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Original scientific paper

The Incidence of Stroke in Baranya County (East Croatia)

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A B S T R A C T

The aim of this retrospective study was to provide a survey of the incidence of stroke in Baranya, Croatia, on patients examined at Beli Manastir Health Center Department of Emergency from November 1, 1997 (the time of Baranya reintegration into the legal system of the Republic of Croatia after the war) till December 31, 2001. A total of 513 patients with symptoms of cerebrovascular diseases, or one patient every third day on an average, were examined. Total incidence of stroke was 16.09 per 10,000 population. The majority of patients were in the 61–80 age group with an incidence of 46.94 / 10,000 after the age of 60, 15-fold that was recorded in younger age groups. The most common risk factors recorded in examined group included hypertension, heart diseases, hyperlipidemia and diabetes mellitus. Total stroke mortality was 38.38%, whereas mortality in patients with hemorrhagic and ischemic stroke was 62.85% and 33.52%, respectively. The ratio of ischemic and hemorrhagic stroke in study subjects was 5:1, and in the causes of death 2.5:1. Out of 81 deceased stroke patients, 96.3% died within first 28 of admission. All of the patients with hemorrhagic stroke died within first 28 days, most within first 7 days (81.8%), whereas 94.9% of patients with ischemic stroke died within first 28 days.

***Key words**: stroke, ischemic stroke, hemorrhagic stroke, incidence, risk factors*

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Introduction

Baranya is a region in northeast Croatia with an area of 1148 km^2 and population of 42,633 living in the town of Beli Manastir and 45 surrounding villages (Figure 1). The region was the last one to be integrated into the legal system of the Republic of Croatia after the war. Emergency Department of the Beli Manastir Health Center (HCED) is located in Beli Manastir, the largest town in Baranya, providing health care service for the entire region. The nearest inpatient institution is Osijek University Hospital (OUH) at a distance of 33 km from Beli Manastir.

Fig. 1. Baranya, a region in east Croatia.

The aim of this retrospective study was to provide a survey of the incidence of stroke in Baranya, on patients with clinical picture of cerebrovascular diseases (CVD), examined at Beli Manastir Health Center Department of Emergency from November 1, 1997 (the time of Baranya reintegration into the legal system of the Republic of Croatia after the war) till December 31, 2001.

Baranya is a rural area with specific lifestyle and diet, based on a large portion of fatty acids in food, that had led to an increased presence of major stroke risk factors such as hypertension, diabetes mellitus, heart diseases and hyperlipidemia. The long period of war and mass migration of the population during and after war actions had resulted in prolonged stress and high proportion of elderly population as additional stroke risk factors in Baranya.

Material and Methods

Data from Beli Manastir HC records and medical documentation of OUH University Department of Neurology and Department of Pathology for the period from November 1, 1997 till December 31, 2001

TABLE 1
PATIENT DISTRIBUTION ACCORDING TO AGE AND SEX

Age groups (yrs)	Males (N)	%	Females (N)	%	Total (N)	%
21–30	1	0.19	1	0.19	2	0.38
31–40	3	0.57	1	0.19	4	0.76
41–50	12	2.34	2	0.38	14	2.72
51–60	36	7.03	18	3.53	54	10.56
61–70	110	21.45	91	17.73	201	39.18
71–80	74	14.42	102	19.91	176	34.33
81–90	13	2.54	46	8.96	59	11.50
91–100	1	0.19	2	0.38	3	0.57
Total	250	48.73	263	51.27	513	100

TABLE 2
CEREBROVASCULAR DISEASES DIAGNOSED IN EXAMINED PATIENTS

CVD disease	Male (N)	%	Female (N)	%	Total (N)	%
Transient ischemic attack	19	3.7	17	3.31	36	7.01
Hemorrhagic stroke	9	1.75	5	0.97	14	2.72
Ischemic stroke	17	3.32	8	1.55	25	4.87
Unspecified stroke	186	36.25	206	40.21	392	76.46
Hypertensive encephalopathy	8	1.55	14	2.72	22	4.27
Late stroke sequels	11	2.14	13	2.53	24	4.67
Total	250	48.71	263	51.29	513	100

