

Occurrence and tendencies of important risk factors in patients with acute stroke in Osijek area

Bibijana Rostohar Bijelić¹, Nikola Bijelić², Ivana Hegeduš³, Dragutin Kadojić³

¹Scientific Research Unit, University Hospital Centre Osijek; ²School of Medicine, Josip Juraj Strossmayer University of Osijek;

³Clinic of Neurology, University Hospital Centre Osijek; Osijek, Croatia

ABSTRACT

Aim To investigate differences in frequency and distribution (according to type and subtype) of risk factors in patients suffering from stroke in Osijek area in years 2004 and 2009. **Methods** The group of 130 patients suffering from acute stroke in 2004 was compared to a group of 100 patients with the same disease in 2009. Stroke was classified as hemorrhagic stroke (intracerebral haemorrhage and subarachnoid haemorrhage) and ischemic stroke (divided into subtypes according to TOAST classification). Presence of risk factors (hypertension, hyperlipidemia, diabetes mellitus, atrial fibrillation, myocardial pathology and smoking) was analyzed.

Results Average age of acute stroke patients increased from 67.3 in 2004 to 70.5 in 2009, and the frequency of arterial hypertension increased from 112 (86%) to 91 (91%), respectively. Frequency of hyperlipidemia, diabetes and atrial fibrillation also increased, while frequency of smoking and myocardial pathology decreased. In 2009 significant differences in the distribution of atrial fibrillation and myocardial pathology according to subtypes were found. Also, there were significant differences between actual presence of hyperlipidemia and atrial fibrillation and the patients' awareness of them.

Conclusion Arterial hypertension remains the most frequent risk factor for stroke. Awareness about the presence of arterial hypertension and diabetes in stroke patients was high, but not about hyperlipidemia and atrial fibrillation. These results emphasize the need for increased activity in the field of primary and secondary prevention of stroke, and a possible review of diagnostic and therapeutic approaches.

Key words: brain infarction, cerebral hemorrhage, hypertension, epidemiology.

Corresponding author:

Bibijana Rostohar Bijelić
University Hospital Center Osijek,
Huttlerova 4, 31000 Osijek, Croatia
Phone: +385 31 512 376;
E-mail: bibijana007@gmail.com

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INTRODUCTION

Stroke is highly positioned on a scale of leading causes of death and disability worldwide (1-5). The situation in our county is likewise rather sullen. Stroke is the most frequent cardiovascular disease, and the second most frequent cause of death in Croatia (6-8). The facts that hypertension is one of the most important risk factors for stroke, and that successful blood pressure control greatly contributes to prevention of onset and recurrence of stroke are well documented (9-11). There are other risk factors which are also important in etiology of atherosclerosis, and consequently arterial hypertension and stroke, such as: hyperlipidemia, diabetes mellitus and smoking (9,12-16). A lot of effort has been made on a global scale in prevention of these risk factors, and this still is a great challenge for modern medicine (12). Therefore, it is of great importance to observe the impact of such factors on stroke and changes in this respect over time periods (9).

The purpose of this research was to determine possible difference in the frequency of hypertension and other risk factors (hyperlipidemia, diabetes mellitus, atrial fibrillation, myocardialopathy and smoking) in patients suffering from various types and subtypes of stroke admitted to the University Hospital Centre Osijek and General Hospital "Josip Benčević" in Slavonski Brod during 2004 and 2009. The distribution of risk factors according to subtypes of stroke in 2009 was analyzed (data for 2004 were, unfortunately, unavailable). Also, we investigated patients' awareness of risk factors presence and the influence of this awareness on their behavior regarding their health and possible preventive measures.

PATIENTS AND METHODS

A group of 130 patients suffering from acute stroke in 2004 was compared with a group of 100 patients with same disease in 2009. In all patients, the diagnosis of stroke was determined using computed tomography of the brain, while other diagnostic procedures such as electrocardiography, Transcranial Doppler, Color Doppler flow imaging (CDFI) of carotid and vertebral arteries, echocardiography and brain magnetic resonance imaging (MRI) were performed depending on clinical features. Stroke was classified as hemorrhagic stroke (intracerebral haemorrhage and subarachno-

id haemorrhage) and ischemic stroke which, according to Trial of Org 10172 in Acute Stroke Treatment (TOAST) classification comprises large vessel stroke (LVS), small vessel stroke (SVS), cardioembolic stroke (CES), stroke of other determined etiology (OCS) and stroke of undetermined etiology (US) (17,18).

