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COGNITIVE FUNCTIONS IN PATIENTS SUFFERING FROM HYPERTENSION AND HYPOTHYROIDISM WITH RETROSPECTIVE EVALUATION OF CONTROL OVER DISEASE COMPENSATION

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Abstract. Cognitive functions in patients suffering from hypertension and hypothyroidism with retrospective evaluation of control over disease compensation. Lesiv M.I. *The aim of the study was to study the status of cognitive functions in hypertensive patients, patients with hypothyroidism, and in patients with combination of these diseases, taking into account the state of disease compensation. 67 patients (36 men and 31 women), average age – 49.84±2.83 years were examined. The control group (CG) consisted of 18 practically healthy individuals (8 men and 10 women). Patients who received appropriate nosology treatment were divided into 3 groups: Group I – 21 patients with hypertension, systolic blood pressure (SBP) – 134.26±5.23 mm Hg, diastolic blood pressure (DBP) – 84.37±4.51 mm Hg; Group II – 18 patients with hypothyroidism, thyrotropic hormone (TSH) – 3.16±0.79 mIU/L, stage of hypothyroidism compensation was diagnosed in 83.3%, subcompensation – in 16.7%; Group III – 28 patients with hypertension (SBP 145.52±5.45 mm Hg; DBP 82.41±3.86 mm Hg) with concomitant hypothyroidism (TSH – 2.92±0.78 mIU/L, stage of compensation for hypothyroidism was diagnosed in 85.7%, subcompensation – in 14.3% of cases. Information about visits to the therapist/cardiologist/family doctor and endocrinologist was used to analyze the therapeutic correction of the disease: ambulatory medical records of patients with measurement of blood pressure (BP) and TSH during the disease were processed. To assess cognitive functions, Mini Mental State Examination (MMSE) and the*

Addenbrooke's cognitive examination (ACE-R) were used. The relationship of average blood pressure data in patients with hypertension and TSH in patients with hypothyroidism during the disease period and the level of cognitive function was investigated. The average level of office BP (SBP/DBP) in Groups I and III compared to CG during the examination was: SBP 134.26±5.23 mm Hg (p=0.047), DBP 84.37±4.51 mm Hg (p=0.041) in Group I; SBP 145.52±5.45 mm Hg (p=0.031), DBP 82.41±3.86 mm Hg (p=0.050) in Group III. Analyzing the TSH levels it was found that at the time of the physical examination of patients in Group II the TSH was 3.16±0.79 mIU/L (p=0.009), the stage of compensation was diagnosed in 83.3%, subcompensation – in 16.7%; in Group III the TSH was 2.92±0.78 mIU/L (p=0.027), the stage of hypothyroidism compensation was diagnosed in 85.7%, subcompensation – in 14.3%. When evaluating MMSE scores, the proportion of patients in Groups I-III who had cognitive impairment (CI) was 6.9%, 10.3% and 13.8% respectively. On individual assessment of ACE-R test scores, CI in Groups I-III was in 6.4%, 9.6% and 13.8% respectively. A detailed analysis of the patterns of the ACE-R scale revealed that patients in Group I had a significantly lower score in the memory domain (22.68±0.96, p=0.037); patients in Group II had a low score in the concentration domain (15.85±1.14, p=0.045) and executive functions domain (11.62±8.63, p=0.041). Taking into account the interaction of factors (hypertension and hypothyroidism), it was found that in 40% of patients in Group III the most affected cognitive domains were memory (21.12±0.98, p=0.012) and speech (22.41±2.32, p=0.038); 60% of patients had problems with executive functions (11.90±9.17, p=0.033) as well as with visual-spatial skills (14.40±8.15, p=0.045). MMSE test showed a significantly lower score in the memory domain (1.87±0.46, p=0.008) in Group I, patients of Group II had a significantly lower score in the concentration domain (2.53±0.54, p=0.018). Basing on the interaction of factors (hypertension and hypothyroidism), it was found that in 45% of patients the most affected cognitive domain was memory (2.3±0.38, p=0.028), and 55% suffer from impaired speech, praxis (7.48±0.59, p=0.018) and perception (2.45±0.67, p=0.028). A retrospective analysis of medical records regarding the control of patients' diseases was conducted. It was found that the average level of SBP/DBP in Groups I and III was 154.38±5.11 (p=0.000) \ 96.47±3.49 (p=0.006) mm Hg; 158.26±5.64 (p=0.001) \ 98.42±4.93 (p=0.005) mmHg, respectively. The TSH level over the disease period in patients of Groups II and III was 7.14±2.37 mIU/L (p=0.002) and 8.03±3.77 mIU/L (p=0.000), respectively, which was different from the data obtained in the last study. Retrospective analysis of medical records made it possible to establish a real long-term control of blood pressure, TSH in patients with hypertension, in patients with hypothyroidism and in patients with combination of these diseases, which caused CI in 6.9% of patients with hypertension, in 10.3% of patients with hypothyroidism and in 13.8% of patients with combined pathology based on MMSE test results. The ACE-R test results show the same sequence. Individual assessment of ACE-R test scores revealed CI in Groups I-III: 6.4%; 9.6% and 13.8%, respectively. The MMSE scale evaluates the selective deficits of one or more cognitive domains; the ACE-R scale is a wide-ranging study tool but it should be noted that the implementation of this scale requires time outlays.

