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Возможности раннего выявления риска когнитивных нарушений

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АННОТАЦИЯ

Обоснование. Актуальность проблемы раннего выявления интеллектуальных расстройств определяется старением населения. Результаты популяционных исследований показывают большой диапазон данных, поэтому наряду с дальнейшим изучением распространённости различных форм когнитивных нарушений необходима оценка относительных рисков их развития, определяющая нагрузку на систему здравоохранения в регионах.

Цель исследования — изучить распространённость когнитивных нарушений в амбулаторном звене многопрофильной клиники и определить отношения рисков когнитивного дефицита в различных возрастных группах.

Материалы и методы. Проведено скрининговое исследование по выявлению когнитивных нарушений в амбулаторном звене многопрофильной клиники среди лиц в возрасте от 45 до 90 лет с использованием Монреальской шкалы когнитивной оценки (Montreal Cognitive Assessment scale — MoCA).

Результаты. С повышением возраста увеличивается доля лиц с когнитивными нарушениями: от 20,0% в возрастной группе 45–59 лет и 33,1% в возрастной группе 60–74 лет к 79,6% в возрастной группе 75–90 лет. Средний балл по результатам оценки когнитивных функций у лиц в возрасте 45–59 лет (27,1±0,3) и в возрасте 60–74 лет (26,2±0,2) находится в диапазоне нормального уровня, а у лиц в возрасте 75–90 лет (23,6±0,3) — смещается в диапазон риска когнитивной патологии. В возрастных группах 60–74 и 75–90 лет нет различия между мужской и женской выборкой в распространённости когнитивных нарушений. Эти нарушения фиксируются в 2,5 раза чаще у мужчин, чем у женщин, в группе лиц 45–59 лет. Относительный риск (ОР) когнитивного дефицита во второй группе (лица 60–74 лет) в сравнении с первой группой (лица 45–59 лет) незначителен: ОР=1,21. В третьей группе (лица 75–90 лет) вероятность риска развития когнитивных нарушений повышается почти в два с половиной раза по отношению ко второй (ОР=2,40) и почти в пять раз выше, чем в первой группе (ОР=4,86).

Заключение. Стратифицированные по полу и возрасту показатели скрининга по оценке когнитивных функций и относительных рисков развития когнитивных расстройств в более старших возрастных группах позволяют планировать диагностические, лечебные и профилактические мероприятия в сфере психического здоровья.

Ключевые слова: когнитивные нарушения; скрининг когнитивной оценки; Монреальская шкала когнитивной оценки (МоСА-тест).

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Early detection of the risk of cognitive disorders

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ABSTRACT

BACKGROUND: Cognitive disorders are a relevant problem in an aging population. Research shows a wide range of data on the prevalence of cognitive disorders in the general population. Thus, more studies on the prevalence of cognitive disorders and assessment of the risks of their development are necessary, which will determine the burden on the regional healthcare system.

AIM: To examine the prevalence of cognitive impairment in an outpatient multidisciplinary clinic setting and determine the risk ratios for cognitive deficits in different age groups.

MATERIALS AND METHODS: The Montreal Cognitive Assessment Scale was used in the screening of people aged 45–90 years.

RESULTS: Cognitive dysfunction was noted in 20.0% of patients in the group aged 45–59 years, 33.1% in the group aged 60–74 years, and 79.6% in the group aged 75–90 years. The average results on the assessment of cognitive functions of persons aged 45–59 (27.1±0.3) and 60–74 (26.2±0.2) years corresponded to the norm, and the value in persons aged 75–90 (23.6±0.3) years was below the norm. In groups aged 60–74 and 75–90 years, the prevalence of cognitive dysfunction was comparable between men and women. Cognitive impairments in men aged 45–59 years were recorded 2.5 times more often than that in women. The risk of cognitive disorders in the second group (aged 60–74 years) relative to that in the first group (aged 45–59 years) is insignificant (relative risk [RR], 1.21). In the third group (aged 75–90 years), the probability of cognitive disorders is significantly higher than that in the second group (RR=2.40) and nearly five times higher than that in the first group (RR=4.86).

