STUDY ON POTENTIAL RISK FACTORS OF CEREBRAL STROKE IN PATIENTS TREATED IN DUC GIANG GENERAL HOSPITAL IN 2020

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ABSTRACT

Stroke is the leading cause of disability and mortality worldwide. It is thus critical to recognize potential risk factor of cerebral stroke to prevent or minimize morbidity and mortality. Therefore, we conducted a cross-sectional study on 131 patients with stroke in Duc Giang general hospital in 2020. The finding of 131 patients with stroke: 57,25% ischemic stroke and 42,75% hemorrhagic stroke; 28,24% right side paralysis, 22,14% left side paralysis and 3.05% complete paralysis. The result also showed potential risk factors of stroke including: male gender (56,49%), over 60 years of age (66,41%), alcohol consumption (53,44%), current smoking (49,62%), diabetes (23,66%), high blood cholesterol (64,89%), high blood pressure (72,52%), heart disease (15,27%), renal disease (9,16%), infectious disease (21,37%) and thrombophilia (15,27%). As a result, we need solutions to prevent stroke especially among elderly people and people with high blood cholesterol, high blood pressure.

Keywords: *cerebral stroke, acute ischemic stroke, risk factors, intracerebral hemorrhage.*

I. INTRODUCTION

Cerebral stroke (called stroke or cerebrovascular accident) has two main clinical types: acute ischemic stroke (AIS) is characterized by a sudden loss of blood circulation to an area of the brain due to blockage of vessels by thrombosis or clots in the cerebral arteries, resulting in the corresponding loss of nerve function; and intracerebral hemorrhage (ICH), also known as cerebral infarction, is more common than hemorrhagic stroke, which is caused by a rupture of arteries in the brain [3]. Every year, 15 millions of people suffer stroke worldwide, of which, 5 million die and 5 million become permanently disabled [3]. The incidence of cerebral infarction increases rapidly with age. Especially, after the age of 55, the prevalence of stroke doubles after every decade [2].

Brain stroke is the leading cause of disability, the second cause of dementia and accounts for 3% of mature deaths (or 7 million people) in the United States. Annually, there are about 800,000 first-time cases and about 600,000 recurrences.

Stroke is a disease that causes brain damage, and disturbs brain function. Lesion sites can cause hemiplegia symptoms in the part of the body opposite the damaged part of the brain. Studies indicated that at the age of 65 and older, about half of patients with hemiplegia die over a 6-month period.

In Vietnam, there is not much available data on brain stroke epidemiology. At Duc Giang General Hospital, about 500 cases are diagnosed and treated each year for brain stroke. In order to find solutions in the prevention, diagnosis and timely treatment of brain stroke, we conducted a study with the topic: "Study on potential risk factors of

cerebral stroke in patients treated at Duc Giang General Hospital in 2020"

II. METHODOLOGY

● **Study subject** *:* Patients identified brain stroke by clinical diagnosis and MRI, CT scan of the brain.

● **Time and place:** From January 1 to December 2020 at Duc Giang General Hospital

● **Study design:** Cross-sectional description, quantitative study, evaluation based on medical records combined with exploitation of the patient's family history

● **Sample size and sample selection method:**

$$n = \frac{Z^2_{\left(1-\frac{\alpha}{2}\right)}p(1-p)}{d^2}$$

-n: is the minimal ample size needed for the study

-$Z_{1-\alpha/2}$: The level of statistical significance, with α= 0.05, the coefficient Z1-α/2=1,96

-d = 0,1 Margin of error

-p=0,5: The hypothetical proportion of patients with cerebral stroke with hemiplegia or paralysis.

n = 93 patients is the minimal number of patients needed for the study, actually surveyed patients is 131.

● **Evaluation criteria:** According to the Professional Document guiding the diagnosis and management of brain stroke according to Decision No. 5331/QD-BYT dated 23/12/2020 [3] .