Реферат. Когнітивні функції у хворих на гіпертонічну хворобу та гіпотиреоз з ретроспективною оцінкою контролю компенсації захворювання. Лесів М.І. *Метою роботи було вивчити стан когнітивних функцій у хворих на гіпертонічну хворобу (ГХ), у пацієнтів з гіпотиреозом і при поєднанні цих захворювань з урахуванням стану компенсації хвороби. Обстежено 67 пацієнтів (36 чоловіків і 31 жінка), середній вік – 49,84±2,83 року. Контрольну групу (КГ) становили 18 практично здорових осіб (8 чоловіків та 10 жінок). Пацієнти, які отримували відповідне лікування за нозологією, були розподілені на 3 групи: І група – 21 хворий з ГХ, систолічний артеріальний тиск (САТ) 134,26±5,23 мм рт.ст.; діастолічний артеріальний тиск (ДАТ) 84,37±4,51 мм рт. ст.; ІІ група – 18 хворих з гіпотиреозом, тиреотропний гормон (ТТГ) – 3,16±0,79 мМО/л, стадія компенсації гіпотиреозу діагностовано у 83,3%, субкомпенсації – 16,7%; ІІІ група – 28 хворих з ГХ (САТ 145,52±5,45 мм рт. ст.; ДАТ 82,41±3,86 мм рт. ст.) із супутнім гіпотиреозом (ТТГ – 2,92±0,78 мМО/л, стадія компенсації гіпотиреозу діагностована в 85,7%, субкомпенсації – 14,3%). Для проведення аналізу терапевтичної корекції захворювання використано дані візитів до терапевта/кардіолога/сімейного лікаря та ендокринолога: були опрацьовані амбулаторні картки хворих, в яких у період захворювання відмічались показники артеріального тиску (АТ), ТТГ. Для оцінки когнітивних функцій використовували коротку шкалу оцінки психічного статусу MMSE (Mini Mental State Examinatin) та шкалу Адденбрука (ACE-R). Проводили пошук зв'язків усереднених даних АТ у хворих з ГХ, ТТГ – з гіпотиреозом за період хвороби та рівнем когнітивних функцій. Середній рівень показників офісного АТ (САТ/ДАТ) у І, ІІІ порівнянно з КГ на момент огляду становив САТ 134,26±5,23 мм рт. ст. (р=0,047); ДАТ 84,37±4,51 мм рт. ст. (р=0,041) І група; САТ 145,52±5,45 мм рт. ст. (р=0,031); ДАТ 82,41±3,86 мм рт. ст. (р=0,050) ІІІ група. При аналізі показників ТТГ було встановлено, що на момент огляду у хворих ІІ групи ТТГ – 3,16±0,79 мМО/л (р=0,009), діагностовано стадію компенсації у 83,3%, субкомпенсації – 16,7%; у ІІІ групі ТТГ – 2,92±0,78 мМО/л (р=0,027), стадія компенсації гіпотиреозу діагностована у 85,7%, субкомпенсації – 14,3%. У 84,7% випадків гіпотиреоз був компенсованим, що підтверджувалось відсутністю клінічних симптомів, а також нормальними показниками ТТГ у сироватці крові. У 15,3 % випадків пацієнти не отримували адекватної замісної терапії і були субкомпенсовані. При оцінці показників MMSE частка пацієнтів у групах I-III, в яких було виявлено когнітивні порушення (КП), становила 6,9; 10,3 і 13,8% відповідно. Результати тесту ACE-R демонструють таку ж послідовність. При індивідуальній оцінці показників тесту ACE-R наявність КП у групах І-ІІІ становила 6,4; 9,6 і 13,8% відповідно. При детальному аналізі патернів*