The data about the risk factors were obtained through interviews with patients and from their medical files. The data about the group of patients from 2004 were taken over from the other research (Dikanović M, 2004, unpublished data). Next, for 2009, the presence of the most frequent risk factors in certain types and most frequent subtypes of stroke was investigated. Also, we analyzed the data about the presence of risk factors in the anamnesis and physical status to find out patients' awareness about the presence of risk factors, their control, and the success of preventive measures. Distribution of patients according to gender was analyzed using chi-square test, distribution of risk factors in tables from 2 to 4 using Fisher's exact test, and presence of risk factors in anamnesis and physical status using McNamar's test. Values of $p < 0.05$ were taken as significant.

RESULTS

Average age of patients suffering from stroke increased from 67.3 in the year of 2004 to 70.5

Table 1. Structure of analyzed groups according to the gender

Gender	No (%) of patients in the year		P
	2004 (n=130)	2009 (n=100)	
Males	66 (51%)	55 (55 %)	0.524
Females	64 (49 %)	45 (45 %)	

Table 2. Structure of analyzed groups according to stroke type and subtype

Type and subtype of stroke		No (%) of patients in the year		P
		2004 (n=130)	2009 (n=100)	
Hemorrhagic	ICH	21 (16 %)	18 (18 %)	0.074
	SAH	2 (2 %)	3 (3 %)	
	LVS	29 (23 %)	12 (12 %)	
	SVS	43 (33 %)	40 (40 %)	
Ischemic	CES	25 (19 %)	26 (26 %)	
	OCS	3 (2 %)	0 (0 %)	
	US	7 (5 %)	1 (1 %)	

ICH, intracerebral haemorrhage; SAH, subarachnoid haemorrhage; LVS, large vessel stroke; SVS, small vessel stroke; CES, cardioembolic stroke; OCS, stroke of other determined etiology; US, stroke of undetermined etiology.

Table 3. Presence of risk factors in analyzed groups of stroke patients, hemorrhagic stroke patients and ischemic stroke patients

Risk factor	Stroke			Hemorrhagic stroke			Ischemic stroke		
	2004 (n=130)	2009 (n=100)	p	2004 (n=23)	2009 (n=21)	p	2004 (n=107)	2009 (n=79)	p
Arterial hypertension	112 (86%)	91 (91%)	0.305	21 (92%)	18 (86%)	0.658	91 (85%)	73 (92%)	0.168
Hyperlipidemia	70 (54%)	58 (58%)	0.593	16 (69%)	14 (67%)	>0.950	54 (50%)	44 (56%)	0.553
Diabetes mellitus	28 (22%)	24 (24%)	0.875	5 (23%)	3 (14%)	0.701	23 (21%)	21 (27%)	0.381
Atrial fibrillation	26 (20%)	26 (26%)	0.340	3 (15%)	2 (10%)	>0.950	23 (21%)	24 (30%)	0.168
Myocardiopathy	74 (57%)	20 (20%)	<0.001	9 (38%)	1 (5%)	0.010	65 (61%)	19 (24%)	<0.001
Smoking	42 (32%)	18 (18%)	0.016	7 (30%)	3 (14%)	0.278	35 (33%)	16 (20%)	0.069

in 2009. According to the gender, in 2004 there were 64 (49%) females and 66 (51%) males, and in 2009 there were 45 (45%) females and 55 (55%) males (Table 1).

In 2004 the most frequent subtype of stroke was SVS (33%), followed by LVS and CES. In 2009 the most frequent subtype was LVS (54%), followed by CES and ICH, while share of SVS declined from 33% to 9% (Table 2). When compared to year of 2004, frequency of risk factors did not change significantly in year of 2009, except for smoking and myocardiopathy (Table 3).

Distribution of risk factors according to most frequent subtypes of ischemic stroke and hemorrhagic stroke showed statistically significant differences in two risk factors – atrial fibrillation and myocardiopathy (Table 4).

