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ORIGINAL PAPER

Predilection Role Diabetes Mellitus and Dyslipidemia in the Onset of Ischemic Stroke

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Introduction: Stroke is the third leading cause of mortality, disability and dementia, but leading cause of epileptic manifestations in the elderly. Diabetes mellitus as permanently elevated blood glucose, often accompanied by dyslipidemia, is among the leading causes of atherosclerotic alteration in blood vessels and is also increasing in the world. **Goal:** To determine the existence and predilection of diabetes mellitus and dyslipidemia, in the development of ischemic stroke. **Material and methods:** During the 2011 are analyzed all people with stroke admitted at the Neurology Clinic. All patients underwent neurological tests and the laboratory test with special emphasis on the value of blood glucose and lipid levels, with brain CT which confirmed the existence of a stroke, EEG and internist examination. **Results:** During the one-year period the stroke was confirmed in 1184 patients, aged 33-81 years and 37% in the younger age group (up to 50 yrs.). There was 50.67% male and 49.33% female patients. Ischemic stroke was confirmed in 78.0% (56% with thrombotic and 22% with embolic genesis), of which the 32% was lacunar infarcts (up to 1.5 cm) and hemorrhagic in 22% (SAH in 4.8%, and intracerebral hemorrhage in 17.2%). The most frequent risk factors were hypertension 85%, then smoking in 65%, diabetes mellitus in 39.0%, in 27.38% dyslipidemia, previous stroke in 26.69%, in 23.57% arrhythmia In the baseline sample 30.06% of patients had previously diabetes mellitus and in 8.94% the diabetes was diagnosed during hospitalization, while dyslipidemia was known from earlier in 22.0% and in 5.38% cases was detected during the hospitalization. Among treated patients 79.01% survived, while 20.09% have a fatal outcome. **Conclusions:** Diabetes mellitus and dyslipidemia, along with hypertension and smoking are the leading risk factors for the occurrence of stroke. By timely detection and treatment can be controlled slow atherosclerotic changes in blood vessels and thus prevent stroke. Key words: stroke, diabetes mellitus, dyslipidemia.

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1. INTRODUCTION

Stroke – cerebrovascular insult is among the leading causes of death worldwide after cardiovascular diseases and cancer (10-15% overall mortality) and in some countries even the leading cause (1). In addition it is the leading cause of disability and dementia, as well as the first cause of epileptic manifestations in old age. It is most common in elderly patients, but stroke can occur at any age, including childhood. Common variable risk factor for stroke is hypertension, occurring in 40-85% of patients. Diabetes belongs to the conditional variable factors, which treatment could influence reduction of complications.

By definition, diabetes mellitus is a metabolic disorder characterized by abnormal glucose metabolism in terms of chronic hyperglycemia, but at the same time disturbed metabolism of lipids and proteins. This disorder accelerates atherosclerosis and induces microangiopathy (changes in retinal blood vessels, nerves, and kidneys) and macroangiopathy (changes in blood vessels of the heart, brain and limbs) (1). There are two types of diabetes mellitus, Type I occur in children and at younger age and it is an autoimmune disease in which there is destruction of the beta cells of Langerhans islands, causing lack of insulin and the insulin-dependent diabetes. Type II occurs in the elderly population and is also called insulin-independent diabetes, because in this case the cells develop resistance to insulin. Therefore, although there is production of insulin occurs chronic hyperglycemia (2).

It accompanies 10-35% of patients with stroke. Conditional variable factor are cardiac disease as a frequent source of emboli and various heart rhythm disorders. Hyperlipidemia is often companion of elevated blood sugar levels and also one of the factors that increase the degenerative changes in blood vessels. The third group of factors is bad

habits: smoking, alcohol consumption, low physical activity and obesity. Stress that is very topical lately, through the hypothalamic-pituitary axis and a genetic predisposition (3). Ischemic stroke can be caused by a narrowing of blood vessel lumen by thrombotic masses, or clogging of the same lumens embolus from the heart or remote parts or the body. Special form of ischemic stroke is lacunar infarcts–up to 15mm where neurological deficit occurs rapidly, but with a tendency of rapid regression and can mimic TIA. Lacunar infarcts are repetitive and resolves without acute neurological disorders, but repeated lacunar infarctions often leads to a variety of psychiatric disorders and dementia (4).

