RESEARCH

ASSOCIATES OF COGNITIVE FUNCTIONS IN AGED TURKISH ADULTS: INSIGHTS FROM A PSYCHIATRY OUTPATIENT CLINIC

Turkish Journal of Geriatrics
DOI: 10.29400/tjgeri.2023.341
2023; 26(2):155−165

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Received : MAy 06, 2023
Accepted : June 05, 2023

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Abstract

Introduction: The aim of this study was to determine the cognitive function and its influential factors in elderly adults in Turkey.

Materials and Methods: 127 patients aged over 65 years referred to a psychiatry outpatient clinic for the first time were included to cross-sectional and descriptive study. Patients were assessed by Carlson Comorbidity index, Montreal Cognitive Assessment Test, Geriatric Depression Scale, Beck Anxiety Inventory, Nottingham Health Profile and Lawton Instrumental Activities of Daily Living Scale.

Results: The mean age of the patients was 69.7±4.2 years and 55.1% (n=70) of the participants were female. The primary diagnosis was Generalized Anxiety Disorder in 48.8% and Major depressive disorder in 51.2% of the patients. In multivariate analysis, age (OR:0.759, 95% CI:0.630-0.914, p=0.004), income <3800 TL (OR:14.72, 95% CI:1.78-121.51, p=0.013), medication usage (OR:0.171, 95% CI:0.035-0.845, p=0.030) and Geriatric Depression Scale score (OR:0.876, 95% CI:0.785-0.977, p=0.017) remained as independent predictors of Montreal Cognitive Assessment Test score.

Conclusion: In Turkish adults with Generalized Anxiety Disorder or Major depressive disorder who admit to a psychiatry outpatient clinic for the first time, various parameters including age, education, income, leisure activity, medication usage, depression, Lawton Instrumental Activities of Daily Living Scale score and Nottingham Health Profile score are linked with cognitive impairment. However, only age, income, medication usage and depression independently associate with cognitive impairment in this highly specific patient population.

Keywords: Cognitive Dysfunction; Geriatric Psychiatry; Depression; Quality of Life.

INTRODUCTION

As the elderly population has substantially increased not only in Turkey but worldwide, aging is considered a global phenomenon. It is predicted that in 2050, approximately one in six people will be 65 years or older (1). Daily activities such as walking, climbing stairs, and getting up without assistance are important tasks for aging individuals. However, cognitive impairment (CoI) and alterations in musculoskeletal and neuromuscular functioning that occur due to the aging process negatively impact such activities and reduce quality of life (QoL) (2).

CoI is characterized by the deterioration of executive functions, memory, attention, orientation, and speech. Elderly adults with CoI are more dependent and have more comorbidities and poorer QoL (2). CoI prevalence in the elderly varies from 5% to 36% (1-3). Studies indicate that CoI is significantly linked with advanced age, the female gender, low education level, low income, daily living, lifestyle, social support, nutritional status, and chronic diseases (2, 3). Mental disorders, such as depression and anxiety, also adversely impact cognitive functions and QoL in older adults. Generalized anxiety disorder (GAD) and late-life depression (LLD) are major public health problems leading to functional decline, physical disability, and overuse of health services in the elderly population (4, 5). Both conditions can induce significant impairments in cognitive functions and independent living skills and thus reduce QoL (4, 6).

Among the various factors that negatively affect cognitive functions in the elderly, age and education level have been investigated more frequently, and their impacts are comparatively greater (6, 7). However, other factors have been understudied, especially in the Turkish population. The present study sought to examine the relationships among cognitive status, daily living activities, and QoL in older Turkish adults who had applied to a psychiatry outpatient clinic for the first time and were diagnosed with major depressive disorder (MDD) or GAD.

METHODS

Study Design and Participants

The study used a cross-sectional and descriptive design and was conducted between October 2021 and October 2022 in a psychiatry outpatient clinic of an university hospital in Turkey. Consecutive patients aged 65 and over who had applied to the clinic for the first time and were diagnosed with MDD or GAD according to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders were included in the study. Clinical evaluation and routine blood tests were performed on all participants to exclude other causes of somatic and psychiatric disorders. Demographic and clinical characteristics, comorbidities, medications, and neuropsychometric test results were gathered prospectively. Patients with neurological diseases (e.g., Parkinson's disease), obstructive sleep apnea syndrome, heart failure, renal failure, hepatic disease, or a history of alcohol or other psychoactive substance use were excluded from the study. Patients who couldn't speak and write Turkish were also excluded.

