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Functional Capacity in Older Adults with Depressive Disorders

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Summary

Aim. The authors evaluated functional capacity, including locomotion and motor skills, in individuals over 60 years old diagnosed with major depressive disorder (MDD) and analyzed the impact of regular physical activity on mood and cognitive functions.

Material and methods. This cross-sectional study involved 71 patients (mean age: 71 ± 8 years) with mild or moderate depressive episodes, assessed using the Geriatric Depression Scale (GDS). Participants scoring <24 points on the Mini-Mental State Examination (MMSE) were excluded. The authors evaluated physical capacity using the following tests: Timed Up and Go (TUG), Single Leg Stance (SLS) with open or closed eyes (SLS OP/CL), and the 30-Second Chair Stand Test (30sCST). The results were compared with population norms, and the relationship between the severity of depressive symptoms and physical capacity was analyzed using Spearman's rank correlation coefficient.

Results. Significant reductions in physical capacity were observed in the study group. Test results indicate a significant negative correlation between the severity of depressive symptoms and functional capacity, particularly for SLS OP ($r = –0.33$; $p = 0.042$) and 30sCST ($r = –0.26$; $p = 0.031$). Women scored worse than men, and a higher body mass index (BMI) correlated with reduced physical capacity.

Conclusions. The findings indicate a significant impact of depression on the deterioration of functional capacity in older adults, emphasizing the importance of incorporating physical interventions into the treatment of this population.

Key words: depression, older adults, fitness

Introduction

Major depressive disorder (MDD) among older adults presents a significant public health challenge, impairing their quality of life and daily functioning. This mental disorder encompasses a range of symptoms, leading to pronounced somatic and cognitive decline, as well as difficulties in maintaining social relationships. The severity of depression in older individuals is often intensified by comorbid health issues, social isolation, and insufficient support systems, creating a complex network of factors that affect overall health [1, 2]. Notably, depressive disorders accelerate muscle mass loss, a key component of age-related frailty syndrome [3–6].

Recent studies indicate that depression profoundly impacts the health status of older adults, directly reducing satisfaction across multiple functional domains, including physical health, psychological well-being, and social connectedness. As a result, individuals with MDD often become dependent on others for routine daily activities, exacerbating a range of physical symptoms like chronic fatigue and cognitive impairment [7–9].

The interplay between depression and chronic illness further complicates the care of older adults, as mental health issues can worsen physical conditions [10–12]. Additionally, social isolation and weak support networks play substantial roles in the persistence and severity of depressive symptoms in elderly patients [13–15]. Therefore, there is an urgent need to develop targeted intervention strategies to address the unique needs of this population.

Aim

This study aimed to evaluate the functional performance, including locomotion and motor abilities, of adults over 60 years old diagnosed with MDD. The primary focus was on assessing physical fitness and examining the effects of regular physical activity on mood and cognitive performance.

Material and methods

Study design

The cross-sectional study aimed to assess the functional capacity of elderly individuals diagnosed with MDD. Participants were over 60 years old and met the inclusion criteria specified for the project The Bioethics Committee of Jagiellonian University approved the study. All participants provided informed consent to participate in the project. Inclusion and exclusion criteria are presented in Table 1.

Table 1. **Inclusion and exclusion criteria for the study**

Inclusion criteria	Exclusion criteria
Age: 60–90 years.	Lack of informed consent to participate in the study.
Diagnosis of a mild to moderate depressive episode in the course of MDD (ICD-10 code F33) by a psychiatrist.	Severe depressive episode
Functional fitness level to perform functional tests.	Bipolar affective disorder
	Acute or chronic psychotic symptoms (identified at the time of study eligibility),
	Addiction to alcohol, benzodiazepine derivatives or other psychoactive substances.
	Sensory impairment preventing examination – including severe visual impairment (≤2 diopters).
	Epilepsy
	Neurological diseases associated with dizziness or impaired motor coordination.
	Need to use orthopedic supplies.
	Severe somatic diseases, significantly affecting functional capacity.

