitation, and functional performance[19].

Given the greater need for care, late-life depression is associated with increased levels of medical comorbidity[20]. A meta-analysis of 108 studies indicated that late-life depression is significantly underdiagnosed by primary care physicians[21], corroborating illness. Living conditions and family networks appear to be related to mental health, although there are variations between different family values and cultures[22]. The FIBRA-RJ study showed that older people who believed they had someone in their informal support network in case of functional dependence were less likely to develop clinically significant depressive symptoms[23]. It is also suggested that families may provide insufficient support, possibly because they are overwhelmed with their multiple roles as a result of their living conditions and because they do not have a formal support network[24].

A large proportion of older people with anxiety symptoms reported no engagement in paid work. Socioeconomic status often influences quality of life, as observed in a review published in 2023, which reported that older people's income was insufficient to allow them to meet basic survival needs[17]. Work activities may be protective against mood disorders in older adults, but the associations are unclear, especially in countries where work opportunities are scarce at older ages. Therefore, the lack of work opportunities may play a role, as many older people need an income for various reasons, whether to maintain or supplement

family income, or to maintain their status, network, identity, or prestige in society, as well as to help a family business[25]. The reasons for the life course have divergent consequences for different forms of social connection[26] and the roles of support networks change constantly from generation to generation, requiring older people and supporters to seek strategies of socio-emotional and compensatory selectivity to balance the needs determined by living and health conditions.

The presence of anxiety and/or depressive symptoms is strongly associated with moderate-to-high clinical-functional vulnerability. Older people are more exposed to daily stressors, such as bereavement, chronic illnesses, and late-life disability, and these stressors interact with biological, social, and psychological vulnerability factors, such as the level of perceived control, helplessness, overload, and a ruminative thinking style[27].

Neurocognitive disorders are determined by cognitive impairment not resulting from normal aging and range from mild to severe. These disorders may be a consequence of an underlying neurological process such as Alzheimer's disease, vascular disease, or some other factors, but they mostly occur due to Alzheimer's disease[7]. Dementia is a prevalent disability among older adults[28], and, as the cognitive impairment progresses, individuals may experience changes such as disorientation and confusion, which can trigger anxiety or depressive symptoms. In the present study, participants with depressive symptoms had an abnormal ACE-R total score, representing an independent risk factor. Functional impairment is one of the factors most strongly associated with depression[29]. Anxiety symptoms were more common in participants with changes in the attention & orientation domain. The impact of age-related cognitive changes on cognitive functioning, coupled with anxiety or worry, suggests that anxiety and aging pose a double risk for reduced or impaired performance on measures of cognitive control[10]. Increased anxiety is associated with poorer performance on executive functioning, processing speed/shifting attention, and inhibition[30]. Having anxiety disorders has been shown to predict an increased risk of developing cognitive disorders such as dementia[31]. Recent evidence also implicates anxiety as an independent risk factor for new cases of dementia[32], demonstrating a bidirectional relationship.

Sleep quality is a complex construct which is difficult to define and/or measure objectively. In the present study, older people with anxiety or depressive symptoms had disturbed sleep. Furthermore, those with depression more frequently had poor sleep quality. A study of 2040 participants, using the same tools to assess sleep quality and depressive symptoms as in our study, found an association between perceived sleep quality and depression in older adults[33]. Another study, also using the PSQI and GDS-15 instruments, evaluated 2032 older people and concluded that poorer sleep quality is associated with a 2-fold increased risk of depression in older adults[34]. Sleep satisfaction, assessed by the concept of perceived sleep

quality, is associated with depression, while sleep efficiency is associated with anxiety[33]. Anxiety symptoms are strongly associated with increased sleep latency. Another study showed that participants with insomnia had an increased risk of developing anxiety, depression alone, and comorbid depression and anxiety[35]. The relationship of anxiety and depressive symptoms with poor sleep quality and disturbed sleep may also result from to the restlessness present in the diagnostic criteria for underlying disorders.

The lack of longitudinal studies limits the ability to draw definitive conclusions about directionality and causality of the topics assessed. Because this is a cross-sectional study, no conclusions about the indication of causality can be concretely drawn. Nevertheless, the present study addresses the importance of assessing coexisting disorders that include anxiety, depression, sleep disturbances, and cognitive decline. Given the methodological issues, future studies should be conducted in this field to clarify the relationship between such symptoms in the older population in order to inform health professionals about their relationships, impacts, and diagnostic assessments, aiming to provide adequate treatment, minimize iatrogenic events, and maximize comfort, quality of life, and safety for older people.

CONCLUSION

Older participants with symptoms of anxiety and/or depression showed a high prevalence of changes in sleep quality. Among those with anxiety, there was a significant association with the presence of sleep disturbances, whereas, among those with depression, there was a significant association with poor sleep quality and disturbed sleep. Regarding cognitive decline, older people with anxiety symptoms more frequently had changes in the attention & orientation domain, whereas those with depressive symptoms had changes in the global score.