CONCLUSION: Sex- and age-stratified screening indicators for assessing cognitive functions and the RRs of developing cognitive disorders in older age groups make it possible to plan for diagnostic, therapeutic, and preventive measures in mental health.

Keywords: cognitive dysfunction; screening of cognitive assessment; Montreal Cognitive Assessment scale.

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BACKGROUND

The relevance of cognitive impairment is determined by its considerable prevalence in the older population, whose proportion is increasing annually [1, 2].

Cognitive disorders include dysfunctions of attention, memory, thinking, gnosis, praxis, and speech. Preclinical forms of mild cognitive impairment often precede the development of dementia [3].

R.S. Petersen et al. [3] proposed the concept of "moderate cognitive impairment" in 1997. Although its criteria were repeatedly revised, it always included lower neuropsychological test results than the age norm, not reaching the level of dementia [4, 5].

"Dementia" is an acquired long-term syndrome that affects all cognitive functions and leads to social maladjustment, disability, and loss of self-care skills [6].

As of 2015, approximately 46.8 million people with dementia were registered worldwide among people aged >60 years (approximately 5% of older and senile people); there are approximately 2 million such patients in Russia [7].

These indicators are predicted to increase in the coming decades [8]. Age-stratified prevalence values of cognitive impairment have shown several data based on the results of population-based studies in different regions [9–11]. Systematic reviews and meta-analyses have also shown a substantial range in the prevalence of dementia of various etiologies, clearly documenting an increase in incidence with age [8, 12].

Data on the sex differences in this syndrome are contradictory [12]. Studies that combined indicators of different types of dementia did not record differences in the level of its prevalence in men and women [10], whereas a differentiated consideration revealed a higher prevalence of Alzheimer's disease in women and vascular dementia in men [8].

The predicted increase in the level of dementia in the population does not agree with actual data on its detection among the population. Moreover, in the most developed countries, trends toward stabilization and even a decrease in the proportion of people with dementia were observed, which is associated with preventive measures of a medical and social nature and, first of all, the early detection of cognitive impairment [13, 14]. However, the WHO report "Dementia: a public health priority" in 2012 indicated that the needs for diagnosis and treatment of cognitive impairment are not sufficiently met; only 10% of dementias are detected in early disease stages [15].

Insufficient awareness of cognitive impairment hinders timely diagnosis, reduces treatment effectiveness, leads to lost opportunities to prevent the increase in intellectual defects, and increases the disease burden [13, 16].

The provision of effective care to patients with cognitive impairment and their families requires identification and monitoring of the extent of the problem. Thus, the prevalence of dementia and preclinical forms of cognitive impairment, which determine the burden on the healthcare system and economic costs, must be assessed.

A method to solve this problem may be early screening for cognitive impairment. Screening is a form of mass examination in the population aimed at identifying risk groups for the diagnosed disease. In Russia, screening for cognitive impairment is a part of separate programs for the early detection and prevention of dementia [17].

Early screening tools aimed at identifying preclinical forms of cognitive impairment must meet several requirements, namely, high sensitivity to the initial impairment of intellectual functions; simplicity and brevity of diagnostic procedures; focus on various components of cognitive impairment; specificity excluding many false-positive results when identifying intellectual disabilities; and possibility of a quantitative assessment of indicators. The Montreal Cognitive Assessment (MoCA) scale meets these criteria. This scale has been recognized as valid for identifying mild cognitive impairment and distinguishing it from dementia [18–20]. Issues related to criterion validity and cutoff indicators of the MoCA test are actively discussed. Most studies, including the Clinical Guidelines "Cognitive disorders in elderly and senile patients" [6], interpret a score of 25 points as the presence of a cognitive deficit [21, 22]. The cutoff score for assessing dementia is defined as 19–21 points [21, 23, 24].

At present, further research is needed to assess the prevalence of dementia and preclinical forms of cognitive impairment, which determines the burden on the healthcare system and economic costs in the regions for the prevention and correction of cognitive disorders.

This study aimed to analyze the prevalence of cognitive impairment in the outpatient department of a multidisciplinary clinic and determine the risk ratios (RRs) for cognitive impairment in different age groups.