ICD-10 – *International Classification of Diseases*, 10th Revision; MDD – major depressive disorder

Participants

Seventy-one patients aged between 60 and 90 (mean age: 71 ± 8 years), enrolled in the outpatient clinic of the Department of Adult Psychiatry in Krakow, participated in the study. The inclusion criteria were as follows: a diagnosis of MDD (mild or moderate depressive episode according to ICD-10: code F33), sufficient physical fitness to perform the functional tests, and providing written consent to participate in the study. Exclusion criteria included, but were not limited to, experiencing a major depressive episode, the presence of psychotic symptoms, dependence on psychoactive substances, and serious medical illnesses that affect physical performance.

Variables and measurement methods

Functional tests

– Timed Up and Go Test (TUG): This quick and practical assessment measures the time it takes for an individual to rise from a standard chair, walk a distance of three meters, turn around, return to the chair, and sit down again. The TUG is widely utilized in clinical settings to evaluate fundamental functional abili-

ties, such as mobility, balance, and motor coordination. This test provides valuable information regarding the risk of falls and the individual's capacity to function independently in daily life.

– TUG-Cognitive Test: This modified version of the classic TUG test assesses balance and mobility and evaluates cognitive function simultaneously. The modification involves adding a cognitive task: as the participant performs the sequence of movements (standing up, walking forward, and walking back), they must count backwards by sevens, starting from 100. This additional task demands attention, divided focus, and computational efficiency, enabling a more comprehensive evaluation of the participant's abilities.
– Single Leg Stance Test (SLS): This test measures the time a participant can maintain balance while standing on one leg with either open eyes (SLS OP) or closed eyes (SLS CL). The SLS OP and SLS CL help assess how visual information influences balance.
– 30-Second Chair Stand Test (30sCST): This test evaluates lower limb muscle strength and endurance. It records how many times the participant can rise from a chair and sit back down within a 30-second timeframe.

Clinical Assessment Scales

– Geriatric Depression Scale (GDS): The study utilized a 15-item version of the GDS. This tool allows for a quick assessment of depressive symptoms in older adults. The scale consists of 15 questions relating to mood, activity, feelings of helplessness, and thoughts of self-harm, with respondents answering 'yes' or 'no' to each item [16].
– Mini-Mental State Examination (MMSE): The MMSE was used to evaluate cognitive functioning [17]. A score of 24 or higher on this scale was set as an inclusion criterion (as it was assumed that participants meeting this threshold would understand the instructions and perform the TUG-Cognitive test correctly). The specific scores obtained on the MMSE were not included in the statistical analysis (this variable was solely for qualifying participants).

Methods of statistical analysis

The data were analyzed using Spearman's rank correlation to examine the relationship between performance test scores and the severity of depressive symptoms. Results were reported as mean ± standard deviation (*SD*) for quantitative variables. The percentage of patients meeting the reference norms for each test was compared with population results [18, 19].

Results

Characteristics of participants

The mean age of the participants was 71 ± 8 years. The average body weight was 77.8 ± 11.2 kg, and the mean height was 1.66 ± 0.087 m. The mean body mass index (BMI) was 28.1 ± 5.05 kg/m², suggesting that most participants were overweight or obese. Participants had an average of 4 ± 1 comorbidities and were taking an average of 4.6 ± 1 medications daily. Baseline characteristics of the study population are presented in Table 2.

Table 2. **Baseline characteristics of the study population**

Number of participants	*N* = 71
Age (years; mean ± *SD*)	71 ± 8 (37.6)
Gender (male/female; %)	27/73
Body weight (kg; mean ± *SD*)	77.8 ± 11.2
Height (m; mean ± *SD*)	1.66 ± 0.087
BMI (kg/m²; mean ± *SD*)	28.1 ± 5.05
Number of comorbidities (mean ± *SD*)	4 ± 1
Number of regularly taken medicines per day (mean ± *SD*)	4.6 ± 1
History of hospitalisations (mean ± *SD*)	2 ± 2
MMSE (mean score ± *SD*)	26.3 ± 2.8
GDS (short version; mean score ± *SD*)	9.9 ± 3.8
TUGT (mean number of seconds ± *SD*)	13.6 ± 8.1
TUG-Cognitive (mean number of seconds ± *SD*)	21.06 ± 13.4
30sChS (mean number ± *SD*)	8.5 ± 3.3
SLS OP (mean number of seconds ± *SD*)	6.1 ± 4.1
SLS CL (mean number of seconds ± *SD*)	1.9 ± 4.4