шкали АСЕ-R виявлено, що хворі I групи мали достовірно нижчий бал у домені пам'ять (22,68±0,96, p=0.037), у хворих II групи визначався достовірно низький бал у домені увага (15,85±1,14, p=0.045) та виконавчі функції (11,62±8,63, p=0.041). При урахуванні взаємодії чинників (ГХ та гіпотиреозу) було встановлено, що в 40% найураженішими когнітивними доменами є пам'ять (21,12±0,98, p=0.012) та мова (22,41±2,32, (p=0.038), а в 60% страждають виконавчі функції (11,90±9,17 p=0.033), також оптико-просторові функції (14,40±8,15, відповідно) (p=0.045). Результат тесту MMSE показав достовірно нижчий бал у домені пам'ять (1,87±0,46, p=0.008), у хворих II групи визначався достовірно низький бал у домені уваги (2,53±0,54, p=0.018). При урахуванні взаємодії чинників (ГХ та гіпотиреозу) було встановлено, що 45% найураженішими когнітивними доменами є пам'ять (2,3±0,38, p=0.028), а у 55% страждають мовлення та праксис (7,48±0,59, p=0.018), сприйняття (2,45±0,67, p=0.028). Проведено ретроспективний аналіз медичної документації щодо показників контролю захворювань досліджуваних пацієнтів. Виявлено, що середній рівень показників САТ/ДАТ у I та III групах був 154,38±5,11 (p=0.000)\96,47±3,49 (p=0.006) мм рт. ст.; 158,26±5,64 (p=0.001)\98,42±4,93 (p=0.005) мм рт. ст. відповідно. Рівень ТТГ за період захворювання в пацієнтів II та III груп становив (7,14±2,37 p=0.002) та 8,03±3,77 мМО/л (p=0.000). Ретроспективний аналіз медичної документації дав можливість установити реальний багаторічний контроль АТ, ТТГ у хворих на ГХ, у пацієнтів з гіпотиреозом і при поєднанні цих захворювань, що стало причиною появи КП у 6,9% при ГХ, 10,3% при гіпотиреозі та 13,8% при поєднаній патології за результатами тесту MMSE. Результати тесту АСЕ-R демонструють таку ж послідовність. При індивідуальній оцінці показників тесту АСЕ-R наявність КП у групах I-III становила 6,4; 9,6 і 13,8% відповідно. Шкала MMSE оцінює вибіркові дефіцити одного або більше когнітивного домена, шкала АСЕ-R є ширшим інструментом дослідження, з урахуванням деталізації, слід відзначити, що проведення такої шкали потребує затрати часу.

Today, the problem of cognitive dysfunction is an urgent medical and social problem in modern society, as it significantly reduces the quality of life of patients, and its long term duration leads to the development of dementia.