The eligible patients underwent neuropsychometric evaluations performed by a psychiatrist. A sociodemographic data form and the Charlson Comorbidity Index (CCI) were also completed for each patient. Afterwards, cognitive status was assessed using the Montreal Cognitive Assessment (MoCA), and depression and anxiety were measured using the Geriatric Depression Scale (GDS) and Beck Anxiety Inventory (BAI), respectively. QoL and disturbances in everyday activities were assessed using the Nottingham Health Profile (NHP) and Lawton Instrumental Activities of Daily Living Scale (IADL), respectively.

The study protocol was approved by the local ethics committee of the hospital, and all

procedures were performed in accordance with the principles defined in the Declaration of Helsinki. Written informed consent was obtained from all participants.

Outcome Measures

The sociodemographic data form, which was prepared by the investigators, included participant age, gender, education, area of residence, marital and living status, occupation, income per month, comorbidities, medications, and leisure activities. The CCI is a questionnaire developed by Charlson et al. to control for comorbid diseases and monitor patient prognosis (8). Scores range from 0 (no conditions) to 6. Higher scores indicate a more severe burden of comorbidity.

The MoCA is a brief cognitive screening tool that was developed to detect mild CoI. The scale covers a wide range of cognitive functions, including spatial/executive ability, naming, language fluency, attention, memory, abstract thinking, and orientation. It is a one-page 30-point test that can be completed in approximately 15 minutes (9). In the Turkish version of the MoCA, a score above 20 is evidence of CoI (10).

The GDS is a 30-item questionnaire developed to screen for depressive symptoms in the elderly. The Turkish validity and reliability study was performed by Sağduyu et al., and the cut-off score was determined to be 13/14 (11). The BAI is a self-report questionnaire that was developed by Beck et al. and consists of 21 items that inquire about the common somatic and cognitive symptoms of anxiety. Higher BAI scores indicate more severe symptoms. The validity and reliability study of the Turkish version of the BAI was published by Ulusoy et al (12).

The NHP is a two-part questionnaire developed to evaluate patients' subjective health status. The first part, which includes 38 dichotomized (yes/no) items, focuses on six dimensions of subjective health: pain, vital energy, sleep disorders, physical mobility, emotional reaction, and social isolation. The second part focuses on the affected areas, and only the first part was used in our study. Higher NHP scores indicate more severe health status. The Turkish validity and reliability study of the NHP was published by Küçükdeveci et al (13).

The IADL evaluates an individual's independence in routine daily activities (e.g., phone use, transportation, shopping, food preparation, housekeeping, laundry, medication use, and money management). The Turkish validity and reliability study was performed by Işık et al (14).

Statistical Analysis

All statistical tests were performed using SPSS for Windows v22.0 (SPSS Inc., Chicago, IL, USA). The Kolmogorov–Smirnov test was used to evaluate the distribution of numerical variables. According to the results of this test, an independent samples t-test or analysis of variance (ANOVA) was applied to the normally distributed numerical data, which conformed to the normal distribution, and the results were presented as mean±standard deviation. On the other hand, the Mann–Whitney U test was used for the abnormally distributed variables, and the results were presented as the median with interquartile ranges (percentiles 25th and 75th). Categorical variables were presented as counts with percentages and compared using the chi-squared test or Fisher's exact test. Independent predictors of MoCA scores were determined by logistic regression analysis. Variables that could be associated with the MoCA score and/or reached statistical significance in comparative analyses, such as age, education, income<3800 TL per month, leisure activity, medications, GDS score, IADL total score, and NHP total score, were included in univariate analysis. Afterwards, the variables that were determined to have a p-value <0.1 in univariate analysis were included in multivariate analysis. A two-sided p-value of less than 0.05 was considered statistically significant for all tests.