TABLE 3
SIGNS AND SYMPTOMS IN EXAMINED PATIENTS ACCORDING TO INTERNATIONAL CLASSIFICATION OF DISEASES AND RELATED HEALTH PROBLEMS, TENTH REVISION

Signs and symptoms	N	%
Circulatory and respiratory system	29	5.65
Gastrointestinal system and abdomen	133	25.92
Skin and subcutaneous tissue	34	6.62
Nervous and musculoskeletal system	344	67.05
Urinary system	31	6.04
Cognition, perception, mental state and behavior	187	36.45
Speech and voice	213	41.52
General symptoms	115	22.41

were retrospectively analyzed and processed by the methods of descriptive statistics.

Results

During the period from November 1, 1997 till December 31, 2001, 513 patients with symptoms of cerebrovascular diseases were examined at Beli Manastir HCED. There were 250 men and 263 women, with mean age 69.46 years and age range 25–100 years. The majority of patients were in the 61–70 (n=201) and 71–80 (n=176) age groups (Table 1).

The following diagnoses were made on prehospital examination: transient ischemic attack (n=36), ischemic stroke (n= 25), hemorrhagic stroke (n=14), nonspecified stroke (n=392), hypertensive encephalopathy (n=22) and late stroke sequels (n=24). The group of patients with the diagnosis of nonspecified stroke (n= 392) showed a slight female predominance (206 female *vs.* 186 male patients) (Table 2).

The following symptoms were observed: symptoms involving circulatory and respiratory system (n=29), gastrointestinal system and abdomen (n=133), skin and subcutaneous tissue (n=34), nervous and musculoskeletal system (n=344), urinary system (n=31), cognition, perception, mental state and behavior (n=187), speech and voice (n=213) and general symptoms (n=115) (Table 3).

On clinical examination, the following neurological deficits were diagnosed: he-

TABLE 4
NEUROLOGIC DEFICITS RECORDED IN EXAMINED PATIENTS

Neurological deficits	N	%
Speech impairment	213	41.52
Deglutition impairment	31	6.04
Paresis	288	56.14
Facial paresis	207	40.35
Vision impairment	66	12.86
Ataxia	26	5.06
Consciusness impairment	77	15

TABLE 5
DURATION OF SYMPTOMS UNTIL HOSPITALIZATION (HOURS)

Duration of symptoms	N	%
<3	60	26.2
3–6	56	24.45
6–12	46	20.09
12–24	30	13.1
>24	37	16.16

miparesis in 288 (right-sided in 160, left -sided in 122, and paraparesis in 6), facial paresis in 207, speech disorders (aphasia and dysphasia) in 213, deglutition disturbance (dysphagia) in 31, vision impairment in 66, ataxia in 26, and consciousness disturbances in 77 (somnolence in 25, sopor in 20 and coma in 32) cases (Table 4).

Out of 401 patients that were referred to OUH University Department of Neurology (UDN) in Osijek, 229 were hospitalized for inpatient treatment; 60 of these 229 patients were admitted to UDN within 3 hours, 56 within 3–6 hours, 46 within 6–12 hours, 30 within 12–24 hours, and 37 patients more than 24 hours from the onset of symptoms (Table 5).

Clinical diagnosis of the hospitalized patients was given on the grounds of the clinical picture and the diagnostic examinations: CT (124), MRI (7), EEG (118).

TABLE 6
RISK FACTORS RECORDED IN EXAMINED PATIENTS

Risk factors	N	%
Hypertension	181	85.78
Diabetes mellitus	57	27.01
Cardiac disease	97	45.97
Hyperlipidemia	92	43.60

Stroke was diagnosed in 211 patients. In other 18 patients with clinical picture of cerebrovascular diseases, diagnoses were morbus cerebrovascularis (8), brain tumor (3), brain metastasis (3), plasmocytoma (1), subdural hematoma (1), dens epistrophei fracture (1), bleeding ventricular ulcer (1).