The relationship between blood pressure (BP) and cognitive impairment (CI) has been confirmed in a number of clinical studies [8]. Long term investigations revealed that high blood pressure in middle-aged patients is associated with a further decline in cognitive function (from mild CI to dementia) [9]. Taking into account the negative effects of elevated blood pressure and its impact on the development of cardiovascular diseases, there is an obvious need for improved blood pressure monitoring [13].

Considering the disappointing results of epidemiological studies on the effectiveness of blood pressure control, the concept of subjective evaluation of the effectiveness of our work arises. Surveys of 23,339 patients and 1,471 physicians in Italy, Spain, France, and the United Kingdom on the effectiveness of blood pressure monitoring showed: 95% of patients and 75% of physicians believe they effectively control blood pressure. However, according to the research, only 35% of patients had a target level of blood pressure. Nearly three-quarters of patients use antihypertensive drugs, but only half of them maintain an average blood pressure at an acceptable level [4]. At the same time, cognitive disorders are specific to hypertensive patients of working age, even with adequate control of blood pressure [9]. That is the difference in our perception of the treatment effectiveness.

The role of hypothyroidism in the development of CI, such as decreased cognitive function, memory, and concentration has been demonstrated. Many studies have found a positive association of cognitive decline in subclinical hypothyroidism [2]. According to various authors, the prevalence of CI in this pathology varies in its duration and severity from 1.3% to 10.3% [12].

In practice, there are often cases when patients with hypertension have a decrease in the functional activity of the thyroid gland. In the last decade, an important question has arisen regarding the relationship between thyroid and cerebrovascular pathology [6].

The Society of Endocrinologists emphasizes that hypertension may be the initial clinical manifestation of endocrine disorders and the quality of treatment of such disorders cannot be effective without consideration of this combination [5].

Assessment of cognitive functions in relation to hypertension and hypothyroidism control is an urgent problem. The issue of testing for cognitive function in primary hypertension, hypothyroidism should be given due attention in order to timely detect mild CI and to prescribe adequate therapy to prevent the progression of cognitive dysfunctions or even to restore them.

The article deals with the peculiarities of the application of the Mini Mental State Examination and the ACE-R scales, which allow determining changes, in particular domains based on foreign experience [1].

The aim of the work is to study the status of cognitive functions in hypertensive patients, in

patients with hypothyroidism and in patients with combination of these diseases, taking into account the state of compensation for the disease.

MATERIALS AND METHODS OF RESEARCH

67 patients (36 men and 31 women) with an average age of 49.84±2.83 years were examined. In order to compare the results with normal variants, 18 practically healthy persons (PHP), aged 47.84±0.36 years were examined; their selection was carried out with consideration of the anamnesis data, in the absence of hypothyroidism, hypertension.

The patients were divided into 3 groups according to nosology: Group I – 21 hypertensive patients who received antihypertensive therapy; Group II – 18 patients with hypothyroidism who received L-thyroxine at a dose of 100-150 mg, Group III – 28 hypertensive patients with concomitant hypothyroidism who received appropriate treatment.

The study included 18 patients with hypothyroidism who were under regular medical check-ups in the department of endocrinology of the Ivano-Frankivsk Regional Clinical Hospital. The duration of confirmed history of hypothyroidism was 8.24±0.76 years. The diagnosis of hypothyroidism was made by an endocrinologist in accordance with the recommendations of the American Association of Clinical Endocrinologists and the American Thyroid Association for the Diagnosis and Treatment of Hypothyroidism in Adults [7]. Hypothyroidism compensation was assessed by thyroid hormone level: the criterion of compensation was thyroid-stimulating hormone (TSH) level<4.4 mIU/L. Hypothyroidism caused by autoimmune thyroiditis was in 9 (27.8%) persons; as a result of surgery on the thyroid gland – in 5 (50%) ones; in 4 (22.2%) persons hypothyroidism developed spontaneously. The study included 21 hypertensive patients who were hospitalized in the department of arterial hypertension to the Ivano-Frankivsk Regional Clinical Cardiology Dispensary.

