

# Cerebrovascular Insult Hospital Cases in the Clinical Hospital Mostar (Bosnia and Herzegovina) From 1999 to 2003 – An Example of an Institutional Register

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## ABSTRACT

*The analysis of a cerebro-vascular insult hospitalized cases in the Clinical Hospital Mostar as a retrospective epidemiological study was done in the Clinical Hospital Mostar for the period from 1999 to 2003. The major source of data was medical documentation of this hospital (an institutional register), the only hospital for the treatments of 457,491 inhabitants who gravitate by a health insurance for the treatment in this hospital. The study included a total of 1,555 cerebro-vascular insult cases treated in the Clinical Hospital Mostar. Among them 727 (46.8%) were male patients, while 828 (53.2%) cases were female. The majority of the cases were above 50 years of life. Majority of treated female patients were older than 61 (45.6% of all cases), as well as among male patients (31.3%). The least number of cases was under 41 years in both groups (1.2%). Prevalence of risk factors was 2,035 cases (74%). During the same period risk factors research for entire Federation of Bosnia and Herzegovina (FBiH) was performed on the sample of 2,750 national insurance holders, out of which 852 gravitate for treatment in CB Mostar. Out of them 1.7% was found to suffer of cerebro vascular insult.*

**Key words:** *cerebro-vascular insult, hospital morbidity and lethality, Clinical Hospital Mostar*

## Introduction

Epidemiological studies worldwide showed that the incidence of cerebro-vascular insult cases (brain insult) ranges from 300 to 500 cases per 100,000. The incidence is higher among male than female population, and it is doubling with each decade after 55 years of life<sup>1</sup>. Cerebro-vascular (brain) insult is defined as a sudden focal neurological deficit, caused by a cerebro-vascular disease lasting more than 24 hours. Cerebro-vascular insult in general is divided as ischemic and hemorrhagic (bleeding brain insult). Ischemic insult is more often, while around 10% of all brain insults are manifested as brain bleeding<sup>2</sup>.

Together with cardiac and malignant diseases, cerebro-vascular diseases are the most common mortality and invalidity cause of modern humans. Each year about 5.5 million of people all around the Globe suffer from the brain insult. Because of that fact, this disease is the leading cause of disability<sup>3–5</sup>. Complications occur among 25–40% of the cases; the most common are pneumonia, heart decomposition, and pulmonary embolia<sup>6</sup>. Brain insult occurs because of brain blood circulation problems, which results in insufficiency in oxygen supply for some parts of the brain. That leads to partial brain damages resulting in functional disability for the function

performed by that part of the brain<sup>3,7,8</sup>. It is estimated worldwide that as much as 46% of brain insult cases are among people between 45 and 59 years of life, while from 30 to 45 years the incidence is about 3%. The major cause in etiology of brain insult is blood vessels damaging due to atherosclerotic processes by mechanical (blood pressure) and/or chemical (hypercholesterolemia) factors; inflammation process of blood vessels; or some immune diseases (lupus erithematodes)<sup>2,6,9</sup>. In the literature major risk factors for developing of brain insult are: arterial hypertension, cardiac diseases, diabetes mellitus, adiposity, smoking, stress, high cholesterol, and rare hyper-uric diathesis<sup>10,11</sup>.

Prevention is the most relevant strategy in the brain insult approach, especially influencing of the changeable risk factors such as: smoking, dietary regime, alcohol intake, obesity etc., as well as influencing and treating some diseases as hypertension, heart diseases, diabetes, hypercholesterolemia. Blood pressure decrease of 5% among hypertonic population leads to the decrease in the brain insult frequency for more than 40 %<sup>12</sup>. Together with the treatment, preventing the risk factor (except for the unchangeable) is the best way to avoid insult.

The objective of this paper was to analyze the hospital morbidity and lethality of cerebrovascular insult in the Clinical Hospital Mostar from 1999 to 2003 from the Neurology department institutional register as well as research on hospitalized cases according to the sex and age distribution, hospital treatment outcome (lethality) and complications by epidemiological characteristics /risk factors.

**Materials and Methods**

This is a retrospective epidemiological study of hospitalized brain insult patients which by health insurance gravitate for treating to the Clinical Hospital Mostar. During 2003 that was a total of 457,491 people. This hospital is the major hospital for the treatment of health insured patients. There are other hospitals for these populations, but majority of these cases were treated in this hospital considering that this hospital is the only one with the neurology department and the intensive care unit. There are 29 beds, 8 neurologists and 26 nurses at this department. As a source of data we used medical documentation – an institutional register – of the neurology department. For each of the cases we analyzed: age,

sex, risk-factors, place of living and clinically confirmed cerebro-vascular insult diagnosis, as well as hospital treatment results and complications.