RESULTS

Baseline characteristics of the patients and their comparisons according to the MoCA scores are presented in Table 1. The entire study population consisted of 127 patients for statistical tests after the application of the exclusion criteria. The mean age of the patients was 69.7±4.2 years and 55.1% (n=70) of the participants were female. The primary

Table 1. Basal characteristics of the study participants

Variables	All patients (n=127)	MoCA score ≤21 (Cognitive impairment) (n= 66)	MoCA score >21 (Normal cognition) (n= 61)	p value
Age (years)	69.7±4.2	71.4±4.6	67.8±2.6	<.001
Gender (female)	70 (55.1%)	39 (59.1%)	31 (50.8%)	.349
Education				
Primary school	85 (66.9%)	55 (83.3%)	30 (49.2%)	<.001
Secondary school	22 (17.3%)	8 (12.1%)	14 (23%)	
High school and above	20 (15.7%)	3 (4.5%)	17 (27.8%)	
Area of residence				
Rural	62 (48.8%)	32 (48.5%)	30 (49.2%)	.427
Urban	65 (51.2%)	34 (51.5%)	31 (50.8%)	
Occupation				
Unoccupied	66 (52%)	37 (56.1%)	29 (47.5%)	.030
Retired	61 (48%)	29 (43.9%)	32 (52.5%)	
Marital status				
Single	29 (22.8%)	19 (28.8%)	10 (16.4%)	.196
Married	98 (77.2%)	47 (71.2%)	51 (83.6%)	
Living status				
Alone	13 (10.2%)	11 (16.7%)	2 (3.3%)	.042
Spouse	91 (71.7%)	43 (65.2%)	48 (78.7%)	
Family	23 (18.1%)	12 (18.2%)	11 (18%)	
Income (per months)				
<2800 TL	73 (57.5%)	45 (68.2%)	28 (45.9%)	<.001
2800-3800 TL	32 (25.2%)	17 (25.8%)	15 (24.6%)	
>3800 TL	22 (17.3%)	4 (6.1%)	18 (29.5%)	
Number of comorbidities				
0	19 (15.0%)	6 (9.1%)	13 (21.3%)	.104
1	57 (44.9%)	34 (51.5%)	23 (37.7%)	
>1	51 (40.2%)	26 (39.4%)	25 (41.0%)	
Medication	109 (85.8%)	61 (92.4%)	48 (78.7%)	.027
Leisure activity	70 (55.1%)	30 (45.5%)	40 (65.6%)	.023
Primary diagnosis				
Generalized Anxiety Disorder	62 (48.8%)	28 (42.4%)	34 (55.7%)	.134
Major Depressive Disorder	65 (51.2%)	38 (57.6%)	27 (44.3%)	

Abbreviations: TL= Turkish lira

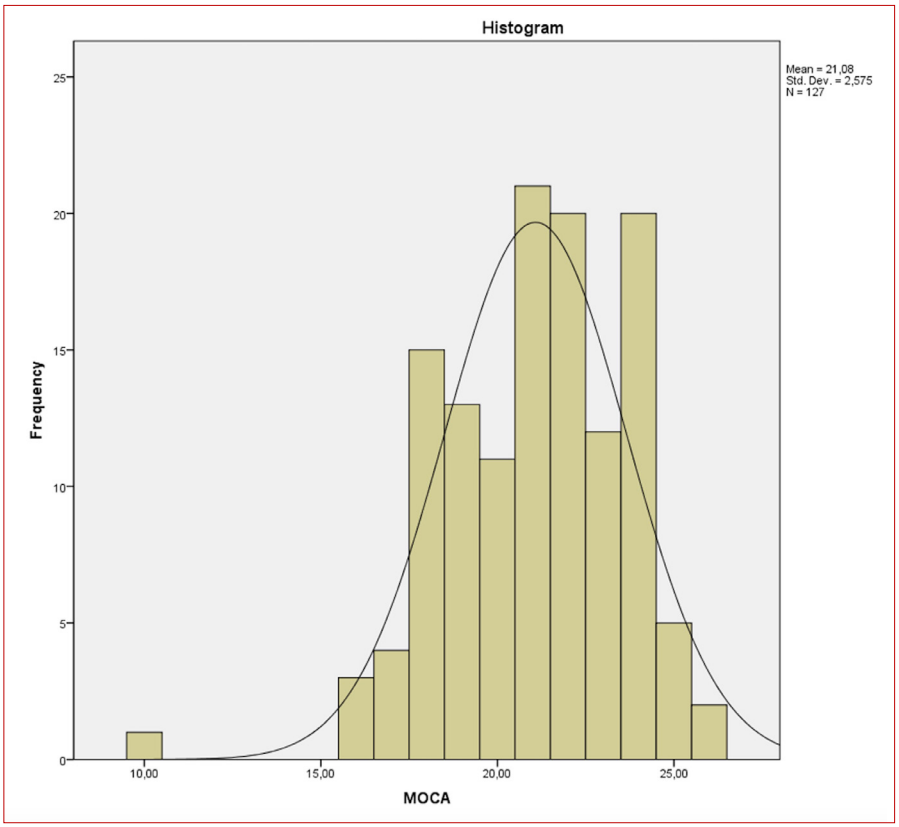

Figure 1. Distribution of Montreal Cognitive Assessment (MoCA) test score among the study population

