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An assessment of the cognitive functions of the senior citizens living in the community

Ocena funkcji poznawczych seniorów żyjących w społeczności lokalnej

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STRESZCZENIE

OCENA FUNKCJI POZNAWCZYCH SENIORÓW ŻYJĄCYCH W SPOŁECZNOŚCI LOKALNEJ

Cel pracy. Badanie miało na celu ocenę stanu funkcji poznawczych u seniorów mieszkających w społeczności lokalnej oraz ustalenie zależności między funkcjami poznawczymi a wybranymi aspektami życia.

Materiał i metody. Populacja badana składała się z 330 żyjących w lokalnej społeczności respondentów w wieku powyżej 60 lat. Funkcje poznawcze badanych oceniano za pomocą Montrealskiej Skali Oceny Funkcji Poznawczych (MoCA), objawy lękowe za pomocą Geriatrycznego Inwentarza Lęku (GAI), a objawy depresji przy pomocy Geriatrycznej Skali Oceny Depresji (GDS-15). Jakość życia oceniano przy użyciu kwestionariusza oceny jakości życia osób starszych (OPQOL-BRIEF).

Wyniki. Średni całkowity wynik w teście MoCA wyniósł 26,2 punktów (SD = 2,3; min. 19; maks. 30), zaś 63,7% badanych uzyskało wynik mieszczący się w normie. Niższy średni wynik MoCA odnotowano u osób, u których zdiagnozowano depresję ($p = 0{,}012$). To samo dotyczyło osób, u których stwierdzono lęki ($p < 0{,}001$). Znacząco gorsze wyniki MoCA stwierdzono u osób, które już nie pracowały ($p = 0{,}027$).

Wnioski. Ze względu na potrzebę wczesnego wykrywania demencji ocena funkcji poznawczych u osób starszych nie powinna być lekceważona. Oprócz działań, które mogą poprawić funkcje poznawcze, istnieje potrzeba wspierania w praktyce aktywności, które koncentrują się na zmniejszaniu objawów lęku i depresji u osób starszych.

Słowa kluczowe: jakość życia, depresja, lęk, seniorzy, funkcja poznawcza

ABSTRACT

AN ASSESSMENT OF THE COGNITIVE FUNCTIONS OF THE SENIOR CITIZENS LIVING IN THE COMMUNITY

Aim. The study aimed to evaluate cognitive function status in community-dwelling seniors and to establish relationships between cognitive function and selected aspects.

Material and methods. The research population consisted of 330 community-dwelling respondents over the age of 60. Cognitive function was assessed using the Montreal Cognitive Test (MoCA), anxiety symptoms – using the Geriatric Anxiety Inventory (GAI), and depression symptoms – using the Geriatric Depression Scale (GDS-15). Quality of life was assessed using the Older People's Quality of Life – Brief version (OPQOL-BRIEF).

Results. The average total score in the MoCA test was 26.2 points (SD = 2.3; min. 19; max. 30), and 63.7% of respondents scored within the norm. A lower average MoCA score was recorded in those who were diagnosed with depression ($p = 0.012$). The same was true for those who were diagnosed with anxiety ($p < 0.001$). Significantly worse MoCA scores were found in those who were no longer working ($p = 0.027$).

Conclusions. Assessment of cognitive function in the elderly should not be underestimated in terms of the need for early detection of dementia. In addition to activities that may enhance cognitive function, there is a need to support activities in practice that focus on reducing the symptoms of anxiety and depression in the elderly.

Key words: quality of life, depression, anxiety, seniors, cognitive function

INTRODUCTION

Population aging is a global phenomenon. Economic prosperity, better health care systems and the use of better and more effective drugs have led to a significant reduction in mortality in societies and an increase in the number of elderly people in the population [1]. Aging causes changes in the structure and function of the brain, leading to a decline in cognitive function. Cognitive functions are defined as processes in the mind that produce thought and purposeful action. Memory is most often impaired, as well as executive (planning, organization) and visual-spatial functions or speech [2].