From 1 January 1999 until 31 December 2003 a total of 1,555 insult cases were hospitalized. Among them, 727 (46.7%) were male and 828 (53.3%) were female patients. The cases were divided in three age groups: less or equal 40, 41–50, 51–60, 61–70 and 70 and more years of life by sex. For the analyzing of table data, standard methods of descriptive statistics were performed.

**Results**

The structure of cerebro-vascular insult treated cases in the Clinical Hospital Mostar according to the age and gender was shown in Table 1.

A total of 1,555 cases were treated of brain insult in the period from 1999 through 2003 in the Clinical Hospital Mostar. Out of that number 727 (46.7%) were male patients, while 828 (53.3%) were female patients (Figure 1). Among both sexes a total of 20 cases (1.2%) were younger than 40 years old, 87 patients (5.6%) were from 51 through 60 years old, and the majority of patients treated because of the brain insult were 61 and over. Among all male and female patients observed separately by gender as a cluster, majority of the treated male cases were in the oldest group (over 61 years) of cases 67.0% (487 patients) as well as it was observed among female patients where registered percent in this group was even higher – 85.7% or 709 patients. The lowest number of cases according to the age structure was treated among younger patients – younger than 50 years old among either sexes – 9.2% (or 16 cases) of male cohort, and only 0.4% (or 4 cases) of female cohort (Table 2, Figure 2).

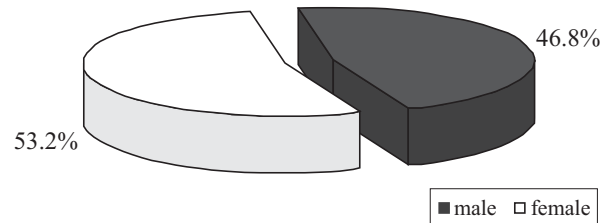


Fig. 1. The structure of total number of brain insult cases by gender treated in the Clinical Hospital Mostar from 1999 to 2003.

**TABLE 1**  
BRAIN INSULT CASES ACCORDING TO THE AGE AND GENDER DISTRIBUTION TREATED IN THE CLINICAL HOSPITAL MOSTAR FROM 1999 TO 2003

Gender	Total number of cases 1999–2003		Age									
			< 40		41–50		51–60		61–70		> 70	
	N°	%	N°	%	N°	%	N°	%	N°	%	N°	%
Male	727	100.0	16	2.2	67	9.2	157	21.6	231	31.8	256	35.2
Female	828	100.0	4	0.4	20	2.4	95	11.5	301	36.4	408	49.3
Total	1,555	100.0	20	1.2	87	5.6	252	16.2	532	34.2	664	42.8

**TABLE 2**  
BRAIN INSULT CASES HOSPITAL LETHALITY IN THE CLINICAL HOSPITAL MOSTAR 1999–2003

Gender	Treatment outcome	Total number of cases 1999–2003		Age									
				W 40		41–50		51–60		61–70		> 70	
		N°	%	N°	%	N°	%	N°	%	N°	%	N°	%
Male	Successfully treated	479	66,8	13	81.2	48	71.6	107	68.1	147	63.6	164	64.1
	Died	248	34,2	3	18.8	19	28.4	50	31.9	84	36.4	92	35.9
Female	Successfully treated	508	61,3	3	75.0	13	65.0	66	69.5	171	60.1	25	50.3
	Died	320	38,7	1	25.0	7	35.0	29	30.5	130	39.9	153	37.5
Total	Successfully treated	987	63,5	16	80.0	61	70.1	173	68.6	328	61.6	419	63.1
	Died	568	36,5	4	20.0	26	29.9	79	31.4	204	38.1	245	36.9

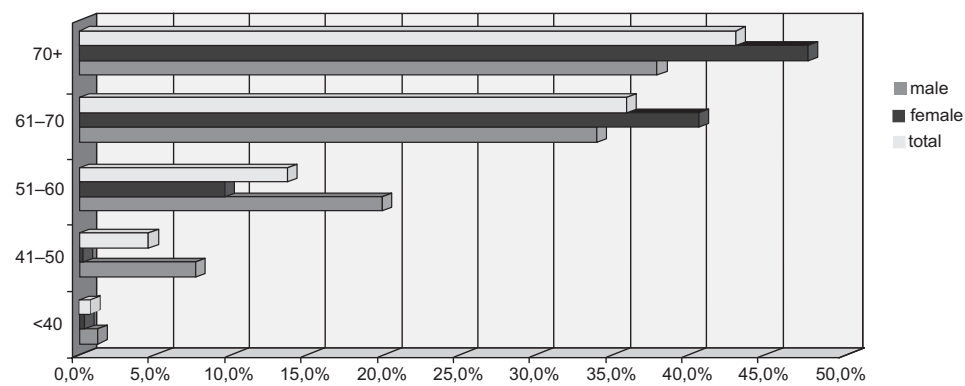


Fig. 2. Brain insult hospital lethality by age groups in the Clinical Hospital Mostar 1999–2003.