Retrospective analysis of the risk factors present in stroke patients revealed 181 patients to have suffered from hypertension, 57 from diabetes mellitus, 97 from cardiac diseases (atrial fibrillation and other arrhythmias, myocardiopathy, myocardial infarction) and 92 from hyperlipidemia (Table 6).

Out of 211 hospitalized stroke patients, 51 had one stroke, 6 had two strokes and 2 patients had three strokes.

Total incidence of stroke was 16.09 per 10,000 population. The male proportion was 51.65%, with stroke incidence of 17.78 and 14.62 per 10,000 in male and female population, respectively. The mean age of stroke patients was 68.37 years, with age range from 25 to 91 years and highest frequency of stroke in older, 61–80 age groups (75.82%). In the 20–59 age group, the incidence of stroke was 3.04 (4.3 and 1.7 in male and female, respectively) per 10,000. After the age of 60, the incidence of stroke was 46.94 (58.69 in male and 39.47 in female) per 10,000.

Out of 211 stroke patients, ischemic stroke was diagnosed in 176 and hemorrhagic stroke in 35 patients, both being most common in the 61–80 age group

(77.84% of ischemic and 65.71% of hemorrhagic stroke cases). Among 176 patients with ischemic stroke, great blood vessel involvement (Trial of Org 10172 in Acute Stroke Treatment – TOAST 1) was recorded in 30, lacunar and small blood vessel involvement (TOAST 2) in 27, cardioembolic stroke (TOAST 3) in 37, one known cause of stroke (TOAST 4) in 29, and two or more known causes or unknown stroke cause (TOAST 5) in 53 patients[1].

Out of 37 patients with hemorrhagic stroke, 33 had intracerebral hemorrhage and two had subarachnoid hemorrhage.

Out of 211 stroke patients, 130 survived: 119 with improved, 8 with unchanged and 3 with aggravated state, whereas 81 patients died (lethality of 38.38%) (Table 7).

TABLE 7
TREATMENT OUTCOME IN STROKE PATIENTS

Outcome	N	%
Improved	119	56.4
Unchanged	8	3.79
Deteriorated	3	1.42
Death	81	38.39

The group of 81 stroke patients who died at OUH UDN included 47 men and 34 women, with age range 25–88 and mean age 68.86 years. Ischemic stroke was diagnosed in 59 and hemorrhagic stroke in 22 patients. In patients who died at the hospital, ischemic stroke occurred after the age of 40, with highest *frequency* in the 71–80 age group (n=25), whereas hemorrhagic stroke occurred at an almost equal rate in all age groups involved, showing highest *frequency* in the 61–70 age group (n=10). In the group of 176 patients with ischemic stroke, 59 patients died (lethality of 33.52%), whereas in the group of 35 patients with hemorrhagic stroke 22 deaths were recorded (lethality of 62.85%).

The length of survival in stroke patients that died at the hospital ranged from several hours to 54 days. Within first 24 hours 15 patients died, 40 patients on day 1–7, 23 on day 8–28 and 3 patients on day 29–54 (Figure 2). Out of 59 patients with ischemic stroke, 10 patients died within 24 hours, 27 patients on day 1–7, 19 patients on day 8–28 and 3 patients on day 29–54 of admission (Figure 3). Out of 22 patients with hemorrhagic stroke, 5 patients died within 24 hours, 13 patients on day 1–7 and 4 patients on day 8–28 (Figure 4).