The following data were taken into consideration for the selection of hypertensive patients: level of blood pressure, stage of the disease and its duration. The stage, degree and risk of hypertension have been determined in accordance with the recommendations of the European Society of Cardiologists (ESH/ESC 2018) [3]. Measurement of blood pressure in the doctor's office was performed three times with an interval of two minutes according to the method of M.S. Korotkov. Hypertensive patients received basic therapy. According to the Declaration of Helsinki, patients were informed about the aims and methods of this clinical trial and agreed to conduct it.

Information about visits to the therapist/cardiologist/family doctor and endocrinologist was used to analyze the therapeutic correction of the disease: ambulatory medical records of patients with measurement of blood pressure (BP) and TSH during the disease course were processed. In order to unify the approaches to data collection, a questionnaire was developed which provided input of the obtained parameters.

To assess the presence and degree of CI, the Mini Mental State Examination scale (MMSE) [14] and the Addenbrooke's cognitive examination scale (ACE-R) [10] were used.

Exclusion criteria were history of traumatic brain injury and stroke, mental and oncological diseases, atrial fibrillation, chronic obstructive pulmonary disease (respiratory failure of II-III stages), diabetes mellitus, renal and hepatic insufficiency in the stage of decompensation.

The statistical processing of the obtained data was carried out using the statistical analysis package Statistica 6.0. Statistical processing of the survey results was performed using a computer using the statistical calculation software environment [10]. The non-parametric Kolmogorov-Smirnov criterion was used to assess the statistical significance of the differences between the groups. Changes in parameters were considered to be reliable at p<0.05.

RESULTS AND DISCUSSION

During the analysis of office BP, the average level of SBP/DBP in Groups I, III during the examination was: SBP – 134.26±5.23 mm Hg (p=0.0047), DBP – 84.37±4.51 mm Hg (p=0.041) in Group I; SBP – 145.52±5.45 mm Hg (p=0.031), DBP – 82.41±3.86 mm Hg (p=0.050) in Group III.

The analysis of TSH showed that during the examination of patients of Group II, TSH was 3.16±0.79 mIU/L (p=0.009), the stage of compensation was diagnosed in 83.3%, subcompensation – in 16.7%; in Group III TSH was 2.92±0.78 mIU/L (p=0.027), the stage of hypothyroidism compensation was diagnosed in 85.7%, subcompensation – in 14.3%.

In 84.7% of cases, hypothyroidism was compensated, which was confirmed by the absence of clinical symptoms and normal serum TSH. In 15.3% of cases, patients did not receive adequate replacement therapy and were subcompensated (Table 1).

To determine the presence of possible cognitive deficit in the corrected blood pressure values TSH, the neuropsychological testing using the MMSE scale and the ACE-R scale was performed (Tables 2, 3).

Table 1

Clinical and laboratory characteristics of patients with hypertension and hypothyroidism (M±m)

Parameters	Control group, n=18	I, n=21	II, n=18	III, n=28
Age, years	48.84±0.83	47.84±0.44	49.24±0.83	49.84±0.56
Duration of hypertension, years		8.31±0.76		8.04±0.93
Duration of hypothyroidism, years			8.24±0.76	6.11±1.56
SBP, mm Hg	123.8±1.93	134.26± 5.23	125.82±1.95	145.52±5.45
DBP, mm Hg	81.5±1.14	84.37±4.51	81.7±2.18	82.41±3.86
TSH, mIU/L			3.16±0.79	2.92±0.78

To determine the nature of CI: in order to find out if there are the selective deficits of one or more cognitive domains in patients with hypertension, hypothyroidism and in hypertensive patients with concomitant hypothyroidism, a detailed analysis of the ACE-R and MMSE patterns was performed (Tables 4, 5).