2. GOAL

To establish the existence of diabetes mellitus and dyslipidemia in patients with stroke.

3. MATERIAL AND METHODS

This paper analyzes all patients with stroke in 2011 and to all the patients are done the neurological exam accompanied by laboratory tests with special emphasis on the value of serum glucose and lipid profile, with monitoring of blood pressure and other risk factors, as well as CT scan (to confirm stroke), ECG and examination by internal diseases specialist.

4. RESULTS

During the one-year period, the stroke was confirmed in 1184 patients aged 33-81 years from which 50.67% are male and 49.33% female.

Gender	Male	Female	Total
No. (N)	600	584	1184
Percent (%)	50.67	49.33	100.00

Table 1. Gender structure

Ischemic stroke was confirmed in 78.10%, from which 56% of thrombotic and 22.1% of embolic type, out of which 32% were lacunar and hemorrhagic and was present in 22.0%, SAH in 4.8 % and intracerebral hematoma in 17.2%.

Analyzing the risk factors in our sample, the most common were hypertension in 85%, then 65% smoking, diabetes mellitus in 39.0%, 27.38% dyslipidemia, previous stroke at 26.69% and 23.57% arrhythmia.

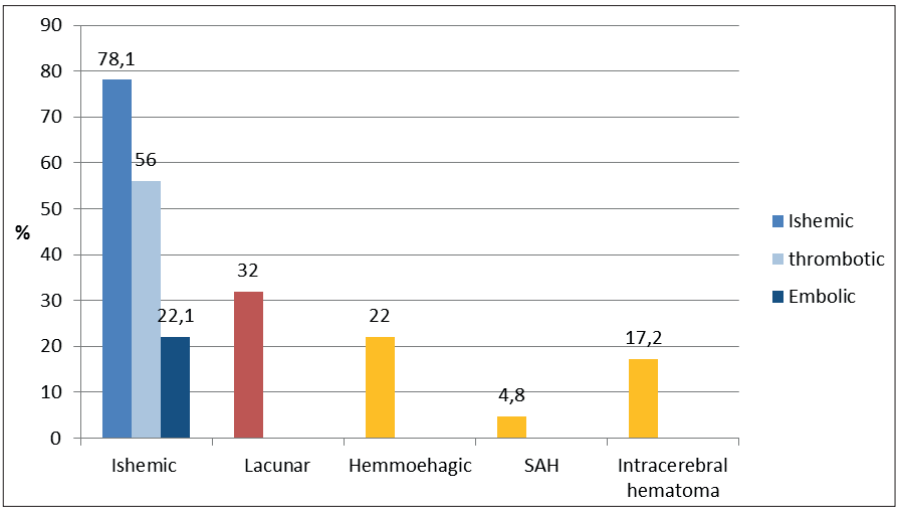

Figure 1. Stroke type

In the group of patients with diabetes, previous diabetes had and was treated 30.06% of patients while in 8.94% the disease was diagnosed after the stroke. Insulin therapy was applied in 42.06% of the total number of patients with diabetes, the per oral therapy in 50% of patients and 7.94% of the total number of patients with diabetes was not treated at all.