METHODS

Study design

A screening study was conducted. The prevalence of cognitive impairment in patients of a multidisciplinary clinic was revealed, and the RR of cognitive dysfunction in various age groups was assessed.

Compliance criteria

The research sample included patients of a multidisciplinary outpatient clinic aged 45–90 years who had not previously sought specialized medical care because of cognitive impairment. The sample size was 279 people (146 men and 133 women). Cognitive impairment was assessed using the MoCA. Results of 26–30 points indicated a normal level of intelligence, 21–25 points indicated moderate cognitive impairment, ⩽20 points indicated severe cognitive impairment.

Conditions

The study was performed at the Center for the Prevention of Cognitive Disorders in Older People of the Memory of Generations Charitable Foundation project, as well as at Polyclinic No. 2 and Polyclinic No. 3 in Smolensk within the implementation of the Dementia.net project from April to September 2022.

Ethical considerations

This study was approved by the ethical committee of the Smolensk State Medical University of the Ministry of Health of the Russian Federation (Minutes of Meeting No. 2 of September 23, 2022).

Statistical analysis

Statistical data processing was performed using Microsoft Office Excel 2016 with the "Data Analysis" and AtteStat 12.0.5 addons. The results were assessed using descriptive analysis with the calculation of absolute and relative frequencies, 95% confidence intervals (CI) using the equation for proportions and frequencies by the Wald method, and for small values using the Wald method with Agresti–Coull correction. Sample characteristics are presented as mean±error of the mean (M±m). The statistical significance of differences in the values of the studied characteristics was assessed using the Mann–Whitney U test. To assess the risks of cognitive deficits in different age groups, the RR was calculated. When testing statistical hypotheses, the significance level p was set to 0.05. The sample size was not previously calculated.

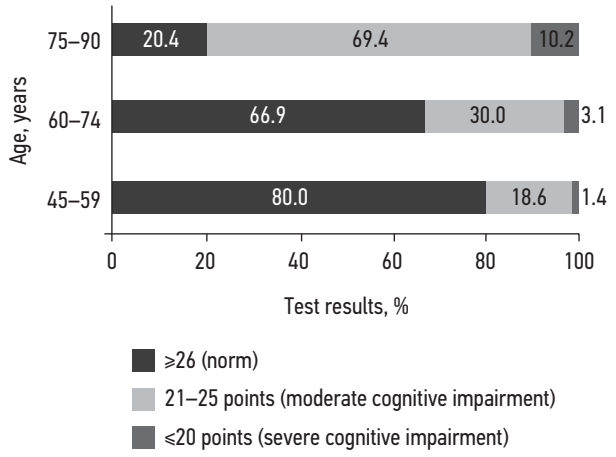

Fig. 1. Histogram of the distribution of cognitive assessment scores in different age groups.

RESULTS

Subjects (participants) of the study

Of the 279 nonclinical samples, 146 were male (52.3%) and 133 were female (47.7%). The research sample was distributed into three groups, namely, group 1 aged 45–59 years, group 2 aged 60–74 years, and group 3 aged 75–90 years. These groups have comparable size, sex, and sociodemographic indicators (Table 1).

Main research results

The distribution of the results of assessing cognitive functions according to the MoCA test in different age groups is presented in Fig. 1.

An assessment of cognitive impairment in the cohort aged 45–59 years revealed that 20.0% of the participants (14/70) had cognitive deficits, 18.6% (13/70) had a moderate impairment, and 1.4% (1/70) had severe cognitive impairment (Table 2). The proportion of men with cognitive deficits in this age group (28.6%, 10/35) was more than 2.5 times higher than that of women (11.4%, 4/35).

In the group aged 60–74 years, 33.1% (53/160) of the patients had cognitive impairment, 30.0% (48/160) had moderate, and 3.1% (5/160) had severe (Table 3).

Cognitive impairment was registered in 79.6% (39/49) of patients in the group aged 75–90 years, and 10.2% (5/49) patients had severe cognitive deficits (Table 4).

According to the comparison diagram (Fig. 2), in each age cohort, individuals with cognitive indicators below normal were identified. Moreover, the average score based on the results of the assessment of cognitive functions was within the normal range in groups 1 (27.1±0.3) and 2 (26.2±0.2) and shifted into the range of cognitive pathology in group 3 (23.6±0.3).