III. RESEARCH RESULTS

3.1. Demographic characteristics

Characteristics		Frequency (n)	Percentage (%)
Gender	Male	74	56.5
	Female	57	43.5
Age	≤50 years old	20	15.3
	51-60 years old	24	18.3
	61-70 years old	34	26.0
	71-80 years old	39	29.8
	>90 years old	14	10.7

The male patients accounted for higher prevalence. The highest age was 92 years and the lowest was 26 years, with an average age of 65,82±13,62, the highest age group was 71-80 years old (29,77%), followed by 61-70 years old (25,95%).

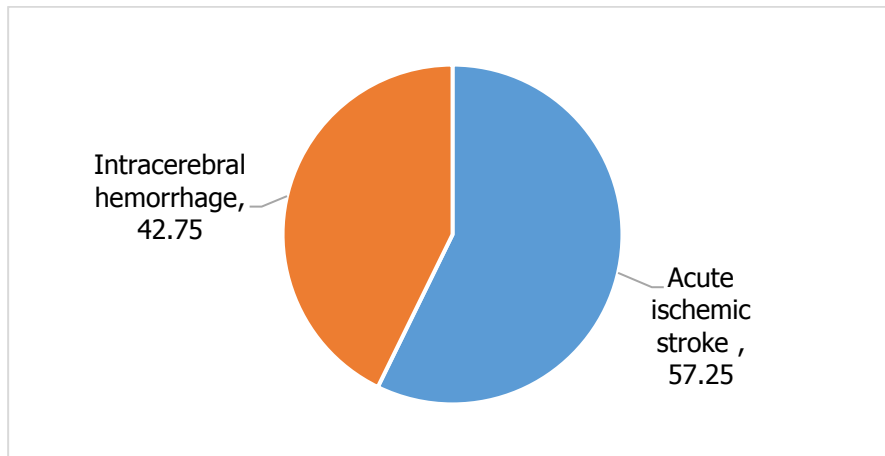**3.2. Epidemiological characteristics of cerebral stroke patients**

Figure 1. *Types of cerebral stroke*

Of the 131 cerebral stroke cases, 56 cases (42,75%) were intracerebral hemorrhage, while 75 cases (57,25%) were acute ischemic stroke.

Table 1. **Types of cerebral stroke by gender**

Gender	Intracerebral hemorrhage		Acute ischemic stroke		General	
	n	%	n	%	n	%
Male	39	69,64	35	46,67	74	56,49
Female	17	30,36	40	53,33	57	43,51
SUM	56	100	75	100	131	100
OR=2.62 (95%CI 1.27-5.43), p<0.001						

Males constituted the majority (56,49%), while females did less numerous (43.51%). Males accounted for a high proportion of intracerebral hemorrhage, while females accounted for a high one of acute ischemic stroke, a statistically significant difference (p<0.001).

Table 2. *Types of cerebral stroke by age*

Age	Intracerebral hemorrhage		Acute ischemic stroke		General	
	n	%	n	%	%	n
≤50 years old	11	19,64	9	12,00	20	15,27
51-60 years old	10	17,86	14	18,67	24	18,32
61-70 years old	13	23,21	21	28,00	34	25,95
71-80 years old	16	28,57	23	30,67	39	29,77
>90 years old	6	10,71	8	10,67	14	10,69
SUM	56	100	75	100	131	100
p=0,814						

The prevalence of both intracerebral hemorrhage and acute ischemic stroke tended to increase by age.

Table 3. *Type of stroke and consequences*

Types of stroke / Aftermath	Intracerebral hemorrhage		Acute ischemic stroke		General	
	n	%	n	%	%	n
Left hemiplegia	31	55,36	6	8,00	37	28,24
Right hemiplegia	20	35,71	9	12,00	29	22,14
Quadriplegia	4	7,14	0	0	4	3,05
Restriction of movement	1	1,79	60	80,00	61	46,56
SUM	**56**	**100**	**75**	**100**	**131**	**100**
p<0.001						

The rate of hemiplegia accounted for more than 50%, of which left hemiplegia is 28,24%, right hemiplegia is 22,14%. Treatment results also showed that 4 cases did not recover and 1 patient asked to quit treatment. Hospitalization duration ranged from days to months.