Unfortunately, proper diagnosis and thorough evaluation, as well as treatment, are often not given priority in the care of geriatric patients, resulting in a lack of necessary attention to the specific demands of this population, thus generating risks. Understanding the interrelationship between these conditions in older adults is crucial to the development of strategies targeting this population, with the goal of improving treatment and quality of life.

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The present study was approved by the scientific committee of the Institute of Geriatrics and Gerontology (number 2,823,737) and by the Research Ethics Committee of PUCRS, together with the research project "Aging and Mental Health Program (PESM)" (CAE: 89158218.5.0000.5336; Opinion Number: 2,823,737; Date of Rapporteurship: 08/15/2018). The confidentiality and freedom of the elderly to remain in the group to be researched were respected. All individuals included in the study signed the Informed Consent Form (ICF). The researchers involved in the study signed the confidentiality agreement for the data.

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Table 1 – Association of sociodemographic variables with anxiety and depressive symptoms in older adults.

Variables	Total n (%)	GDS-15		p	GAI		p
		Normal n (%)	Abnormal n (%)		Normal n (%)	Abnormal n (%)	
Gender				0,496			0.694
Female	200 (76.0)	73 (36.5)	127 (63.5)		77 (38.5)	123 (61.5)	
Male	63 (24.0)	26 (41.3)	37 (58.7)		26 (41.3)	37 (58.7)	
Age group (years)				0,415*			0.444*
60 – 69	127 (48.3)	51 (40.2)	76 (59.8)		47 (37.0)	80 (63.0)	
70 – 79	92 (35.0)	33 (35.9)	59 (64.1)		37 (40.2)	55 (59.8)	
80 or older	44 (16.7)	15 (34.1)	29 (65.9)		19 (43.2)	25 (56.8)	
Education (years)				0,898*			0.755*
0 – 4	35 (14.5)	14 (40.0)	21 (60.0)		13 (37.1)	22 (62.9)	
5 – 8	51 (21.1)	21 (41.2)	30 (58.8)		20 (39.2)	31 (60.8)	
9 – 12	87 (36.0)	28 (32.2)	59 (67.8)		34 (39.1)	53 (60.9)	
13 or more	69 (28.5)	30 (43.5)	39 (56.5)		28 (40.6)	41 (59.4)	
Has a partner				0,359			0.293
Yes	123 (51.0)	53 (43.1)	70 (56.9)		45 (36.6)	78 (63.4)	
No	118 (49.0)	44 (37.3)	74 (62.7)		51 (43.2)	67 (56.8)	
Currently lives				0,007			0.064
Alone	60 (23.6)	32 (53.3)	28 (46.7)		30 (50.0)	30 (50.0)	
With others	194 (76.4)	66 (34.0)	128 (66.0)		71 (36.6)	123 (63.4)	
Retired				0,316			0.047
Yes	187 (77.6)	69 (36.9)	118 (63.1)		80 (42.8)	107 (57.2)	
No	54 (22.4)	24 (44.4)	30 (55.6)		15 (27.8)	39 (72.2)	
Paid work				0,028			0.742
Yes	40 (15.9)	22 (55.0)	18 (45.0)		15 (37.5)	25 (62.5)	
No	211 (84.1)	77 (36.5)	134 (63.5)		85 (40.3)	126 (59.7)	
Caregiver				0,012			0.722
Yes	55 (22.8)	13 (23.6)	42 (76.4)		21 (38.2)	34 (61.8)	
No	186 (77.2)	79 (42.5)	107 (57.5)		76 (40.9)	110 (59.1)	
Total	263 (100)	99 (37.6)	164 (62.4)		103 (39.2)	160	

GDS-15, Geriatric Depression Scale – Short Form; GAI, Geriatric Anxiety Inventory.
*Linear trend of the chi-square test.

Table 2 – Association of clinical variables with anxiety and depressive symptoms in older adults.