Comparison of indicators in different age cohorts demonstrated an obvious tendency toward an increase in the proportion of patients with cognitive impairment with increasing age (Fig. 3). The RR for the development of cognitive impairment with increasing age when comparing groups 1 (45–59 years old) and 2 (60–74 years old) was 1.21 (95% CI 1.02–1.42; p <0.05). When comparing groups 2 and 3 (75–90 years old), the RR was 2.40 (95% CI 1.85–3.12; p <0.05). When comparing groups 1 group 3, the RR was 4.86 (95% CI 2.68–8.79; p <0.05).

Table 1. Sample structure

Study groups	Age, years	Absolute number of subjects (*n*)	Number of men, *n*/%	Number of women, *n*/%
1	45–59	70	35/50.0	35/50.0
2	60–74	160	91/56.9	69/43.1
3	75–90	49	20/40.8	29/59.2

Table 2. Test results using the Montreal Cognitive Assessment Scale in participants aged 45–59 years

Test results	Total sample		Women		Men	
	n	Percentage, 95% CI	n_1	Percentage, 95% CI	n_2	Percentage, 95% CI
Total number of subjects	70	100 (100–100)	35	100 (100–100)	35	100 (100–100)
≥26 points (norm)	56	80.0 (70.6–89.4)	31	88.6 (78.0–99.1)	25	71.4 (56.5–86.4)
≤25 (cognitive deficit)	14	20.0 (10.6–29.4)	4	11.4 (0.9–22.0)	10	28.6 (13.6–43.5)
21–25 points (moderate cognitive impairment)	13	18.6 (9.5–27.7)	2	5.7 (2.0–13.4)	9	25.7 (11.2–40.2)
<20 (severe cognitive impairment)	1	1.4 (0.4–4.2)	0	0	1	2.9 (1.7–8.4)

Table 3. Montreal Cognitive Assessment Scale test results for participants aged 60–74 years

Test results	Total sample		Women		Men	
	n	Percentage, 95% CI	n_1	Percentage, 95% CI	n_2	Percentage, 95% CI
Total number of subjects	160	100 (100–100)	69	100 (100–100)	91	100 (100–100)
≥26 points (norm)	107	66.9 (59.6–74.2)	46	66.7 (55.5–77.8)	61	67.0 (57.4–76.7)
≤25 (cognitive deficit)	53	33.1 (25.8–40.4)	23	33.3 (22.2–44.5)	30	33.0 (23.3–42.6)
21–25 points (moderate cognitive impairment)	48	30.0 (22.9–37.1)	22	31.9 (20.9–42.9)	29	31.9 (22.3–41.4)
<20 (severe cognitive impairment)	5	3.1 (0.4–5.8)	1	1.4 (0.4–4.3)	3	3.3 (0.4–7.0)

Table 4. Montreal Cognitive Assessment Scale test results for participants aged 75–90 years

Test results	Total sample		Women		Men	
	n	Percentage, 95% CI	n_1	Percentage, 95% CI	n_2	Percentage, 95% CI
Total number of subjects	49	100 (100–100)	29	100 (100–100)	20	100 (100–100)
≥26 points (norm)	10	20.4 (9.1–31.7)	6	20.7 (5.9–35.4)	4	20.0 (2.5–37.5)
≤25 (cognitive deficit)	39	79.6 (68.3–90.9)	23	79.3 (64.6–94.1)	16	80.0 (62.5–97.5)
21–25 points (moderate cognitive impairment)	34	69.4 (56.5–82.3)	20	69.0 (52.1–85.8)	14	70.0 (49.9–90.1)
<20 (severe cognitive impairment)	5	10.2 (1.7–18.7)	3	10.3 (0.7–21.4)	2	10.0 (0.1–23.1)