A research on risk factors among 213 patients during 2003 was conducted as well, either searching through available medical documentation or directly checking with patients wherever was possible regarding patient's conditions. The results were: 57.2% (122 patients) had

hypertension, 32.3% (69 patients) had myocardiopathy, 22.3% (47 patients) had diabetes, 16.1% (34 patients) had atrial fibrillation, 17.8% (38 patients) had hypercholesterolemia, 41.3% (88 patients) had increased triglycerides, 7.1% (15 patients) had triglycerides + cardiac diseases,

**TABLE 3**  
TREATMENT OUTCOME OF BRAIN INSULT IN 2001

Gender	Treatment outcome	Republic of Croatia*		Tuzla Canton**		West Herzegovina Canton ***	
		N°	%	N°	%	N°	%
Male	Treated in hospital	4,642	100.0	322	100.0	38	100.0
	Successfully treated	3,415	73.5	218	67.7	25	65.8
	Died	1,267	27.3	104	32.3	13	34.2
Female	Treated in hospital	6,706	100.0	375	100.0	44	100.0
	Successfully treated	4,621	68.9	244	65.1	27	61.4
	Died	2,045	30.5	131	34.9	17	38.6
Total	Treated in hospital	11,348	100.0	697	100.0	82	100.0
	Successfully treated	8,036	69.8	462	66.3	52	63.5
	Died	3,312	29.2	235	33.7	30	36.5

\*Republic of Croatia (all hospitals) = 4,381,352 inhabitants

\*\*Canton Tuzla (KB Tuzla) = 500,503

\*\*\*Canton West Herzegovina (KB Mostar) = 88,257 inhabitants

5.6% (12 patients) had triglycerides + hypercholesterolemia, 3.8% (8 patients) had hypertension + triglycerides, 3.3% (7 patients) had triglycerides + diabetes, 2.8% (6 patients) had diabetes + hypertension and 1.3% (3 patients) had hypercholesterolemia + diabetes. Some patients had more than one risk factor present in their status.

## Discussion

During the previous, recent period, population of Bosnia and Herzegovina was exposed to certain level of exposure to different risk factors influencing health status of individuals. This was particularly the case with the chronic non-communicable diseases, gastrointestinal problems as well as some viral diseases. Psychosocial factors and changed life styles, dietary regime, psycho stresses and social and economic factors have been linked with greater number of brain insult cases<sup>13,14</sup>. Cardiovascular diseases are the leading cause of mortality worldwide. Cerebro-vascular diseases are the leading cause of mortality among female population in neighboring countries in transition (Croatia), while the same diseases are in the second place among male population, just following cardiovascular diseases<sup>15</sup>. The same is characteristic for Bosnia and Herzegovina, and particularly for Federation of BiH<sup>16</sup>. If we compare our results with results of a similar study done in Tuzla Canton<sup>17</sup> we can see that hospital lethality among our patients was 36.5% while among Tuzla patients were 33.5%. The difference can be explained by different population age structure – Herzegovina has in general ageing population out of 457,491<sup>2</sup> and it is exposed to many risk factors that are combinative. More than 23% patients had 2 or more risk factors that result in higher lethality. This rather high lethality rate in both B&H regions is higher than in Western European Countries<sup>18</sup> but it is similar to the hospital lethality of other countries in transition<sup>19</sup>. In the Republic of Croatia (counting all hospitals) the hospital lethality is lower than in B&H, and that can be explained as a result of better organized prevention and early diagnosis<sup>16,20</sup>. One of the recommendations for decreasing the hospital lethality by up to 18% in B&H, according to the studies in developed countries, is establishing intensive care units for brain insult treatment<sup>21</sup>. Among our patients high value of triglycerides was observed in almost half of our patients (41.3%) – maximum referral values for male is 1.9 mmol/L and 1.6 mmol/L for female; and 17.8% of our patients had cholesterol above normal values (referral from 6.7–10.1 mmol/L). For them a treatment with *statins* was recommended as one kind of brain insult preventions, because *statin* treatment leads to the increased risk for clinical manifesting of brain insult for 19–31% of cases according to the other authors research's results<sup>22</sup>. Significance of establishing of an intensive care unit is greater when one bears in mind that among all treated cases in the Clinical Hospital Mostar over 70% (72.3%) are brain insult cases. According to Poek<sup>13</sup> there is no statistically significant difference in brain insult morbidity between men and women. The same finding was a result of our study.