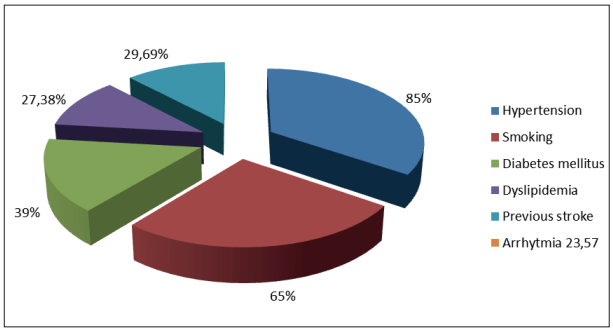

Figure 2. Risk factors

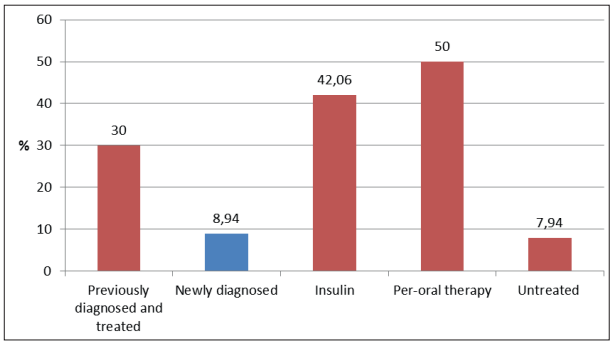

Figure 3.Diabetes treatment

Dyslipidemia was present in 27.38% of patients, the same was known earlier in 22.0% and at 5.38% was newly discovered. Diabetes with dyslipidemia was present in 21% of patients, hypertension with diabetes had 38% of patients, diabetes, hypertension and dyslipidemia was present in 27.5% of patients.

From the total number of stroke patients, survived (during treatment) 79.01% and 20.09% had lethal outcome.

5. DISCUSSION

In our study from the total number of stroke patients there was 50.67% male and 49.33% female patients.

In a study carried out by Peter Appelros, Birgitta Stegmayr and Andreas Terént, which was a systematic review of 98 articles around the world on the topic of gender differences among patients with stroke, it was concluded that the stroke is more frequent in male patients compared to female patients (5).

The age ranged from 33-81 years, with fact that 17% of patients were younger (up to 50 years).

U.S. National Institute of Neurological Disorders and Stroke states that the age is the leading risk factor of stroke and that 95% of all episodes occur in people older than 45 years, while two thirds of all episodes occur in people older than 65 years (6). In our study, 87%

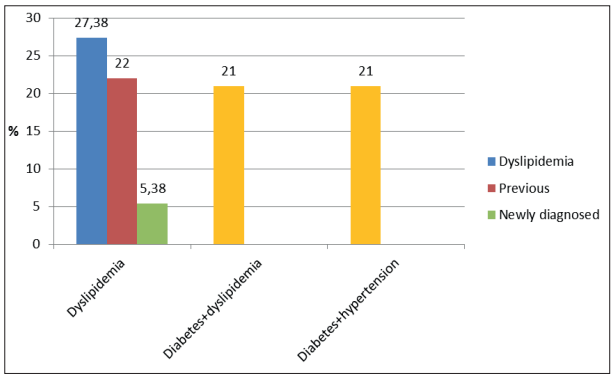

Figure 4. Dyslipidemia and hypertension in group of patients with diabetes

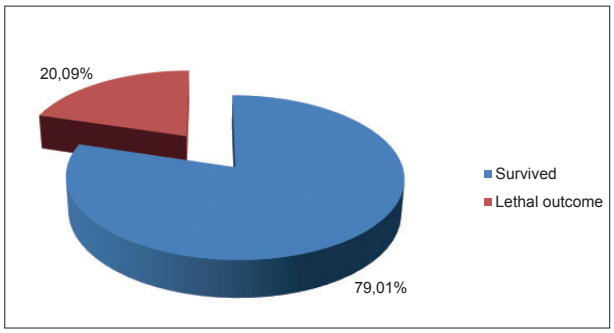

Figure 5. Treatment outcome

of strokes were in the age group over 50 years of age which is in accordance with world results.

Under the age of 40 years, men are present at 0.40% and women with 0.00%, at age group 50-59 years, males account for 10.32% and women for 3.97%, while in age group 60-69 years men account for 12.70% and women for 11.11% compared to the total number of all patients with a diagnosis of stroke, while in the age group over 70 years there is a greater proportion of women (14.52% F to 11.5% M)

Specifically, this study showed that the higher incidence of illness is among elderly women compared to men, which is in accordance with research by Demarin V, Trkanjca Z and Seric V and the Croatian society for the prevention of stroke who claim that men are more prone to stroke in reproductive and women at the age after the menopause (7).

In addition to age, there are a large number of risk factors that affect the development stroke and we follow in this paper: hypertension, diabetes mellitus, dyslipidemia, previous stroke and arrhythmias.