diagnosis was GAD in 48.8% (n=62) of the patients and MDD in 51.2% (n=65). The mean MoCA score of the study population was 21.07±0.22 as demonstrated in Figure 1. The patients were categorized into two groups according to their MoCA test score and classified as CoI and normal cognition: MoCA score ≤21 (CoI) (n=66) and MoCA score >21 (normal cognition) (n=61). Patients with CoI were older, less educated, and had lower income compared to patients with normal cognition ($p<0.001$ for all). Occupation and living status significantly differed between groups, whereas gender, area of residence, marital status, number of comorbidities, and primary diagnosis were comparable among the groups. The percentage of patients using a medication was significantly higher ($p=0.027$), and percantage of patients that allowed time for leisure activity was significantly lower ($p=0.023$) in patients with CoI compared to patients with normal cognition.

A comparison of the neuropsychometric test results of the study participants according to their MoCA scores is given in Table 2. The GDS scores of patients with CoI were significantly higher ($p=0.009$), whereas BAI and CCI scores were comparable between groups. NHP total score and subscale scores were significantly lower in CoI patients compared to patients with normal cognition ($p<0.001$ for all). Moreover, the IADL total score and subscale scores, except the IADL handling medications score, were significantly lower in the CoI group than in the normal cognition group.

Table 2. Neuropsychometric tests of the study participants

Variables	MoCA score ≤21 (Cognitive impairment) (n= 66)	MoCA score >21 (Normal cognition) (n= 61)	p value
GDS	16.4±4.4	13.9±6.1	.009
BAI	14.8±8.2	14.6±6.2	.891
CCI	3.8±1.3	3.4±1.1	.062
NHP total score	250.7±103.4	156.7±72.7	<.001
NHP energy level	38.3±32.8	9.9±20.5	<.001
NHP pain	36.7±26.5	19.9±19.7	<.001
NHP emotional reaction	57.4±25.0	42.3±27.8	<.001
NHP social isolation	37.8±25.6	17.2±25.1	<.001
NHP sleeping	47.4±33.4	50.1±30.1	.644
NHP physical activity	32.9±25.5	17.1±17.6	<.001
IADL total score	15.2±4.1	18.4±2.8	<.001
IADL using telephone	2.2±0.7	2.6±0.5	<.001
IADL shopping	2.1±0.6	2.4±0.5	<.001
IADL preparing food	1.9±0.6	2.3±0.5	<.001
IADL house keeping	1.1±0.7	1.5±0.5	<.001
IADL transportation	2.6±0.8	3.1±0.6	.001
IADL handling medications	2 (1–2)	2 (2–2)	.081
IADL handling finances	0.88±0.73	1.35±0.60	<.001

Abbreviations: BAI= Beck Anxiety Inventory, CCI= Charlson Comorbidity Index, GDS= Geriatric Depression Scale, IADL= Lawton Instrumental Activities of Daily Living Scale, NHP= Nottingham Health Profile

Predictors of the MoCA score assessed by logistic regression analysis are presented in Table 3. All parameters included in the regression model were significantly associated with the MoCA score in univariate analysis. In multivariate analysis, age (OR:0.759, 95% CI:0.630–0.914, p=0.004), income <3800 TL (OR:14.72, 95% CI:1.78-121.51, p=0.013), medication usage (OR:0.171, 95% CI:0.035–0.845, p=0.030), and GDS score (OR:0.876, 95% CI:0.785–0.977, p=0.017) remained as significant and independent predictors of MoCA test scores. Education, leisure activity, IADL total score, and NHP total score did not reach statistical significance in the multivariate analysis.