Discussion

During the period from November 1, 1997 till December 31, 2001, 513 patients with symptoms of cerebrovascular dis-

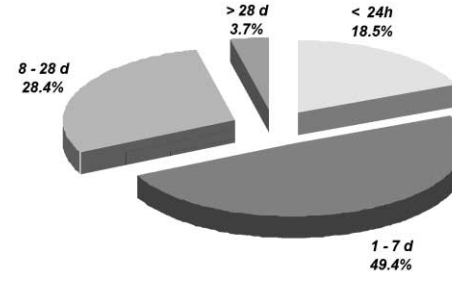

Fig. 2. Duration of the survival among the patients who died from stroke (days).

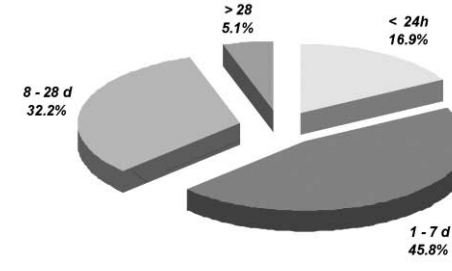

Fig. 3. Duration of the survival among the patients who died from stroke of ishemic type (days).

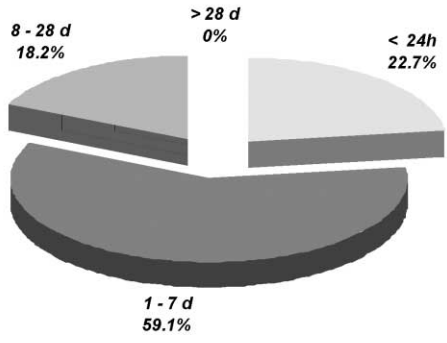

Fig. 4. Duration of the survival among the patients who died from stroke of haemorrhagic type (days).

ease, or one patient every third day on an average, were examined at Beli Manastir HCED. 401 patients were referred to OUH University Department of Neurology and 229 (57.1%) of these were hospitalized. On account of the limited capacity of diagnostics in emergency departments at Beli Manastir HCED, mostly based on history, heterohistory and clinical examination, the majority of patients (80.04%) were referred to the hospital with the diagnosis of nonspecific stroke.

Out of 229 hospitalized patients stroke was verified in 211. Overall stroke incidence was 16.09 *per* 10,000. The presence of the same exogenous risk factors such as saturated fat rich diet**,** alcohol consumption, cigarette smoking and weather conditions resulted in a comparable incidence of stroke in Baranya and Osijek (18.2 *per* 10,000 in the latter), as differentiated from 12.6 *per* 10,000 recorded in 1989 in Split[2,3]. The data obtained in the study are consistent with those on the incidence of cerebrovascular disease in the Caucasian population in the USA, ranging from 10 to 25 *per* 10,000[4], France (14.5 *per* 10,000)[5] and west Europe (15.5 *per* 10,000)[3].

The cohort of stroke patients showed a slight male predominance (51.65%), like in Sacco's research[6], with stroke incidence of 17.78 *per* 10,000, which was lower than the incidence recorded in Osijek but higher than that in Split (20.9 and 14.1 *per* 10,000, respectively). The difference from Split data was more evident in women (14.62 *vs.* 11.2 *per* 10,000)[3].

The mean age of stroke patients was 68.37 years, the youngest patient being aged 25 and the oldest 91 years. The highest frequency of stroke was recorded in the 61–80 age group (75.82%), with an incidence of 46.94 *per*10,000 after the age of 60. Similar to data from Split, a male predominance was observed under the age of 70 and female predominance after the age of 70, whereas male predominance was recorded in Osijek[3]. Patient age was demonstrated to be the major risk factor for the occurrence of stroke[7,8]. Stroke distribution rose exponentially with age in Osijek as well as in Split in 1989[3]. After the age of 60, the incidence of stroke was 15-fold that recorded in younger subjects. The rise in the incidence of stroke was especially pronounced in females (23 -fold that in <60 age groups), although sex comparison in the elderly showed the incidence of stroke to be by 33% higher in men, similar to the results reported from England and Wales[7].