Table 2

Results of cognitive function examination of patients with hypertension and hypothyroidism by MMSE, ACE-R scales (M±m)

Parameters, score	CG, n=18	I, n=21	II, n=18	III, n=28
MMSE, scores	29.64±0.87	27.02±0.58*	26.41±1.07*/**	25.66±0.83*/**/***
ACE-R	94.97±1.22	86.23±0.9*	85.87±0.91*/**	84.97±1.26*/**/***

Note: * – significance of difference of parameters compared to CG (p<0.05); ** – significance of parameters with group I (p<0.05); *** – significance of parameters with group II (p<0.05).

The individual evaluation of MMSE test scores revealed CI in 6.9%; 10.3% and 13.8% of patients in Groups I, II, III, respectively. Thus, MMSE test scores in Group III were significantly lower compared to Groups I and II – by 7.4% (p=0.008) and 3.8% (p=0.040), respectively. The ACE-R test results show the same sequence. The individual evaluation of MMSE test scores revealed CI in 6.4%, 9.6% and 13.8% of patients in Groups I, II, III, respectively. ACE-R scores in Group III were significantly lower compared to Groups I and II – by 8% (p=0.009) and 4.7% (p=0.016), respectively.

Table 3

Distribution of patients by the degree of cognitive impairment by MMSE and ACE-R scales

Degree of cognitive impairment	I, n=21 Number of patients	%	II, n=18 Number of patients	%	III, n=28 Number of patients	%
MMSE						
Absence of CI	6	28.6	4	22.3	3	10.7
Mild CI	9	42.8	6	33.3	10	35.6
Moderate CI	6	28.6	8	44.4	15*	53.6
ACE-R						
Absence of CI	6	28.6	3	16.7	3	10.7
Mild CI	8	38	9	50	9	32
Moderate CI	7	33.4	6	33.3	16*	57.3

Note. * – significance of difference between groups (p<0.05).

Results of examination of patients' cognitive functions using the Addenbrooke's scale (ACE-R), М±m

ACE	Control group, n=18	I, n=21	II, n=18	III, n=28
Total score	95.04±11.28	87.23 ±8.91*	85.87 ±9.87*	84.95±10.26*×
Concentration	17.68±0.53	16.25±0.12	15.85±1.14*•	13.77±1.07*×
Memory	24.54±1.14	22.68±0.96*	24.15±1.24	21.12±0.98*×
Executive functions	13.87±0.85	12.05±7.12	11.62±8.63*	11.90±9.17*
Speech	25.71±4.89	24.02±6.21	25.11±1.24	22.41±2.32*
Visuoconstruction skills	16.66±4.56	15.30±2.15	15.47±1.18	14.40±8.15*

Note: * significance of difference between the parameters compared to the CG (p<0.05); • significance of difference between the parameters of Groups I and II (p<0.05); × significance of difference between the parameters of Groups I and III (p<0.05).

A detailed analysis of the patterns of the ACE-R scale (Table 4) revealed that patients of Group I had a significantly lower score in the memory domain (22.68±0.96, p=0.037). Patients in group II showed significantly low score in the domain of attention (15.85±1.14, p=0.045) and executive functions (11.62±8.63, p=0.041). So, the analysis revealed that in 40% of hypertensive and hypothyroid patients the most affected cognitive domains are: memory (21.12±0.98, p=0.012) and speech (22.41±2.32, p=0.038); 60% of patients have impaired executive functions (11.90±9.17, p=0.0033) and visual-spatial skills (14.40±8.15), (p=0.045), respectively. The MMSE test result (Table 5) showed a significantly lower score in the memory domain (1.87±0.46, p=0.008). Patients of Group II had significantly lower scores in the attention domain (2.53±0.54, p=0.018) and in the domains of speech and praxis (7.48±0.59, p<0.05). Taking into account the interaction of factors (hypertension and hypothyroidism), it was found that 35% of the most affected cognitive domains are memory (2.3±0.38, p=0.028), 65% of patients have problems with speech and praxis (7.48±0.59, p=0.018), perception (2.45±0.67, p=0.028).