Variables	Total n (%)	GDS-15		p	GAI		p
		Normal n (%)	Abnormal n (%)		Normal n (%)	Abnormal n (%)	
Complaint - Depressive symptoms				<0.001			0.006
Yes	130 (49.4)	28 (21.5)	102 (78.5)		40 (30.8)	90 (69.2)	
No	133 (50.6)	71 (53.4)	62 (46.6)		63 (47.4)	70 (52.6)	
Complaint - Anxiety symptoms				0.780			0.017
Yes	149 (56.7)	55 (36.9)	94 (63.1)		49 (32.9)	100 (67.1)	
No	114 (43.3)	44 (38.6)	70 (61.4)		54 (47.4)	60 (52.6)	
Psychiatric diagnosis				0.001			0.336
Depression	77 (29.3)	14 (18.2)	63 (81.8)		27 (35.1)	50 (64.9)	
Anxiety	138 (52.5)	62 (44.9)	76 (55.1)		51 (37.0)	87 (63.0)	
Bipolar disorder	25 (9.5)	13 (52.0)	12 (48.0)		12 (48.0)	13 (52.0)	
Dementia	16 (6.1)	8 (50.0)	8 (50.0)		9 (56.2)	7 (43.8)	
Psychotic syndromes	7 (2.7)	2 (28.6)	5 (71.4)		4 (57.1)	3 (42.9)	
Use of psychotropic drugs				0.620			0.845
Yes	221 (88.4)	81 (36.7)	140 (63.3)		88 (39.8)	133 (60.2)	
No	29 (11.6)	12 (41.4)	17 (58.6)		11 (37.9)	18 (62.1)	
Clinical comorbidity				0.955			0.820
Yes	222 (88.4)	83 (37.4)	139 (62.6)		87 (39.2)	135 (60.8)	
No	29 (11.6)	11 (37.9)	18 (62.1)		12 (41.4)	17 (58.6)	
Clinical medication				0.315			0.880
Yes	211 (86.1)	81 (38.4)	130 (61.6)		84 (39.8)	127 (60.2)	
No	34 (13.9)	10 (29.4)	24 (70.6)		14 (41.2)	20 (58.8)	
Psychiatric hospitalization				0.061			0.279
Yes	32 (12.8)	7 (21.9)	25 (78.1)		10 (31.3)	22 (68.8)	
No	218 (87.2)	85 (39.0)	133 (61.0)		90 (41.3)	128 (58.7)	
Psychiatric family history				0.442			0.328
Yes	88 (53.0)	31 (35.2)	57 (64.8)		34 (48.6)	54 (61.4)	
No	78 (47.0)	32 (41.0)	46 (59.0)		36 (46.2)	42 (53.8)	
Vulnerability (IVCF-20)				<0.001			<0.001
Low	27 (33.3)	21 (77.8)	6 (22.2)		19 (70.4)	8 (29.6)	
Moderate	37 (45.7)	17 (45.9)	20 (54.1)		15 (40.5)	22 (59.5)	
High	17 (21.0)	2 (11.8)	15 (88.2)		3 (17.6)	14 (82.4)	
Total	263 (100)	99 (37.6)	164 (62.4)		103 (39.2)	160 (60.8)	

GDS-15, Geriatric Depression Scale – Short Form; GAI, Geriatric Anxiety Inventory; IVCF-20, Clinical-Functional Vulnerability Index-20.

Table 3 – Association of the measured components of sleep quality with anxiety and depressive symptoms in older adults.

Variables	Total n (%)	GDS-15		p	GAI		p
		Normal n (%)	Abnormal n (%)		Normal n (%)	Abnormal n (%)	
Sleep quality				<0.001*			<0.001*
Good	39 (19.5)	24 (61.5)	15 (38.5)		24 (61.5)	15 (38.5)	
Poor	94 (47.0)	37 (39.4)	57 (60.6)		42 (44.7)	52 (55.3)	
Disturbed sleep	67 (33.5)	16 (23.9)	51 (76.1)		16 (23.9)	51 (76.1)	
Subjective sleep quality				0.002			0.001
Very good/Good	133 (66.5)	62 (46.6)	71 (53.4)		65 (48.9)	68 (51.1)	
Bad/Very bad	67 (33.5)	16 (23.9)	51 (76.1)		17 (25.4)	50 (74.6)	
Sleep latency				0.107			0.022
Up to 30 min	102 (51.3)	45 (44.1)	57 (55.9)		50 (49.0)	52 (51.0)	
Above 30 min	97 (48.7)	32 (33.0)	65 (67.0)		32 (33.0)	65 (67.0)	
Sleep duration				0.620			0.211
More than 6 h	146 (73.4)	58 (39.7)	88 (60.3)		64 (43.8)	82 (56.2)	
Less than 6 h	53 (26.6)	19 (35.8)	34 (64.2)		18 (34.0)	35 (66.0)	
Habitual sleep efficiency				0.726			0.218
≥ 75%	119 (59.5)	47 (39.5)	72 (60.5)		53 (44.5)	66 (55.5)	
< 75%	81 (40.5)	30 (37.0)	51 (63.0)		29 (35.8)	52 (64.2)	
Sleep disturbance				0.004			0.003
No	143 (71.5)	64 (44.8)	79 (55.2)		68 (47.6)	75 (52.4)	
Yes	57 (28.5)	13 (22.8)	44 (77.2)		14 (24.6)	43 (75.4)	
Use of sleeping medication				0.027			0.323
None or less than 1×/week	84 (42.2)	40 (47.6)	44 (52.4)		38 (45.2)	46 (54.8)	
1×/week or more	115 (57.8)	37 (32.2)	78 (67.8)		44 (38.3)	71 (60.7)	
Daytime dysfunction				<0.001			<0.001
None or less than 1×/week	131 (65.5)	68 (51.9)	63 (48.1)		71 (54.2)	60 (45.8)	
1×/week or more	69 (34.5)	9 (13.0)	60 (87.0)		11 (15.9)	58 (84.1)	
Total	200 (100)	77 (38.5)	123 (61.5)		82 (41.0)	118 (59.0)	