There was a statistically significant difference in the share of most frequent risk factors in the anamnesis and physical status of stroke patients. It is obvious that a large portion of stroke patients was aware of arterial hypertension and diabetes mellitus, but in spite of that, they were poorly controlled. Moreover, it was found that only a small number of examinees were aware of hyperlipidemia and atrial fibrillation, and that they were, consequently, unable to control them. The total number of 51 (out of 72, 71%) patients did not treat the hypertension successfully, 10 (out of 15, two thirds) diabetic patients did not manage to control the glucose

level, only six (out of 55, 11%) patients were aware of hyperlipidemia, and six (out of 26, 23%) of atrial fibrillation (Table 5).

DISCUSSION

The comparison of data from 2004 and 2009 showed that arterial hypertension is still the most frequent and the most important risk factor for stroke. The frequency of arterial hypertension in patients suffering from stroke in our population was rather high (91%) when compared to other countries (Denmark 43%, Canada 58%, USA 63%, and Poland 82%) (19-22). Our research showed that there was also high frequency of other common risk factors such as hyperlipidemia, diabetes, atrial fibrillation and smoking in our population. Overall distribution of risk factors was most similar to that in Poland, and in comparison to other stated countries only the distribution of diabetes and smoking was similar, while the frequency of other risk factors was much lower in those countries (19-22).

Since the incidence and prevalence of stroke in Croatia as a whole remained approximately the same in the 2004 and 2009 (7,8,23,24), and since stroke is the leading cause of death in Osijek-Baranja county (25), such high frequency of arterial hypertension points out some serious concerns. Although a lot of effort had been made to promote a healthier life-

Table 4. Distribution of risk factors according to most frequent subtypes of ischemic stroke and hemorrhagic stroke

Type of stroke	No (%) of patients with risk factor				p
	SVS (n=40)	LVS (n=12)	CES (n=26)	HS (n=21)	
Arterial hypertension	39 (98%)	10 (83%)	24 (92%)	18 (86%)	0.167
Hyperlipidemia	19 (48%)	10 (83%)	15 (58%)	14 (67%)	0.137
Diabetes mellitus	12 (30%)	3 (25%)	6 (23%)	3 (14%)	0.644
Atrial fibrillation	0 (0%)	1 (8%)	23 (88%)	2 (10%)	<0.001
Myocardiopathy	3 (8%)	4 (33%)	12 (46%)	1 (5%)	<0.001
Smoking	8 (20%)	2 (17%)	5 (19%)	3 (14%)	0.963

SVS, small vessel stroke; LVS, large vessel stroke; CES, cardioembolic stroke; HS, hemorrhagic stroke

Table 5. Presence of risk factors according to anamnesis and physical status

		No of patients		
		Status		
		Positive	Negative	Total
Arterial hypertension				
Anamnesis	Positive	51	21	72
	Negative	19	9	28
	Total	70	30	100
p=0.875				
Hyperlipidemia				
Anamnesis	Positive	6	3	9
	Negative	49	42	91
	Total	55	45	100
p<0.001				
Atrial fibrillation				
Anamnesis	Positive	6	0	6
	Negative	20	74	94
	Total	26	74	100
p<0.001				
Diabetes mellitus				
Anamnesis	Positive	10	5	15
	Negative	8	77	85
	Total	18	82	100
p=0.581				

style among the population, as well as to screen for and treat the hypertension effectively, there seems to be no significant improvement in the stroke-related morbidity and mortality. Also, questions arise both for prevention and management of hypertension and other risk factors, which measures should be taken in order to improve the current state in population, and consequently, outcome of stroke (26).

It was interesting to see that there was no significant change in the share of patients with hyperlipidemia, although, according to data available at the Croatian Agency for Drugs and Medical Products, the usage of two most prescribed antihyperlipidemic drugs in Croatia increased by 157.28% from 2004 to 2009 (in DDD/patient/day) (27, 28). On the other hand, some researchers reported that lower serum lipid levels seem to have had no independent effect on stroke morbidity and mortality (29,30). Further investigation of this phenomenon is needed, because this could suggest re-evaluation of current therapy approach concerning these medications.