Parameters of cognitive function in patients with hypertension, hypothyroidism, evaluated by the MMSE scale (М±m)

Parameters of MMSE scale, score	Control group, n=18	I, n=21	II, n=18	III, n=28
Total score on the scale	29.64±0.87	27.02±0.58*	26.41±1.07*/**	25.66±0.83*/**/***
Orientation in space and time	9.87±0.84	9.81±0.41	9.84±0.75	9.83 ± 0.05
Memory	2.97±0.46	1.87±0.46*	2.93±0.38	2.3±0.38*/**
Concentration	4.89±1.05	4.72±1.05	2.53±0.54*/**	2.96±0.54*/**/***
Perception	3.44±0.68	3.24±0.05*	3.15±0.57	2.45±0.67*/**
Speech and praxis	8.91±0.92	8.74±0.92	7.62±1.47*/**	7.48±0.59*/**

Note: * – significance of difference of parameters compared to CG (p<0.05); ** – significance of difference of parameters with group I (p<0.05); *** – significance of difference of parameters with group II (p<0.05).

So, the results of the study indicate that in hypertension and hypothyroidism and in the case of combination of these two disorders, even if blood pressure and TSH are controlled, patients suffer from CI. This indicates that there is an unfavourable long-term profile of BP, TSH in this category of patients, which is associated with a decrease in cognitive function and it was significantly confirmed in hypertensive patients with concomitant hypothyroidism. A significant decrease in cognitive function in examined hypertensive patients with concomitant hypothyroidism was revealed.

After a retrospective analysis of medical records concerning the disease control it was found that the

average level of SBP/DBP in Groups I and III was 154.38±5.11 (p=0.000)\96.47±3.49 (p=0.006) mm Hg; 158.26±5.64 (p=0.001)\98.42±4.93 (p=0.005) mmHg, respectively.

We also evaluated TSH in patients over a period of a confirmed history of hypothyroidism. A retrospective analysis of the data was conducted and it was found that in the examined patients the average level of TSH was insufficiently adjusted 7.14±2.37 mIU/L; 8.03±3.77 mIU/L for Groups II, III, respectively, which was significantly different from the data obtained in the last study (p=0.000) (Table 1).

The results of studies using the scales [12] revealed that the ACE-R scale is a broader research tool and it considers detalization. It should be mentioned that the implementation of the ACE-R scale requires more time, as it usually takes10-12 minutes to examine a patient on an outpatient basis.

Thus, based on the results of our study, the data obtained did not differ from each other according to the MMSE, ACE-R scales. The results of this study and those obtained in the study [1] are consistent with these data. So, the MMSE scale is a useful diagnostic tool that can be used in medical practice to detect and evaluate CI.

These findings are powerful impetus for further research and interpretation of the data. Given the above, it should be noted that they deserve attention and require a detailed analysis of the mild and moderate CI, because they are of the greatest interest in the prevention of the progression of their severity and selective deficits of one or more cognitive domains.

CONCLUSIONS

1. Retrospective analysis of medical records made it possible to establish real long-term control of blood pressure and TSH in patients with hypertension, hypothyroidism and in patients with a combination of these diseases, which caused CI in 6.9% of hypertensive patients, in 10.3% of patients with hypothyroidism and in 13.8% of patients with combined pathology according to the MMSE test results. The ACE-R test results show the same sequence. In the individual assessment of ACE-R test scores revealed CI in Groups I-III: 6.4%; 9.6% and 13.8%, respectively. The MMSE scale evaluates the selective deficits of one or more cognitive domains; the Addenbrooke's ACE-R scale is a wide-ranging study tool, but it should be noted that the implementation of this scale requires more time.

2. Prospects for further research are in identifying the most vulnerable domains of cognitive functions in patients with hypertension, hypothyroidism, aiming at early detection of CI. All this necessitates the use of simple and reliable psychometric tools for the early diagnosis of cognitive disorders.

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