30sChS – 30-Second Chair Stand Test; BMI – body mass index; GDS – Geriatric Depression Scale; MMSE – Mini Mental State Examination; *SD* – standard deviation; SLS CL – Single Leg Stance Closed Eyes; SLS OP – Single Leg Stance Open Eyes; TUG-Cognitive – Timed Up and Go Cognitive; TUGT – Timed Up and Go Test

Functional performance

The assessment of functional fitness revealed reduced physical capacity in most of the subjects. The results of the relevant tests were as follows:

– Timed Up and Go Test (TUG). The mean performance time was 13.6 ± 8.1 seconds, with 34.7% of subjects meeting the standards.
– Timed Up and Go Cognitive (TUGCOG). The average time was 21.06 ± 13.4 seconds, and only 6.9% of participants met the standards.
– 30-Second Chair Stand Test (30sCST). Participants performed an average of 8.5 ± 3.3 repetitions, with 36.1% meeting the standards.
– Single Leg Stance Open Eyes (SLS OP). The average time was 6.1 ± 4.1 seconds, and 23.6% of participants met the standards.
– Single Leg Stance Closed Eyes (SLS CL). The poorest results were observed in the SLS CL test, where the average time was 1.9 ± 4.4 seconds, and only 2.7% of participants met the standards.

The results of functional tests are presented in Table 3.

Table 3. **Functional test results**

Variable	Study group (*N* = 71)	Reference values (the relevant literature references are given in square brackets)	% of participants meeting standards
TUGT (seconds) (mean ± *SD*)	13.6 ± 8.1	9.4 [18]	34.7
TUG-Cognitive (seconds) (mean ± *SD*)	21.06 ± 13.4		6.9
30sChS (number) (mean ± *SD*)	8.5 ± 3.3	10.54-12.21 [19]	36.1
SLS OP (seconds) (mean ± *SD*)	6.1 ± 4.1	10□30 [20]	23.6
SLS CL (seconds) (mean ± *SD*)	1.9 ± 4.4	10□30 [20]	2.7

30sChS – 30-Second Chair Stand Test; *SD* – standard deviation; SLS CL – Single Leg Stance Closed Eyes; SLS OP – Single Leg Stance Open Eyes; TUG-Cognitive – Timed Up and Go Cognitive; TUGT – Timed Up and Go Test

Correlation between depressive symptoms and functional capacity

A significant negative correlation was identified between the severity of depressive symptoms and fitness test performance. Greater severity of depressive symptoms was associated with poorer performance on the SLS OP ($r = –0.33$; $p = 0.042$), 30sCST ($r = –0.26$; $p = 0.031$), and the SLS CL ($r = –0.18$; $p = 0.031$) These findings indicate that higher levels of depressive symptoms (assessed using the GDS scale) correlate with reduced physical performance in participants. Correlations between the severity of depressive symptoms and functional performance indicators are presented in Table 4.

Table 4. **Spearman's rank correlations between severity of depressive symptoms and functional performance**

Variable	MDD *r/p*
TUGT (s)	0.29 / 0.319
TUG-Cognitive (s)	0.17 / 0.078
30sChS (*xn*)	–0.26 / 0.031
SLS OP (s)	–0.33 / 0.0422
SLS CL (s)	–0.18 / 0.031

30sChS – 30-Second Chair Stand Test; GDS – Geriatric Depression Scale; *SD* – standard deviation; SLS CL – Single Leg Stance Closed Eyes; SLS OP – Single Leg Stance Open Eyes; TUG-Cognitive – Timed Up and Go Cognitive; TUGT – Timed Up and Go Test

r – Spearman's rank correlation coefficient; *p* – *p*-value

Additional analyses

Subgroup analysis revealed that women performed poorer on fitness tests compared to men. Higher BMI values were also associated with poorer performance on the TUG and 30sCST tests.