Cognitive impairment was recorded in 20.0% of the patients in group 1 (45–59 years old), 33.1% in group 2 (60–74 years old), and 79.6% in group 3 (75–90 years old). RR determines the extent to which the risk of cognitive impairment is higher in one age group compared with another. When comparing groups 1 and 2, this risk was insignificant (RR=1.21; 95% CI 1.02–1.42, p <0.05). This means that individuals aged 60–74 years are 1.21 times more likely to develop cognitive impairment than those aged 45–59 years. The risk of cognitive impairment in group 3 was 2.4 times higher than that in group 2 (RR=2.40; 95% CI 1.85–3.12, p <0.05), i.e., at the age of 75–90 years, the risk of cognitive impairment increased by nearly 2.5 times compared with that at the age of 60–74 years. When comparing groups 1 and 3 (RR=4.86; 95% CI 2.68–8.79, p <0.05), the probability of cognitive impairment in individuals aged 75–90 years was nearly five times higher than that in those aged 45–59 years.

DISCUSSION

The screening study enabled us to establish in each age group of patients in an outpatient multidisciplinary clinic the proportion of people with normal indicators of cognitive functioning, which decreases with increasing age, that is,

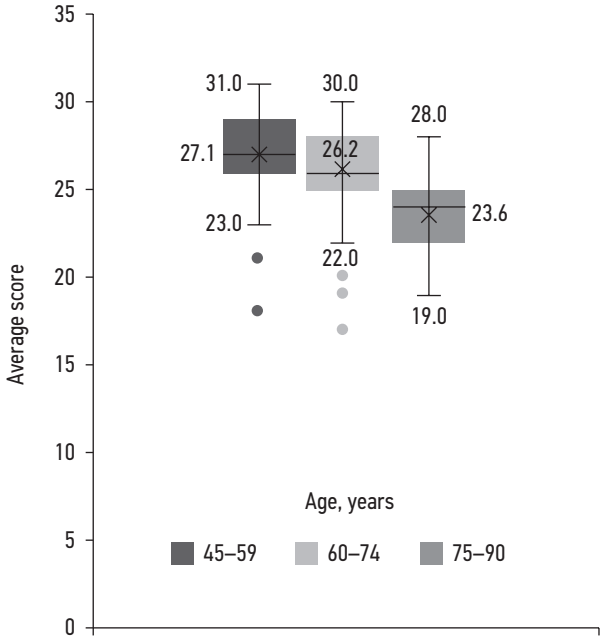

Fig. 2. Chart comparing the mean scores on the cognitive assessment results of different age groups.

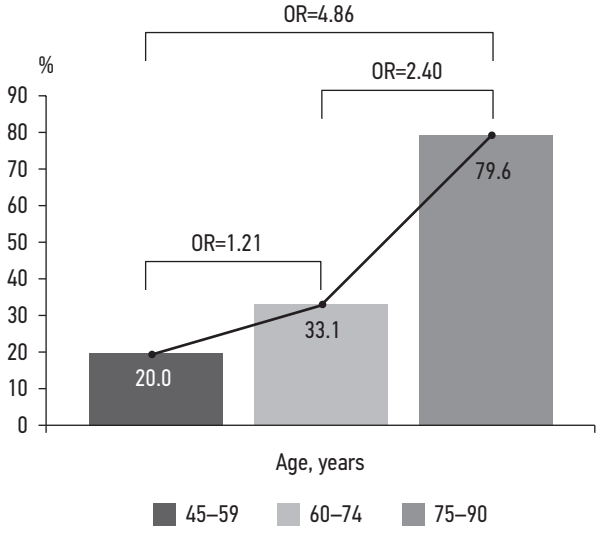

Fig. 3. Individuals with cognitive impairment and relative risks of developing cognitive dysfunction in different age groups.

from 80.0% in group 1 (45–59 years old) and 66.9% in group 2 (60–74 years old) to 20.4% in group 3 (75–90 years old). In turn, the proportion of patients with cognitive impairment increased with age from 20.0% in group 1 and 33.1% in group 2 to 79.6% in group 3.

The average score for assessing cognitive functions in the studied groups decreased with increasing age, and in patients aged 75–90 years, this indicator shifted into the range of severe cognitive impairment, which is evidence of intellectual pathology. In general, the data obtained are consistent with the results of population-based studies [10] and meta-analyses [8] on the epidemiology of cognitive impairment. This enables us to conclude that screening studies organized at outpatient medical care facilities can be an "entry gate" for more widespread epidemiological studies of cognitive pathology.