DISCUSSION

Our study results indicate that age, income, medication usage, and high depression scores are independent predictors of CoI in older adults

Table 3. Predictors of MoCA test score by logistic regression analysis

	Univariate		Multivariate	
	Odds Ratio (95%CI)	**P value**	**Odds Ratio (95%CI)**	**P value**
Age	.753 (.663-.856)	<.001	.759 (.630-.914)	.004
Education	1.39 (1.17-1.64)	<.001	1.11 (.914-1.37)	.274
Income <3800 TL	30 (5.89-152-62)	<.001	14.72 (1.78-121.51)	.013
Leisure activity	2.28 (1.11-4.68)	.024	1.86 (.670-5.20)	.232
Medication	.303 (.101-.908)	.033	.171 (.035-.845)	.030
GDS score	.913 (.852-.979)	.011	.876 (.785-.977)	.017
IADL total score	1.25 (1.14-1.45)	<.001	1.01 (.855-1.21)	.848
NHP total score	.988(.983-.993)	<.001	.994 (.987-1.001)	.103

Abbreviations: CI=Confidence interval, GDS= Geriatric Depression Scale, IADL= Lawton Instrumental Activities of Daily Living Scale, MoCA= Montreal Cognitive Assessment, NHP= Nottingham Health Profile, TL= Turkish lira

suffering from GAD or MDD. Education, leisure activity, IADL total score, and NHP total score were also associated with the MoCA test score but mediated by other contributing factors. Also, anxiety had no association with CoI. To our knowledge, this is the first study investigating predictors of CoI in Turkish adults of older age who suffer from GAD or MDD.

Among the many disorders affecting the elderly, CoI, depression, and anxiety deserve special attention, as they have a high prevalence and adverse effects on independent living activities and health-related QoL (HR-QoL) (3, 4). Some older individuals protect most of their cognitive abilities throughout their lives, while others suffer from neurodegenerative diseases or even severe dementia (15). The scope of our work was to investigate cognitive function status and its influential factors in patients aged 65 years and older who applied to the psychiatry outpatient clinic and were diagnosed with GAD or MDD. It is already known that cognitive functions, such as working memory, executive function, and attention, tend to decrease with increasing age, even in healthy aging individuals (15). In a similar manner, we found that the risk of CoI increased with age in older patients with GAD or MDD.

Impaired cognitive function negatively affects the daily lives of elderly people. It is known that instrumental daily living activities that include complex activities, such as shopping or administering drugs, require a high level of cognitive function. The relationship between cognitive function and daily living activities is largely dependent on IADL, according to previous studies (16, 17). In our study, like the literature, patients with impaired cognitive functions had significantly lower IADL, including managing finances, making communication, shopping and meal preparation, house cleaning and home maintenance, and managing transportation. Our univariate comparison of patients with and without CoI showed a significant difference for the IADL total score, but this association did not reach statistical significance in multivariate analysis. Recent studies showed that lower education levels, lower income, and depression seem to have negative effects on IADL in elderly (18). IADL might have been affected by these contributing factors,

which could be the reason why the IADL total score failed to associate with MoCA test scores in an independent manner.

Late-life depression (LLD) is a remarkable public health concern, as it is quite common in the aging population. It also leads to physical disability and functional decline and negatively impacts QoL. The prevalence of clinically considerable depressive symptoms varies between 11% and 53% in elderly patients, according to diverse studies (4, 5). These high rates can be explained by multifaceted factors, such as aging, physical disability, and CoI (4). LLD is related to the risk of cognitive decline, mild CoI, and dementia (5, 19). Patients with LLD suffer from cognitive complaints, and it is estimated that 20-50% of elderly with LLD have cognitively impaired abilities (4). In our study, consistent with the literature, the depression scores of the CoI group were significantly higher and independently associated with the MoCA test scores. The relationship between depression and cognitive functions is bidirectional (4, 5, 19). Depressive symptoms often lead to cognitive complaints, and perceived CoI may lead to anxiety and probable fear of dementia accompanying depression (4, 19). Some research suggests a concurrent incidence between depressive symptoms and MCI, while others indicate that poor cognitive function may lead to depression. Another possible explanation is that these two conditions occur concurrently due to the presence of hippocampal atrophy in both CoI and depression. Another common finding is that depression is a significant risk factor for subsequent CoI (4). It has also been suggested that cognitively affected depressive older adults continue to be cognitively impaired even if depression has been cured (4, 20). Briefly, we can suggest that depressive symptoms may lead to and worsen CoI. However, from a clinical point of view, LLD is often underrecognized, underreported, and undertreated. Depression alone and worsening IADL scores can negatively affect cognition (18).