The share of myocardopathy decreased significantly, which is an interesting fact, yet of unclear cause. Future studies, perhaps on a larger sample, might confirm and elucidate this finding. Significant decline in the share of patients who smoke was recorded. This may

be due to aggressive anti-smoking public campaigns.

In this study, significant differences in the presence of atrial fibrillation and myocardopathy were found. Both, as it was expected, were more frequent in cardioembolic stroke, which is most often a consequence of those two risk factors. It is well known that those conditions are susceptible to embolus formation and that the patients suffering from atrial fibrillation have a significantly larger risk for cardioembolic stroke (31).

Our data about the presence of risk factor in the anamnesis compared to physical status are indicative. It would be expected that patients who are aware of a risk factor (positive anamnesis) also control and neutralize this factor, and that it would not be present in the physical status during admission. However, it was concerning to see that majority of stroke patients with hypertension and diabetes were unable to control those risk factors. On the other hand, a large share of patients with hyperlipidemia and atrial fibrillation was unaware of these risk factors until they were found during admission into hospital, probably because symptoms are not as pronounced as for hypertension or diabetes. The above presented findings emphasize the need for education of the population on the importance of primary and secondary prevention. Increased activity in this field is necessary, perhaps working on new ways of approaching and reaching the population in order to improve awareness of importance of risk factors control in prevention of stroke. Since hypertension remained the most important risk factor for stroke, there is a great need for public education with regard to importance of regular blood pressure control and hypertension treatment. Also, improvement in screening of the population for certain risk factors, such as hyperlipidemia and atrial fibrillation should be considered. These measures should prove to be important steps in stroke prevention.

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TRANSPARENCY DECLARATION

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Pojavnost i promjene učestalosti važnih rizičnih faktora u oboljelih od akutnog moždanog udara na osječkom području

Bibijana Rostohar Bijelić¹, Nikola Bijelić², Ivana Hegeduš³, Dragutin Kadojić³

¹Znanstvena jedinica, KBC Osijek, ²Medicinski fakultet Sveučilišta J. J. Strossmayer, Osijek, ³Klinika za neurologiju, KBC Osijek; Osijek, Hrvatska

SAŽETAK

Cilj Istražiti razlike u učestalosti važnih rizičnih faktora u oboljelih od moždanog udara na osječkom području, u godinama 2004. i 2009, razlike u njihovoj distribuciji ovisno o vrsti i podvrsti moždanog udara, te svijest oboljelih o prisutnosti pojedinih rizičnih faktora.

Metode Skupina od 130 pacijenata oboljelih od akutnog moždanog udara u 2004. godini usporočena je sa skupinom od 100 pacijenata oboljelih od iste bolesti 2009. godine. Moždani udar je klasificiran kao hemoragijski (intracerebralno i subarahnoidalno krvarenje) i ishemijski (podijeljen u podvrste u skladu s TOAST klasifikacijom). Analizirana je prisutnost rizičnih faktora (hipertenzija, hiperlipidemija, dijabetes melitus, fibrilacija atrijsa, miokardiopatija i pušenje).

Rezultati Prosječna dob oboljelih od akutnog moždanog udara povećala se sa 67,3 u 2004. na 70,5 u 2009. godini. Učestalost arterijske hipertenzije je porasla sa 112 (86%) na 91 (91%), kao i učestalost hiperlipidemije, dijabetesa i fibrilacije atrijsa, dok se učestalost pušenja i miokardiopatije smanjila. U 2009. godini utvrđena je statistički značajna razlika u distribuciji fibrilacije atrijsa i miokardiopatije po podtipovima, kao i između prisutnosti i svijesti o prisutnosti hiperlipidemije i fibrilacije atrijsa.

Zaključak Arterijska hipertenzija i dalje je najčešći rizični faktor u svim vrstama i podvrstama moždanog udara. Svijest o njezinoj prisutnosti, kao i prisutnosti dijabetesa u rizičnoj populaciji je visoka, za razliku od svijesti o prisutnosti hiperlipidemije i fibrilacije atrijsa. Navedeni rezultati ističu potrebu za pojačanom aktivnosti u području primarne i sekundarne prevencije moždanog udara, kao i za mogućim modifikacijama u dijagnostičkom i terapijskom pristupu.

Ključne riječi: infarkt mozga, cerebralna hemoragija, hipertenzija, epidemiologija