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THE IMPACT OF COMORBIDITY ON COGNITIVE PARAMETERS AFTER ISCHEMIC STROKE.

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SUMMARY

Objective: The aim of our study is to examine the impact of comorbidity on cognitive parameters after the first ever ischemic stroke.

Material and methods: We examined 112 patients (aged 46 to 84 (66.67± 5.96), 69 males and 43 females) with first ever ischemic stroke. For cognitive assessment we used Mini Mental State Examination (MMSE), 10 word test (for short term memory and delayed recall), Isaack's test for verbal fluency (VF), Geriatric depression scale (GDS), Hamilton depression scale (HDS), Blessed dementia information memory concentration test (revised, BDIMCT), Benton Visual Retention test (A,E; BVRT) – number of corrects and number of errors and Wiskonsin Card Sorting Test (number of errors, WCST). The patients were examined on two step model. At acute stage, after collecting medical history, somatic and neurological examinations, MMSE, 10 words test and HDS were applied. At subacute stroke stage (90±5 days after first stroke symptoms), all cognitive tests were used. „STATGRAPHICS Plus 5.0 (free version)"was used for statistical analysis.

Results: Chronic ischemic heart disease and chronic obstructive pulmonary disease are the most important additional risk factors for cognitive decline. Thyroid pathology, renal failure and anemia are independently associated with poststroke depression.

Conclusions: On the basis of these data we can conclude that vascular risk factors are independently associated with cognitive and emotional changes after stroke and their effects should be assessed and taken into account for subsequent treatment of stroke survivors.

Key words: comorbid diseases, postroke depression, poststroke cognitive impairment, vascular risk factors.

INTRODUCTION

Stroke is well known cause for cognitive impairment and dementia all over the world. It is strongly associated with vascular risk factors that act not only before stroke developing but even after that[1,2].

The aim of our study was to examine the impact of comorbidity on cognitive parameters after the first ever ischemic stroke.

MATERIAL AND METHODS

We examined 112 patients (aged 46 to 84 (66.67± 5.96), 69 males and 43 females) with first ever ischemic stroke. Of them, 34 (30.36%) were with basic level (below 8years) of education, 64 (57.14%) were with formal education between 11-13 years and 14 (12.50%) were with high level of formal education. Inclusion criteria for participation of the study were: Clinically and laboratory verified first ischemic stroke, lack of history or family history of dementia, moderate or severe decompensate internal diseases or psychiatric diseases, lack of aphasia.

For stroke assessment we used history, neurological status and CT/MRI imaging. Comorbidity was assessed on the basis of medical history, examinations and laboratory data. For cognitive assessment we used Mini Mental State Examination (MMSE), 10 word test (for short term memory and delayed recall), Isaack's test for verbal fluency (VF), Geriatric depression scale (GDS), Hamilton depression scale (HDS), Blessed dementia information memory concentration test (revised, BDIMCT), Benton Visual Retention test (A,E; BVRT) – number of corrects and number of errors and Wiskonsin Card Sorting Test (number of errors, WCST). The patients were examined in double step model. At acute stage, after collecting medical history, somatic and neurological examinations, MMSE, 10 words test and HDS were applied. At subacute stroke stage (90 ±5 days after first stroke symptoms), all cognitive tests were used.

„STATGRAPHICS Plus 5.0 (free version)"was used for statistical analysis. Kruskal Wallis test statistics were applied. All results were interpreted at the 95% confidential level.

RESULTS

The numbers of patients with or without examined comorbid diseases were summarized on table 1.

Table 1. Comorbidity

	With		Without	
	N=	%	N=	%
Chronic ischemic heart disease	45	40.18	67	59.82
Arterial hypertension	90	80.36	22	19.64
Arrhythmias	18	16.07	94	83.93
Chronic obstructive pulmonary disease	10	8.93	102	91.07
Thyroiditis	4	3.57	108	96.43
Renal failure	5	4.46	107	95.54
Anemia	6	5.36	106	94.64

Legend: N – number of patients, % - percent of them.

1. Impact of heart pathology on cognitive parameters after stroke.

After correction for education and age, Kruskal – Wallis test statistics was done. The results were summarized on table 2.

Table 2. Impact of heart pathology on cognitive parameters after stroke

	CIHD	AH	Arrhythmias
MMSE (A)	P>0.05	P>0.05	P>0.05
MMSE (SA)	**KW=5.93 P=0.0149**	P>0.05	P>0.05
Short term memory (A)	**KW=4.62 P=0.0316**	P>0.05	P>0.05
Short term memory (SA)	**KW=7.17, P=0.0074**	P>0.05	P>0.05
Delayed recall (A)	P>0.05	P>0.05	P>0.05
Delayed recall (SA)	**KW=6.34; P=0.0118**	P>0.05	P>0.05
VF (SA)	**KW=5.75, P=0.0165**	P>0.05	P>0.05
GDS (SA)	P>0.05	P>0.05	P>0.05
HDS (A)	**KW=5.27 P=0.0217**	P>0.05	**KW 9.71 P=0.0018**
HDS (SA)	**KW=7.80 P=0.0052**	P>0.05	P>0.05
BDIMCT (SA)	P>0.05	P>0.05	P>0.05
BVRT Cor	**KW=4.99 P=0.0255**	P>0.05	P>0.05
BVRT Er	**KW=5.62 P=0.0177**	P>0.05	P>0.05
WCST Er	P>0.05	P>0.05	P>0.05

Legend: MMSE – Mini Mental State Examination. VF – verbal fluency. GDS – Geriatric depression scale. HDS – Hamilton depression scale. BDIMCT – Blessed dementia information – memory – concentration test. BVRT – Benton visual retention test.