Anxiety is frequently observed in CoI, prodromal stages of dementia, and physiological aging (5). Anxiety prevalence in the elderly population ranges between 3.7-43%. Anxiety symptoms have been studied less than depression, and their relationship with cognition is controversial (5). Some researchers have suggested that anxiety symptoms are adversly related to cognition, while others have demonstrated that comorbid depressive symptoms account for this relationship (5). Several reports state anxiety symptoms as a risk marker for cognitive decline, but there are many inconsistencies among studies. On the other hand, some researchers have reported a lack of an association akin to our study. Eventually, anxiety appears to be important in predicting the progression from MCI to dementia rather than predicting CoI (5).

CoI in older people leads to a gradual decline in many physical abilities, functional independence, and social relationships, subsequently resulting in worsening QoL (19). Also, memory complaints are linked to low satisfaction with social support and higher depressive symptoms (19). In our study, HR-QoL was measured using NHP. HR-QoL shows perception of how a health condition affects physical, mental, emotional, and social well-being and the functional ability to perform everyday activities (20, 21). Examining the HR-QoL of elderly people with CoI is important for accurate future health interventions. However, whether QoL is already disturbed in the early stages of CoI is controversial. Also, the relationship between QoL and cognition is not well understood (21). Some research has suggested that QoL is altered in CoI, while others have not. Also, the association between CoI and QoL is affected by negative aging stereotyping and depression (20, 21). In our study, there was no independent association between the total NHP score and CoI, which made us consider that the association between QoL and CoI is mediated by other contributing factors. Moreover, in our study, patients with CoI showed more detoriated HR-QoL

in all areas except the sleep subscale than patients with normal cognitive function. The findings of our study are consistent with previous studies, which suggest that lower QoL is associated with higher CoI in elderly people (20). Our results are of clinical importance because there are limited data about HR-QoL in patients with MCI and in the preclinical/prodromal phase of Alzheimer's disease.

There are scientific facts that older adults may alter the risk of CoI by keeping their brains active. Prior observational studies have shown that higher leisure activity engagement has been linked to better cognition and a lower risk of dementia (6, 22). A recent study also suggested that depressive symptoms negatively affect cognitive functions by decreasing continued activities that help promote cognitive reserve. Also, a negative association between leisure activities and CoI might indicate that either a higher level of engagement provides protection against dementia and/or decreased level of engagement is an early marker of cognitive impairment. Being engaged in more reading and hobby activities is associated with a lower risk of CoI (6, 22). Consistent with the literature, there is a significant association between leisure activities and cognition in univariate analysis but not in multivariate analysis.

To our knowledge, most people with CoI live in low-medium income countries (2, 23). Higher levels of income have been associated with better cognitive functions in a cohort study, and another recent research study suggested a positive relationship between healthy cognition and a stable economic state (3, 23). Similarly, elderly adults with higher monthly incomes had significantly better cognition in our study. Additionally, medication usage had a remarkable effect on cognition in our study. Studies have shown that using many drugs at the same time can aggravate CoI. Medication-related CoI is relatively common in the elderly and is underrecognized. Individuals at higher risk are elderly with baseline cognitive impairment. Medications should be considered a potential cause when a patient presents with cognitive alterations. A recent study suggested that polypharmacy was especially associated with CoI in older adults. Various drugs including anticholinergic drugs, H2 receptor antagonists, cardiac drugs, statins, and antibiotics can cause CoI. Interactions between drugs and the accumulation of the same side effects should also be considered in CoI (24).

There are significant limitations in our study that need to be acknowledged. The MoCA test was used to evaluate the cognitive functions of the study participants. The MoCA test has been shown to be sensitive in detecting people with mild cognitive impairment (9). However, it would have been more valuable if we had performed multiple cognition tests. Also, the study was performed in a single center with a relatively limited number of patients from the Turkish population. The lack of an age-and gender-matched community dwelling control group without a psychiatric condition is another limitation of the study. Also, the cross-sectional nature of the study limits the generalization of the results.

In conclusion, in Turkish adults with GAD or MDD who are admitted to a psychiatry outpatient clinic for the first time, various parameters, including age, education, income, leisure activity, medication usage, depression, IADL, and HR-QoL, are linked with CoI. However, only age, income, medication usage, and depression were independently associated with CoI in this highly specific patient population.

Authors' Notes

All authors have made substantial contributions to conception and design, or acquisition of data, analysis, and interpretation of data, drafting the article or revising it critically for important intellectual content, and final approval of the version to be published.

Declaration of Conflicting Interests

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent

Informed consent was obtained from all individual participants included in the study.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

Data Availability Statement

The data used to support the findings of this study are available from the corresponding author upon reasonable request.

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