Early identification of cognitive impairment in older adults is important due to its prevalence, which increases with increasing life expectancy. Cognitive disorders are manifested by the impairment of various cognitive domains. Memory is most often impaired, as well as, for example, executive (planning, organization) and visual-spatial functions or speech. The term mild cognitive impairment is defined as an objectively demonstrable deterioration of cognitive functions, which, however, does not yet limit the individual's self-sufficiency. Dementia is another stage of cognitive deterioration, when the patient's self-sufficient functioning is already limited [2]. Meta-analysis of Bai et al. [3] in community samples found that the overall prevalence of MCI based on 66 studies and over 240,000 community dwellers was 15.56%. According to IHIS data, 142,000 people over the age of 60 were living with dementia in the Czech Republic in 2017 and the prevalence of dementia has been estimated to reach 250,000 by 2050 [4].

In geriatric patients, cognitive disorders often go hand in hand with other health problems. The literature, for example, states that comorbid depressive disorders occur in the range of 25 to 50% [5]. This brings with it many challenges for the healthcare team, when it is necessary to correctly interpret the screening examination, accurately diagnose cognitive disorders and choose a treatment plan based on these results.

AIM

The objective of this cross-sectional study was to evaluate the cognitive function in community-dwelling seniors and analyze the association between cognitive function and the presence of anxiety and depression symptoms, quality of life, and other aspects (age, gender, living alone, employment).

MATERIALS AND METHODS

The research group consisted of seniors attending activities within the Center for the Promotion of Healthy Aging of the Faculty of Medicine of the University of Ostrava. Individuals living in a separate household in the community who reached the age of 60 or more were included in the research group. The ability to complete the questionnaire in the Czech language and consent to the research were also criteria for inclusion in the research group. The size of the research group was 330 persons. Data were collected during the period 2021-2022 in the Moravian-Silesian Region. Exclusion criteria were elderly people with psychosis or a history of psychiatric illness (e.g. personality disorders, post-traumatic stress disorders, dissociative disorders, bipolar disorder). Cognitive function was evaluated through the Montreal Cognitive Test (MoCA), which includes visual-spatial and executive tasks and assesses areas such as naming, memory, attention, speech, abstraction and orientation. It is a rapid screening tool with the potential to evaluate even mild cognitive impairment. For the purpose of this study, a training version of MoCA-CZ1 was used. The maximum score a patient can score is equal to 30 points, with a score ≥ 26 points within the norm. Mild cognitive impairment is referred to with a score of 18-25 and moderate cognitive impairment with a score of 10-17. A score lower than 10 points refers to severe cognitive impairment. Cronbach's alpha demonstrated good scale consistency (alpha = 0.77 for raw scores and 0.81 for standardized scores, with each item weighted equally) [6].

The presence of anxiety symptoms was assessed using the 20-item Geriatric Anxiety Inventory (GAI), with scores ranging from 0 to 20 points. Higher scores indicate higher anxiety levels. Scores above 8-9 points, according to the authors of the tool, indicate more clinically serious anxiety. Cronbach's alpha was 0.91 among normal elderly people and 0.93 in the psychogeriatric sample [7]. For the purpose of our study, a threshold of ≥ 9 points was chosen for the presence of more clinically serious anxiety.

Depressive symptoms were assessed using the Geriatric Depression Scale (GDS-15). This tool contains 15 items, with scores ranging from 0 to 15 points. Scores ranging from 0 to 5 points indicate that no depressive symptoms were detected in the subject. If the score is in the range of 6-10 points, mild depression is detected. Scores above 10 points then indicate manifest depression. GDS has good psychometric properties, a high internal consistency (Cronbach's alpha = 0.92) [8].

Quality of life was assessed using the Older People's Quality of Life – Brief version (OPQOL-BRIEF). Scores range from 13 to 65 points and the higher the score, the better the quality of life. The internal consistency of the single-factor model of OPQoL-brief was found to be excellent $\alpha = 0.921$ [9]. The SPSS program (version 29) was used for data analysis. Descriptive statistics (absolute and relative frequency, mean, standard deviation) were used for file description. The correlation between the analysed aspects was evaluated using the Spearman correlation coefficient. The Mann-Whitney test was used for statistical testing of differences between groups. The level of statistical significance was set at 5%.