According to the available literature the greater part of hospital treated patients according to the age is older than 50 year of life. That is confirmed in our study as well, where 93.2% of patients belong to that age group. We observed 77.0% patients older than 61 years. If we look to the sex distribution, 46.8% were male, and 53.2% were female patients among hospitalized. This data is similar to other authors' findings<sup>6,14</sup>. Our findings also showed that greater number of treated women were older than 61–59.3% compared to 40.7% of men among our hospitalized patients in that age group (45.6% female to 31.3% men of all cases in that age group). According to the same findings, looking to the younger patients, that ratio is slightly different – 66.9% of men vs. 33.1% of treated women. That is understandable having in mind that women have some hormone protection until after of menopause, and this finding is matching the other authors' findings<sup>8</sup>. Some authors' estimation considering age and brain insult is that in between 45 and 59 years of life should be about 46.0% of all brain insult cases<sup>11</sup>. Among our cases that percentage is lower for that age group (from 41 to 60) – 21.8%. Brain insult incidence according to the literature until 45 years of life is 3%<sup>11</sup>, while we found 1.2% younger than 40 years among all our observed hospitalized patients. Stress has significant role in increasing brain insult incidence and lethality as it was proved during the Gulf War in Jerusalem and during the recent War in Bosnia and Herzegovina<sup>22, 23</sup>.

If we calculate our total number of cases as an incidence rate per existing population gravitating to the Clinical Hospital and per 1,000 people the incidence rate for this population is 3.4‰.

Cerebro-vascular/brain insult as a last stage of cerebro-vascular diseases is among top leading mortality causes worldwide, so research on risk factors for developing that disease is of the highest importance. Such a research study was done among 2,750 insured in FBiH using questionnaires and measurements. Among that population 46 (or 1.7%) were found to have brain insult. Regarding standard risk factors 18.5% were found to have hypertension, 15.8% hypercholesterolemia, and 5.9% diabetes. In 2002 in all Cantons of Federation of B&H research on chronic non-communicable diseases risk factors was conducted on a sample of 2,750 populations. A part of that study was 852 inhabitants of Herzegovina from 25 to 64 years gravitating for a medical treatment to Clinical Hospital Mostar. Among them 1.7% were found to had brain insult (2.0% male, 0.5% female). Some of the risk factors analyzed and found among them were: hypertension had 41% (35.5% male, 44.8% female), smoking 37.6% (49.2% male, 29.7% female), overweight was 21.5% (16.5% male, 25.0% female), diabetes has 5.4% (4.8% male, 5.8% female)<sup>20</sup>.

In this retrospective epidemiological study including the Clinical Hospital Mostar patients from 1999–2003, a total of 1,555 brain insult patients were hospitalized. The greater part of hospitalized patients age 61 and more were women; in the age group from 51 to 60 years majority were men, same as among patients below 41 which

was the smallest patient cohort. Regarding the objective, this study follows other neighboring countries in transition. Data obtained for the neurology department from an institutional register as a very reliable source of information proved to be very useful for our study. Using these information public health care system can organize and undertake targeted brain insult risk factors preventive measures. Better organization of primary health

care settings and capacities planning is easier to achieve if collected data are reliable. Establishing population screening programs through family medicine physicians/practice will contribute significantly to early diagnosis and adequate on-time treatment. If more efforts will be given to the prevention programs and population based activities including screening and its results, brain insult lethality rate in B&H should be reduced.

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## HOSPITALIZACIJA OBOLJELIH OD CEREBROVASKULARNOG INSULTA U KLINIČKOJ BOLNICI MOSTAR OD 1999. DO 2003. GODINE – PRIMJER INSTITUCIJSKOG REGISTRA

### SAŽETAK

Analiza oboljelih od cerebrovaskularnog inzulta u Kliničkoj bolnici (KB) Mostar, kao epidemiološka retrospektivna studija, učinjena je u Kliničkoj bolnici Mostar u vremenskom razdoblju od 1999 do 2003 godine. Glavni izvor podataka je bila medicinska dokumentacija (institucionalni registar) pacijenata ove bolnice, kao jedine bolnice za liječenje 457 491 stanovnika koji gravitiraju ovoj bolnici prema zdravstvenom osiguranju. Studijom je obuhvaćeno 1 555 pacijenata, koji su liječeni zbog cerebralno-vaskularnog inzulta u KB Mostar. Od sveukupnog broja, 727 (46.8%) su bili muškarci, dok je 828 (53.2%) bilo žena. Većina oboljelih je bila starija od 50 godina. Većina liječenih ženskih pacijenata je bila starija od 61 godine života (45.6% svih oboljelih), isto kao i muškaraca (31.3%). Najmanji broj oboljelih je imao manje od 41 godine u obje grupe (1.2%). Prevalencija čimbenika rizika je 2,035 (74%). Tijekom istog razdoblja čimbenici rizika su istraženi na 2,750 nacionalnih osiguranika cijele Federacije Bosne i Hercegovine, od kojih 852 je gravitiralo liječenju u KB Mostar. Od njih 1.7% je imalo cerebrovaskularni inzult.