Most population-based studies on the prevalence of intellectual-mnestic disorders include individuals aged >60 years. However, according to ontogenetic concepts, the development of cognitive dysfunction begins at a younger age, and preventive measures should be focused on people aged >45 years. Our results show a significant proportion of individuals (20.0%) with cognitive deficits in the group aged 45–59 years. Of these, 18.6% have moderate cognitive impairment, which is more amenable to therapeutic intervention [5, 13]. Cognitive impairment in group 1 was recorded 2.5 times more often in men than in women. In groups 2 and 3, no significant differences in the overall prevalence of cognitive impairment were found between men and women. This is consistent with the results of some studies that have reported no or minimal differences in the prevalence of general cognitive decline in men and women aged ⩾60 years [8, 10].

Degenerative and vascular diseases of the brain predominate among the causes of cognitive disorders in older and senile populations [8, 10, 12]. In middle age, attention, memory, and thinking disorders are more often a consequence of affective disorders and other comorbid psychopathologies [25, 26]. One of the common causes of cognitive impairment at a younger age is alcohol addiction, which is much more common among men [27, 28]. According to the rating of the Federal Project "Sober Russia," the Smolensk region is among the 20 most "alcohol-intensive" regions of Russia; therefore, the influence of this factor must be separately analyzed. We can also assume a negative effect of the coronavirus infection on the state of cognitive processes of the examined individuals, particularly unfavorable along with chronic alcohol intoxication [29, 30].

Cognitive impairment was recorded in 20% of people in the group aged 45–59 years. The risk of developing cognitive deficits in the group aged 60–74 years relative to the group aged 45–59 years was 1.21, and the proportion of people with cognitive impairments aged 60–74 years was 33.1%. This is an insignificant risk of increasing cognitive dysfunction during the transition from group 1 to age group 2. However, such results indicate the need to consider the age range of 45–59 years as the initial period for the early detection and prevention of cognitive impairment. In this age cohort, particular attention should be paid to the study and prevention of factors that adversely affect cognitive functions in men. The risk of developing cognitive deficit in people aged 75–90 years relative to the group of people aged 60–74 years was 2.40, and the share of people aged 75–90 years with cognitive dysfunction was 79.6%. Compared with group 1, group 3 had a higher risk of cognitive impairment, i.e., 4.86. Given the high risk of cognitive impairment, further research is required to control modifiable factors to prevent the development of cognitive impairment and dementia at different age periods.

The obtained results of calculating the stratification of the relative risks of developing cognitive impairment in various cohorts enable us to predict the dynamics of the number of patients with manifestations of intellectual incapacity in connection with changes in the age structure of the population and plan treatment and preventive measures.

CONCLUSION

A screening study of cognitive impairment in outpatients of a multidisciplinary clinic, stratified by sex and age, provided data generally consistent with global statistics on the prevalence of intellectual disorders. The proportion of people with cognitive impairment increases with age, and the average level of cognitive function decreases. At the age of >75 years, it shifts toward the range of severe cognitive impairment. A remarkable predominance of the proportion of patients with cognitive impairment was noted among men aged 45–59 years compared with similar indicators in women. The reasons for these differences require further study of the sex specifics of comorbid psychopathology and somatic diseases, sociopsychological factors, and lifestyle. Prediction of the dynamics of the prevalence of cognitive impairment due to changes in the age structure of the population will enable planning of economic costs and organizational decisions in the healthcare sector, associated with the detection, diagnostics, prevention, and treatment of cognitive impairment.

ADDITIONAL INFORMATION

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Authors' contribution: I.Y. Mashkova — literature review, writing the text of the article; E.V. Dmitrieva — collection and statistical analysis of data; A.V. Krikova — research design, data collection; G.A. Aleshkina — literature review; L.M. Bardenstein — theoretical and methodological justification of the study, scientific revision of the text of the article. All authors made a substantial contribution to the conception of the work, acquisition, analysis, interpretation of data for the work, drafting and revising the work, final approval of the version to be published and agree to be accountable for all aspects of the work.

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