RESULTS

Sociodemographic and health characteristics of the population

The average age in the 330-person research set was 71.4 years (SD = 5.3; min. 60; max. 87). The 60-74 age group included 69.7% of the subjects, and women were more frequent in

the research set (89.1%). The average total quality of life score was 55.4 (SD = 5.6; min. 39; max. 65), the average total anxiety score was 4.8 (SD = 5.2; min. 0; max. 0) and depression was 2.7 points (SD = 2.6; min 0; max. 14). Additional characteristics of the set are shown in Tab. 1.

Assessment of cognitive function

The average total score of the MoCA test was 26.2 points (SD = 2.3; min. 19; max. 30). Results within the norm were recorded in 63.7% of subjects. In Tab. 2. we provide an evaluation of individual areas of the MoCA test according to the score obtained.

A correlation analysis was also carried out to establish the correlation between the different areas assessed by the MoCA test. A significant correlation was found only between attention and visual-spatial and executive tasks ($r = 0.155$; $p < 0.001$), suggesting that the larger the attention deficit, the larger the deficit was in visual-spatial and executive tasks. Similarly, significant correlations were found between abstraction and naming ($r = 0.121$; $p < 0.05$), as well as between memory and visual-spatial and executive tasks ($r = 0.188$; $p < 0.001$), and between memory and speech ($r = 0.144$; $p < 0.001$). The larger the deficit recorded in one area, the larger the deficit in the other area, see Tab. 3.

Tab. 1. Sociodemographic and health characteristics of the population

	N	%
Age		
60–74 years	230	69.7
≥ 75 years	100	30.3
Gender		
Man	36	10.9
Woman	294	89.1
Marital status		
Single	10	3.0
Married	151	45.8
Divorced	83	25.2
Widowed	86	26.1
Employment		
Part-time	14	4.2
Agreement on work performance	38	11.5
No	278	84.3
Living arrangements		
Alone	153	46.4
With spouse/partner	161	48.8
Children	16	4.8
Faith, religion		
Yes, affiliates to church	98	29.7
Yes, doesn´t affiliate to church	96	29.1
No	136	41.2
	Mean	**SD (min.-max.)**
Quality of life	55.4	5.6 (39–65)
Anxiety (GAI)	4.8	5.2 (0–20)
Depression (GDS-15)	2.7	2.6 (0–14)

SD – standard deviation, min. – minimum, max. – maximum, N – number

Relationship of cognitive function with selected aspects

Our study also included an analysis of the association between cognitive function as assessed by MoCA and aspects such as age, gender, living alone, depression, anxiety and quality of life. The Spearman correlation coefficient analysis shows statistically significant correlations between MoCA total score and depression ($r = -0.184$; $p < 0.001$), anxiety ($r = -0.159$; $p < 0.001$), quality of life ($r = 0.127$; $p < 0.05$), as well as age ($r = -0.310$; $p < 0.001$). The greater the cognitive deficit (MoCA total score), the more the respondents experienced symptoms of depression and anxiety. The higher the MoCA score, the better the quality of life of the respondents. Deficit in cognitive function by total score was associated with increasing age. Deficit in cognitive function by visual-spatial and executive tasks ($r = -0.216$; $p < 0.001$), naming ($r = -0.175$; $p < 0.001$), attention ($r = -0.142$; $p < 0.001$), abstraction ($r = -0.117$; $p < 0.05$), memory ($r = -0.143$; $p < 0.001$) and orientation ($r = -0.160$; $p < 0.001$) were also related to increasing age. Further links between the analysed aspects are shown in Tab. 4.