CIDS – chronic ischemic heart disease. AH – arterial hypertension

A – acute stage, SA – subacute stage, Cor – corrects, Er – errors, KW – Kruskal – Wallis coefficient, P – P of Kruskal – Wallis test statistics (Pe"0.05 – no statistically significant impact, P<0.05 – statistically significant impact).

2. Impact of chronic obstructive pulmonary disease, thyroiditis, renal failure and anemia on cognitive parameters.

The results were summarized in table 3.

Table 3. Impact of Chronic obstructive pulmonary disease, thyreoiditis, kidney failure and anemia on cognitive scales.

	COPD	Thyroiditis	Renal failure	Anemia
MMSE (A)	P>0.05	P>0.05	P>0.05	P>0.05
MMSE (SA)	P>0.05	P>0.05	P>0.05	P>0.05
Short term memory (A)	P>0.05	P>0.05	P>0.05	P>0.05
Short term memory (SA)	P=0.05	P>0.05	P>0.05	P>0.05
Delayed recall (A)	P>0.05	P>0.05	P>0.05	P>0.05
Delayed recall (SA)	P>0.05	P>0.05	P>0.05	P>0.05
VF (SA)	**KW 6.5 P=0.0107**	P>0.05	P>0.05	P=0.05
GDS (SA)	P>0.05	**KW 5.61 P=0.0179**	P>0.05	P=0.05
HDS (A)	P>0.05	**KW 8.41 P=0.0037**	**KW 9.18 P=0.0025**	**KW 6.57 P=0.0103**
HDS (SA)	P>0.05	**KW 7.87 P=0.0050**	P>0.05	**KW 6.13 P=0.0132**
BDIMCT (SA)	P>0.05	P>0.05	P>0.05	P>0.05
BVRT Cor	**KW 5.38 P=0.0204**	P>0.05	P>0.05	P>0.05
BVRT Er	**KW 5.59 P=0.0181**	P>0.05	P>0.05	P>0.05
WCST Er	P>0.05	P>0.05	P>0.05	P>0.05

Legend: MMSE – Mini Mental State Examination. VF – verbal fluency. GDS – Geriatric depression scale. HDS – Hamilton depression scale. BDIMCT – Blessed dementia information – memory – concentration test. BVRT – Benton visual retention test.

COPD - chronic obstructive pulmonary disease

A – acute stage, SA – subacute stage, Cor – corrects, Er – errors, KW – Kruskal – Wallis coefficient, P – P of Kruskal – Wallis test statistics (Pe"0.05 – no statistically significant impact, P<0.05 – statistically significant impact)

DISCUSSION

According to our study, we could conclude that additional vascular risk factors play important role not only on developing ischemic stroke itself, but on the severity of poststroke cognitive impairment. Chronic ischemic heart disease has the greatest influence on neuropsychological scales, result that we have been expected. It is associated with the disease of small brain vessels, particularly in elder patients, who may develop vascular cognitive impairment, even without stroke[3,4,5]. Stroke survivors with chronic ischemic heart disease have lower scores on MMSE and more severe memory impairment (verbal and visual), than patients without, particularly in subacute stroke stage so this factor acts not only before, but even more strong after the stroke. The disease is associated also with poststroke depression that is not so severe to influence cognitive domains and is not associated with additional impairment of executive functions. These data is in correlation with the conclusions of Framingham study[6].

Arterial hypertension is not an independent risk factor for poststroke vascular cognitive impairment, although the opposite results of other authors[5,6,7]. However Sachdev and al.[8] in their analysis on the problem wrote that while the hypertension increased the risk of vascular dementia itself, the retention of high blood pressure in already developed dementia had protective role on cognitive functions. On the other hand, most of them are on antihypertensive therapy and it is more or less difficult to examine the exact effect of these drugs on cognitive functions, moreover in literature there are controversial data for impact of hypotension therapy on cognition[9,10]. However, it is possible some of the patients without current arterial hypertension to have in their previous history hypertonic episodes even without their knowledge.

According to our study arrhythmia is not an independent risk factor for cognitive decline after stroke. However it increases the severity of acute poststroke

depression, although the exact mechanism is unclear.

Similarly to the work of De Carolis and al.[11], our data suggest that chronic obstructive pulmonary disease increases the severity of cognitive dysfunction. This fact could be explained with the continuous brain hypoxia. It affects more intensively verbal fluency and the retention of visual information, which seem to be more vulnerable on hypoxic factors.

Our results are in correlation with previous findings on association between thyroid gland pathology and depression[12], even in compensate stage of the disease. But there is not such association with cognitive performing. It may be due to the small sample of patients with thyroiditis examined.

Comparatively compensate renal failure and anemia are predisposing factors for poststroke depression due to various and diffuse mechanisms of action.

CONCLUSION

Comorbidity influences some cognitive and emotional domains, although this impact is not as strong as it has been previously assessed. Chronic ischemic heart disease and chronic obstructive pulmonary disease are the most important additional risk factors. Thyroid pathology, renal failure and anemia are associated with poststroke depression. So we can conclude that vascular risk factors are independently associated with cognitive and emotional changes after stroke and their effects should be assessed and taken into account for subsequent treatment of stroke survivors and even because of the exact risk profile of Bulgarian population[13], this should be taken into account for very specific national treatment program.

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