GDS-15, Geriatric Depression Scale – Short Form; GAI, Geriatric Anxiety Inventory.
*Linear trend of the chi-square test.

Table 4 – Association of the measured components of cognition with anxiety and depressive symptoms in older adults.

Variables	Total n (%)	GDS-15		p	GAI		p
		Normal n (%)	Abnormal n (%)		Normal n (%)	Abnormal n (%)	
MMSE							
Normal	109 (66.9)	45 (41.3)	64 (58.7)	0,453	47 (43.1)	62 (56.9)	0.458
Abnormal	54 (33.1)	19 (35.2)	35 (64.8)		20 (37.0)	34 (63.0)	
ACE-R total score				0,053			0.431
Normal	84 (51.5)	39 (46.4)	45 (53.6)		37 (44.0)	47 (56.0)	
Abnormal	79 (48.5)	25 (31.6)	54 (68.4)		30 (38.0)	49 (62.0)	
Attention & Orientation				0,004			0.015
Normal	74 (45.4)	38 (51.4)	36 (48.6)		38 (51.4)	36 (48.6)	
Abnormal	89 (54.6)	26 (29.2)	63 (70.8)		29 (32.6)	60 (67.4)	
Memory				0,049			0.724
Normal	102 (62.6)	46 (45.1)	56 (54.9)		43 (42.2)	59 (57.8)	
Abnormal	61 (37.4)	18 (29.5)	43 (70.5)		24 (39.3)	37 (60.7)	
Fluency				0,630			0.225
Normal	93 (57.1)	38 (40.9)	55 (59.1)		42 (45.2)	51 (54.8)	
Abnormal	70 (42.9)	26 (37.1)	44 (62.9)		25 (35.7)	45 (64.3)	
Language				0,119			0.838
Normal	108 (66.3)	47 (43.5)	61 (56.5)		45 (41.7)	63 (58.3)	
Abnormal	55 (33.7)	17 (30.9)	38 (69.1)		22 (40.0)	33 (60.0)	
Visuospatial				0,269			0.619
Normal	101 (62.0)	43 (42.6)	58 (57.4)		40 (39.6)	61 (60.4)	
Abnormal	62 (38.0)	21 (33.9)	41 (66.1)		27 (43.5)	35 (56.5)	
Total	163 (100)	64 (39.3)	99 (60.7)		67 (41.1)	96 (58.6)	

GDS-15, Geriatric Depression Scale – Short Form; GAI, Geriatric Anxiety Inventory; MMSE, Mini-Mental State Examination; ACE-R, Addenbrooke's Cognitive Examination – Revised.

Table 5 – Multivariate analysis using a hierarchical Poisson regression model with robust variance.

Variables	GDS-15			GAI		
	PR	95% IC	p	PR	95% IC	p
Sociodemographic data						
Currently lives						
Alone	1.00			1		
With others	1.59	1.122-2.243	0.009	1.23	0.925-1.642	0.154
Retired						
Yes	–	–	–	1		
No	–	–	–	1.23	0.992-1.520	0.059
Caregiver						
Yes	1.28	1.042-1.569	0.019	–	–	–
No	1.00			–	–	–
Clinical data						
Vulnerability (IVCF-20)						
Low	1.00			1.00		
Moderate	2.33	1.102-4.941	0.027	1.95	0.988-3.851	0.054
High	3.31	1.599-6.868	0.001	2.67	1.356-5.260	0.005
Instruments						
ACE-R total score						
Normal	1.00			–	–	–
Abnormal	1.36	1.025-1.802	0.033	–	–	–
Attention & Orientation						
Normal	–	–	–	1.00		
Abnormal	–	–	–	1.41	1.042-1.906	0.026
Sleep quality						
Good	1.00			1.00		
Poor	1.78	1.042-3.038	0.035	1.56	0.918-2.669	0.100
Disturbed sleep	2.01	1.193-3.387	0.009	1.97	1.166-3.322	0.011

GDS-15, Geriatric Depression Scale – Short Form; GAI, Geriatric Anxiety Inventory; PR, prevalence ratio; IVCF-20, Clinical-Functional Vulnerability Index-20; ACE-R, Addenbrooke's Cognitive Examination – Revised.