Out of 211 stroke patients, 176 patients had ischemic stroke and 35 patients hemorrhagic stroke, both being most common in the 61–80 age groups (77.84% of ischemic stroke and 65.71% of hemorrhagic stroke cases), comparable to Osijek and Split in 1989[3].

The most common risk factors for stroke were hypertension[8–11], cardiac diseases[8,12–14], diabetes mellitus[8,9,15] and hyperlipidemia[8,9,16]. Hypertension was recorded in 85.78%, cardiac disease in 45.97%, hyperlipidemia in 43.60% and diabetes mellitus in 27.01% of our stroke patients. Baranya is a rural area with still present inappropriate dietary patterns, which have been deeply rooted and are still widely

present, resulting in an increased presence of major stroke risk factors. This may explain the higher presence of these risk factors as compared with Osijek in 1989 (hypertension in 68.6%, cardiac disease in 24.2%, elevated cholesterol in 41.2% and diabetes mellitus in 16.9% of stroke patients) and especially with Split (hypertension in 32.4%, cardiac disease in 22.9%, elevated cholesterol in 13.3% and diabetes mellitus in 15.0% of stroke patients)[3].

Out of 211 stroke patients, 130 survived: 119 patients with improved state, 8 with unchanged state, and 3 patients with deteriorated state, whereas 81 patients died. The lethality of 38.38% was slightly lower than that in Osijek (42.4%) but higher than in Split in 1989 (33.2%)[3].

Among the deceased, 72.83% had ischemic stroke and 27.17% hemorrhagic stroke. In those that died at hospital, ischemic stroke occurred after the age of 40 and with highest frequency in the 71–80 age group, similar to data from Osijek and Split. Hemorrhagic stroke occurred at a comparable rate in almost all age groups, however, highest frequency was recorded in the 61–70 age group, in contrast to Osijek and Split where it occurred after age of 45, but mostly after age of 65[3].

Lethality was higher among patients with hemorrhagic stroke than in those with ischemic stroke (62.85% *vs.* 33.52%), which is consistent with literature data[17,18].

Out of 81 deceased stroke patients, 96.3% died within first 28 of admission. All of the patients with hemorrhagic stroke died within first 28 days, most within first 7 days (81.8%), whereas 94.9% of patients with ischemic stroke died within first 28 days.

Conclusions

Total incidence of stroke in Baranya was 16.09 *per* 10,000. The majority of stroke patients belonged to older, 61–80 age groups (75.82%), with an incidence of 46.94 *per* 10,000 after the age of 60. After that age, the incidence of stroke was 15-fold that recorded in younger age groups. The survey showed a male predominance under the age of 70, and female predominance after the age of 70. The most common risk factors for stroke were hypertension, heart disease, hyperlipidemia and diabetes mellitus. Total stroke lethality was 38.38%, whereas hemorrhagic stroke and ischemic stroke lethality was 62.85% and 33.52%, respectively. The ischemic stroke to hemorrhagic stroke ratio in study patients was 5:1, and in the causes of death 2.5:1.