Relationships between cognitive function, presence of anxiety and depression, and socio-demographic factors

The presence of depression (GDS ≥ 6) was statistically significantly related to the MoCA total score ($p = 0.012$). Persons with the presence of depressive symptoms scored worse. Similarly, it was also related to the presence of anxiety (GAI ≥ 9). Persons with anxiety

Tab. 2. Areas rated in the MoCA test by score obtained

Number of points	0	1	2	3	4	5	6
Domains	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**
Visuospatial and executive tasks	0 (0)	3 (0.9)	17 (5.2)	36 (10.9)	105 (31.8)	169 (51.2)	---
Naming	0 (0)	0 (0)	49 (14.8)	281 (85.2)	---	---	---
Attention	0 (0)	0 (0)	1 (0.3)	9 (2.7)	23 (7.0)	95 (28.8)	202 (61.2)
Speech	1 (0.3)	11 (3.3)	79 (23.9)	239 (72.4)	---	---	---
Abstraction	6 (1.8)	78 (23.6)	246 (74.5)	---	---	---	---
Memory	14 (4.2)	34 (10.3)	55 (16.7)	86 (26.1)	74 (22.4)	67 (20.3)	---
Orientation	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	5 (1.5)	325 (98.5)

N – number

Tab. 3. Link between MoCA domains

Spearman's correlation coefficient	Visuospatial and executive tasks	Naming	Attention	Speech	Abstraction	Memory
Visuospatial and executive tasks	1.000					
Naming	-0.018	1.000				
Attention	0.155**	-0.020	1.000			
Speech	-0.066	0.073	0.035	1.000		
Abstraction	0.082	0.121*	0.025	0.054	1.000	
Memory	0.188**	0.034	0.055	0.144**	0.014	1.000
Orientation	0.042	-0.052	0.073	-0.023	-0.072	0.103

*p < 0.05; **p < 0.001

Tab. 4. Link between the analysed aspects

Spearman's correlation coefficient	Depression *r*	Anxiety *r*	Quality of life *r*	Age *r*
Visuospatial and executive tasks	-0.022	-0.058	0.050	-0.216**
Naming	-0.044	-0.018	0.132*	-0.175**
Attention	-0.053	-0.098	0.040	-0.142**
Speech	-0.127*	-0.038	0.084	-0.095
Abstraction	-0.134*	-0.071	0.033	-0.117*
Memory	-0.098	0.097	0.095	-0.143**
Orientation	-0.058	0.033	0.078	-0.160**
Total score MoCA	-0.184**	-0.159**	0.127*	-0.310**

*p < 0.05; **p < 0.001

Tab. 5. MoCA total score in relation to selected aspects

	N	Mean	p		N	Mean	
GDS ≥ 6	43	25.3	0.012*	Lives alone	153	26.3	0.301*
GDS < 6	287	26.3		Lives with someone	177	26.0	
GAI ≥ 9	78	25.2	< 0.001*	Employed	52	26.8	0.027*
GAI < 9	252	26.4		Unemployed	278	26.0	

*Mann-Whitney test

symptoms also scored worse ($p < 0.001$). Significant relationships between the MoCA total score and gender, or whether an individual lives alone, could not be demonstrated. However, statistically significantly worse MoCA scores were reported by those who were no longer working ($p = 0.027$), see Tab. 5.

DISCUSSION

As the population ages, there is a need to detect cognitive impairment in the early stages. The ideal means of detecting cognitive impairment is a high-quality neuropsychological examination, which is, however, limited by availability and time-consuming. Simple cognitive screening tools are commonly used to detect clinically significant cognitive impairment in old age. In our research, we used the MoCA screening tool. The average total cognitive function score of the MoCA test in our study was 26.2 points, which corresponds to the limits of the norm, which are based on the recommendations of the original version of the test. However, up to 36.3% of the subjects did not reach this limit in our study. In the past, there was a discussion in the field of the Czech professional public about a possible reduction in the borderline score of the MoCA test. The Bartoš et al. study subsequently recommends an optimal borderline score of ≤ 23 points [6] for the Czech training version, which was also used in this study. A meta-analysis revealed that a cut-off score of 23, rather than the initially recommended score of 26, lowers the rate of false positives and shows overall better diagnostic accuracy [10]. Norms stratified by age and education in the English MoCA were published by Rosseti et al. [11] and other authors publishing normative data for e.g. Quebec-French [12], Portuguese [13] and Italian [14]. In our study, it was confirmed that the larger the cognitive deficit, the more symptoms of depression and anxiety occurred in the respondents. Depression and anxiety are the two most common neuropsychiatric symptoms associated with mild cognitive impairment [15]. The impact of the severity of symptoms of depression and anxiety on cognitive performance is widely studied in the literature, but the conclusions are heterogeneous and dependent on how the results were obtained (e.g. screening tests, complex neuropsychological evaluations) [16]. There is very little known information on how symptoms of depression or anxiety may affect MoCA results. In our study, the presence of depressive symptoms was associated with deterioration in the areas of abstraction and speech.