Discussion

The data collected within this research project confirm the existence of an association between major depressive disorder (MDD) and the deterioration of physical performance in older adults [21]. It was observed that the severity of depressive symptoms correlates with the results of functional tests, especially the 30-Second Chair Stand Test (30sCST). This finding suggests that MDD may be a risk factor for falls. Older individuals diagnosed with this disorder often experience reduced muscle strength, balance difficulties, and delayed reaction times, significantly increasing the risk of falls. Weak muscles make it challenging to maintain a stable posture, while balance issues and delayed reactions hinder the ability to respond effectively in situations requiring quick motor adjustments. Falls can lead to severe consequences, ranging from fractures or other injuries to the exacerbation of general medical conditions and worsening mental health problems, including MDD.

Conclusions

The results of this study provide solid arguments for incorporating rehabilitation exercises into comprehensive treatment plans for older adults suffering from MDD. There is a clear cause-and-effect relationship between depression and reduced physical

performance, with both factors reinforcing each other in a vicious cycle. People with MDD often avoid physical activity, which, in turn, exacerbates the symptoms of the disorder. Physical rehabilitation can break this destructive cycle, benefiting the body and the mind. By enhancing muscle strength, balance, and coordination, and reducing the risk of falls, physical activity alleviates depressive symptoms and improves mood, even in individuals without diagnosed mental health conditions [22]. Integrating psychological interventions with physical rehabilitation within a comprehensive therapeutic program optimizes treatment. As an essential component of multimodal therapy, physical exercises can amplify the effects of pharmacotherapy and psychotherapy.

The study presents important conclusions for clinical practice, emphasizing the need to pay special attention to the physical fitness of older adults with depression. By incorporating rehabilitation exercises into the treatment plan, the risk of falls can be reduced, patients' quality of life can be improved, and their independence can be increased [23]. Moreover, this approach may help minimize healthcare costs for payers.

It should be emphasized that the intensity of physical activity is likely not the only factor determining the intervention's effectiveness. Although numerous studies demonstrate the positive impact of exercise on mood, the mechanisms underlying these changes remain largely unexplored. Key variables influencing the effectiveness of these interventions include the type of physical activity, training frequency, and the availability of social support. Overall, a comprehensive and individualized approach combining physical activity with psychological therapy seems the most effective solution [23]. However, this hypothesis requires validation in randomized trials. Additionally, future research should explore the neurobiological mechanisms underlying the relationship between depression and physical impairment and identify factors that predispose older adults with depression to a higher risk of falls.

Limitations of study reliability

Some methodological limitations of this study should be acknowledged. Although statistically significant results were obtained, the strength of the correlation between the severity of depressive symptoms and functional impairment was moderate, and various confounding factors may influence the nature and magnitude of these differences.

One of the main limitations is the heterogeneity of the study group regarding cognitive performance. The exclusion of individuals with an MMSE score below 24, although allowing the focus on patients with relatively preserved cognitive functions, limited the generalizability of the results to the broader population of older adults with depression. Consequently, among patients with more severe cognitive impairments – which may be linked to comorbidities or adverse medication effects (or result from them) – the relationship between depression and physical limitations may have been overestimated.

Future research should focus on the needs of individuals with varying levels of cognitive impairment and consider a wider range of potential factors affecting the observed relationships between depression and functional capacity. These factors include the types and dosages of medications, the presence of chronic diseases, levels

of physical activity, and the efficiency of social support networks. Employing more detailed diagnostic tools, such as neuropsychological tests and functional scales, would enable a more precise assessment of the relationship between depression and functional capacity. Considering these aspects in future study designs will deepen our understanding of the connections between depression and physical performance in older adults and support the development of more effective therapeutic interventions.

Recapitulation

In summary, this study observed a relationship between the severity of depressive symptoms and the deterioration of functional capacity in older adults. However, caution is needed when interpreting these findings due to certain methodological constraints, such as excluding potential participants who scored low on the MMSE during the qualification stage. Despite these constraints, the collected data suggest that incorporating rehabilitative exercises into the treatment plans of older adults with depressive disorders may offer benefits, including a reduced risk of falls, improved quality of life, and better overall health.

Future research should involve more diverse patient groups and consider broader factors that may influence the observed relationships. This approach will deepen our understanding of the issue and support the development of more effective therapeutic strategies.

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