REFERENCES

1. ADAMS, H. P. Jr, B. H. BENDIXEN, L. J. KAPPELLE, J. BILLER, B. B. LOVE. D. L. GORDON, E. E. MARSH 3rd, Stroke, 24 (1993) 35. — 2. VULETIĆ, S., Coll. Antropol., 15 (1991) 197. — 3. PALIĆ, J.: Učestalost CVI i značaj faktora rizika u razvoju bolesti (epidemiološka studija – područje grada Osijeka). Ph. D. Thesis. (School of Medicine, University of Zagreb, Zagreb, 1999). — 4. SCHULTE, B. P. M., Neuroepidemiology of cerebrovascular disease: An overview. In: CHOPRA, J. S. (Ed.): Progress in cerebrovascular disease: Current concept in stroke and vascular dementia. (Elsevier, Amsterdam-New York-Oxford, 1990). — 5. GIROUD, M., P. BEURIAT, P. VION, P. H. D'ATHIS, L. DUSSERRE, R. UMAS, Neuroepidemiology, 8 (1989) 97. — 6. SACCO, R. L., Neurology, 49 Suppl 4 (1997) 39. — 7. MALMGREN, R., J. BAMFORD, C. WARLOW, P. SANDERCOCK, J. SLATTERY, BMJ, 298 (1989) 656. — 8. SACCO, R. L., Neurology, 45 Suppl. 1 (1995) 10. — 9. BRODERICK, J., T. BROTT, T. TOMSICK, A. LEACH, Stroke, 24 (1993) 49. — 10. PETTY, G. W., A. J. ORENCIA, B. K. KHANDHERIA, J. P. WHISNANT, Mayo Clin. Proc., 69 (1994) 632. — 11. HACHINSKI, V., C. GRAFFANGINO, M. BEAUDRY, G. BERNIER, C. BUCK, A. DONNER, J. D. SPENCE, G. DOIG, B. M. WOLFE, Arch. Neurol., 53 (1996) 303. — 12. KELI, S., B.

BLOEMBERG, Stroke, 23 (1992) 347. — 13. ADAMS, R. J., Neurology, 45 Suppl. 1 (1995) 15. — 14. SOUVIK, S., M. STEPHEN, S. M. OPPENHEIMER, Cerebrovasc. Dis., 51 (1998) 55. — 15. CHUKWUMA, C. S. R., J. TUOMILEHTO, J. Diabetes Complications, 7 (1993) 250. — 16. HACHINSKI, V., C. GRAFFAGNINO, M. BEAUDRY, G. BERNIER, C. BUCK, A. DONNER, J. D. SPENCE, G. DOIG, B. M. WOLFE, Arch Neurol., 53 (1996) 303. — 17. CHANG, C., National Taiwan University College of Medicine, Republic of China, 24 (1993) 212. — 18. MARINI, C., M. Di NAPOLI, P. SANTALUCIA, L. TRIGGIANI, A. CAROLEI, Eur. J. Neurol., 5 Suppl. 1 (1998) 19.

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INCIDENCIJA CEREBROVASKULARNIH INZULTA U BARANJI (ISTOČNA HRVATSKA)

S A Ž E T A K

Cilj ove retrospektivne studije bio je prikazati incidenciju cerebrovaskularnih inzulta (CVI) u Baranji, kod bolesnika pregledanih u Odjelu hitne medicinske pomoći (HMP) Doma zdravlja Beli Manastir u periodu od 1.11.1997. (vrijeme reintegracije u pravni sustav Republike Hrvatske nakon rata) do 31.12.2001. godine. Pregledano je 513 pacijenata sa simptomima cerebrovaskularne bolesti – u prosjeku, jedan pacijent svaki treći dan. Ukupna incidencija CVI bila je 16,09 na 10.000 stanovnika. Najviše ispitanika bilo je u skupini od 61 do 80 godina, sa incidencijom 46,94 na 10.000 nakon 60. godine života, gdje je 15 puta veća od one kod mlađih ispitanika. Najčešći čimbenici rizika ispitanika u našoj studiji bili su hipertenzija, srčane bolesti, hiperlipidemija, dijabetes. Ukupni letalitet CVI je bio 38,38%. Letalitet pacijenata sa CVI hemoragijskog tipa bio je 62,85%, a letalitet pacijenata sa CVI ishemijskog tipa 33,52%. Odnos ishemijskih i hemoragijskih inzulta među ispitanicima je bio 5:1, dok je ovaj odnos među uzrocima smrti bio 2,5:1. Od ukupno 81 umrlog bolesnika od CVI 96,3% ih je umrlo u prvih 28 dana. Svi bolesnici sa inzultom hemoragijskog tipa su umrli unutar prvih 28 dana, najviše u prvih sedam dana (81,8%), dok je od inzulta ishemijskog tipa u prvih 28 dana umrlo 94,9% bolesnika.