Other studies also found a correlation between symptoms of depression and anxiety and the results of the MoCA [17]. The Del Brutta et al. [17] study showed that those with lower scores in the domain of short-term memory, location and time orientation and abstraction had a higher incidence of symptoms of depression.

A number of studies report a high co-morbidity of depressive symptoms and cognitive impairment in the elderly. According to the available literature, up to 30% of older adults have symptoms of depression and similarly 36% of older adults show signs of cognitive impairment [18]. At the same time, there is a discussion about whether depression causes cognitive decline or vice versa. Formánek et al. [19] found that individuals at the highest risk of rapid cognitive decline are those in whom symptoms of depression increase in late age.

The average score for depression in our study was within the limits of the norm. However, it was found that significantly worse overall cognitive function scores were seen in those with depression. Some patients diagnosed with depression may experience cognitive dysfunction, which can make screening difficult. Therefore, it is very important to investigate the issue of cognitive deficit also in patients with major depressive disorder, which may ultimately help in differential diagnosis, as cognitive impairment is also associated with other diseases, such as dementia in addition to depression.

Past research has revealed the prevalence of anxiety disorders in older adults in the community between 1.2%

and 15%, and in the clinical setting between 15% and 52.3% [20]. It is not entirely clear from the available literature whether anxiety symptoms affect cognitive performance in older people. In the studies [16,21] it was found that abilities in cognitive areas were significantly correlated with anxiety in older adults. In our investigation, those with anxiety symptoms scored worse overall on cognitive function ($p < 0.001$). Anxiety may increase the risk of cognitive decline by reducing the performance of cognitively demanding tasks or by using benzodiazepines. The explanation for the inconsistent findings between studies may be due to differences in e.g. sample selection, socio-economic-demographic characteristics, as well as assessment tools used in different studies function.

In our study, a better quality of life was found in people with higher levels of cognitive function. Chaves et al. [22] highlighted in their study that individuals with cognitive decline exhibited lower QoL compared to the control group. This study demonstrated that cognitive function decreases with increasing age. Age-specific health effects were also supported by other studies [23]. In our study, there was no evidence of significant relationships between total MoCA score and gender or whether an individual lives alone.

Limitations of the study

There are several limitations of this study. The greatest limitation lies in the low number of participants, which prevents generalizing the results to the entire populations of seniors living in the community. The second limitation is an unbalanced gender sample. The third limitation is that all measuring instruments were developed in other countries.

CONCLUSIONS

Lower MoCA scores were associated with older age, higher rates of depression and anxiety, and lower quality of life. Early detection and effective treatment of cognitive impairment and affective symptoms in the elderly can not only restore mental health but also improve their QoL. The nurse should perform an orientational memory test whenever the patient complains of memory disorders or the patient's relatives report memory disorders. One of the very short memory tests can be used for an initial orientation examination. If the result of these tests is pathological, it is possible to carry out a more detailed examination of cognitive functions using complex screening tests (e.g. MoCA). If the results of these tests are pathological, it is necessary to consider sending the patient to a specialist for further examination and to start treatment. The earlier the incipient cognitive deficit is detected in the patient, the earlier appropriate treatment can be started, thereby extending the time during which the patient's self-sufficiency is preserved.

From a perspective point of view, we understand the work mainly as a starting point for further research in this area. In order to identify the exact extent of the problem of the state of cognitive functions of the elderly, the implementation of further, more extensive research studies is necessary.

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