Hypertension as a risk factor was found in 85.0%, smoking in 65%, diabetes mellitus in 39.0%, dyslipidemia in 27.38% patients and 26.69% had previous history of stroke. Genetic factor was present in 7.54%. This study showed that diabetes mellitus and dyslipidemia, as risk factors, taking third and fourth place in frequency relative to other risk factors.

U.S. National Institute of Neurological Disorders and Stroke states that the existence of diabetes mellitus as a risk factor for stroke is same as have 15 years more than the actual age. Patients with diabetes mellitus have a 3 times greater risk of developing stroke compared to patients who without diabetes, and also often have some other risk factors, thus the overall risk of stroke morbidity multiplies (8).

Patients with diabetes in this study used a different type of therapy. In percent, 42.06% of patients used insulin in the treatment, 50.00% used oral anti-diabetes therapy, while 7.94% of patients was without any therapy for diabetes.

These results show that a better control of diabetes was established in those patients who use insulin in the treatment, compared to those who used oral anti-diabetics and that the higher risk for the occurrence of stroke is in those patients who used oral anti-diabetics in therapy due to poor disease control.

Demarin V, Bosnjak-Pasic M and Bosnar-Puretić M in their study presented the fact that diabetes mellitus is a major risk factor for cerebrovascular disease and progression of atherosclerosis. Of the five people who have experienced a stroke, one in its history has records of previous diabetes. This study showed twice the incidence of diabetes mellitus as a risk factor for the occurrence of stroke in relation to the data produced by the aforementioned authors. The explanation for this difference in results can be found in older patients in this study, because even at 83% of patients was older than 50 years (9).

Dyslipidemia is one of the major risk factors for the cerebrovascular disease. In numerous studies it has been observed that elevated levels of cholesterol and triglyceride in the serum leads to the accelerated development of atherosclerosis. Accelerates development of atherosclerosis is especially present with high levels of LDL-cholesterol or so called „bad“ cholesterol (low-density lipoproteins, which represent a fraction of cholesterol) versus „good“ HDL cholesterol (high-density lipoprotein, which reduces the risk of developing atherosclerosis).

On dyslipidemia, or the development of atherosclerosis, it can be influenced primarily by healthy diet, physical activity and use of statins. In our study, 27.38% patients had dyslipidemia, particularly cholesterol. A recent meta-analysis, which included data from studies CARE and 4S confirmed that the overall risk reduction is 31% by the use of statins (pravastatin and simvastatin) for the development of all forms of stroke, except for those with a fatal outcome (10).

In percent, 10.91% of the total number of patients involved in the study, has diabetes mellitus and dyslipidemia as risk factors, or approximately one out of nine patients in the study have both risk factors.

Research conducted in several cities in Bosnia and Herzegovina (Mostar, Livno, Tuzla) showed that dyslipidemia as a risk factor is present in 11.3% of patients with diabetes mellitus who developed stroke (11).

The study by Djelilovic-Vranic J, Alajbegovic A, Tiric-Campara M, and Todorovic Lj. in 2009 in Sarajevo shows that dyslipidemia as a risk factor was found in 48.65% of patients aged between 18 and 49 years, while in 24.43% of patients of the same age was found diabetes mellitus as a risk factor. Data collected by these authors differs from the results reached in this study (42.46% of patients with diabetes and 27.38% of patients with dyslipidemia). The reason for the discrepancy mentioned is due to the different populations involved in these studies, as this study included all ages, while in the previously mentioned

study included only younger age groups (18-49 years) (12).

When the outcome of the disease is in question, in this study it was found that 79.01% of the patients survived and 20.09% have lethal outcome. The results of this study are consistent with the results obtained by Ingall T at the Mayo Clinic in Arizona. Mentioned authors found that the survival of people diagnosed with stroke in the United States in the 2004 was 76.43% (13).

6. CONCLUSIONS

Ischemic stroke is more common than hemorrhagic.

The most common risk factors for stroke are hypertension, smoking, diabetes mellitus, dyslipidemia, previous stroke and heart rhythm disturbances.

Early detection of risk factors, especially diabetes and dyslipidemia and their adequate treatment contributes certainly to complications reduction at blood vessels and thus also reduces the likelihood of stroke.

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