Table 4. *Risks related to the patient's habits*

Type of stroke / Habits		Intracerebral hemorrhage		Acute ischemic stroke		General		p
		n	%	n	%	%	n	
Cigarette smoking	Yes	41	73,21	24	32,00	65	49,62	**<0.001**
	No	15	26,79	51	68,00	66	50,38	
Drink alcohol	Yes	39	69,64	31	41,33	70	53,44	**0,001**
	No	17	30,36	44	58,67	61	46,56	
SUM		**56**	**100**	**75**	**100**	**131**	**100**	

Patients smoking accounted for 49,62%, alcohol consumption accounted for 53,44%. The cerebral hemorrhage group had a higher history of alcohol consumption and smoking than the cerebral infarction group (p<0.001).

Table 4. *Risks related to medical conditions*

Type of stroke / Risk		Intracerebral hemorrhage		Acute ischemic stroke		General		p
		n	%	n	n	%	n	
Diabetes mellitus	Yes	21	37,50	10	13,33	31	23,66	**0,001**
	No	35	62,50	65	86,67	100	76,34	
Hypercholesterolemia	Yes	48	85,71	37	49,33	85	64,89	**<0.001**
	No	8	14,29	38	50,67	46	35,11	
Hypertension	Yes	50	89,29	45	60,00	95	72,52	**<0.001**
	No	6	10,71	30	40,00	36	27,48	
Cardiovascular disease	Yes	12	21,43	8	10,67	20	15,27	0,0902
	No	44	78,57	67	89,33	111	84,73	
Kidney disease	Yes	8	14,29	4	5,33	12	9,16	0,074
	No	48	85,71	71	94,67	119	90,84	
Bacterial infections	Yes	3	5,36	25	33,33	28	21,37	**<0.001**
	No	53	94,64	50	66,67	103	78,63	

Type of stroke		Intracerebral hemorrhage		Acute ischemic stroke		General		p
Risk		n	%	n	n	%	n	
Coagulopathy	Yes	3	5,36	17	22,67	20	15,27	0,003
	No	53	94,64	58	77,33	111	84,73	
SUM		56	100	75	100	131	100	

The results showed that stroke patients had a higher incidence of hypercholesterolemia, hypertension. The study also found that the intracerebral hemorrhage group had higher rates of contracting diabetes, hypercholesterolemia, and hypertension than the acute ischemic stroke patients group (p<0.001). The acute ischemic stroke patients group had a higher incidence of bacterial infections and coagulopathy than the cerebral hemorrhagic group (p<0.01).

IV. DISCUSSION

The highest age group in the study was 92 years and the lowest was 26 years, with an average age of 65,82±13,62, the highest age group was 71-80 years (29,77%), followed by 61-70 years old with 25,95%, 51-60 years old (18,32%), under 50 years old (15,27%), over 90 years old (10,69%).

The study found that out of 131 patients, there were 56 cases of intracerebral hemorrhage (42,75%), and 57 cases of cerebral infarction (57,25%). Our study results differ from those of Tadi et al. (2021) with 85% cases of cerebral infarction and 15% cases of cerebral hemorrhage [8]. Our results are similar to the study of Nguyen Trong Hung with 30% intracerebral hemorrhage and 70% cerebral infarction [5], and the one of Nguyen Duy Cuong and Nguyen Thi Tuyet [6].

Our research results show that males constituted the majority of cerebral stroke cases (56.49%), while females did less (43.51%). Males accounted for a high proportion of intracerebral hemorrhage, while females accounted for a high incidence of cerebral infarction, with a statistically significant difference (p<0,001). Our results are similar to Nguyen Duy Cuong et al.

(2014): male 56%, female 44% [6]. Studies around the world showed that men constituted 20–30% higher percentage of brain stroke than women [7].

The study results also showed that both groups of intracerebral hemorrhage and cerebral infarction were similarly increasing along with patients' age (p>0,05). Our study is similar to the results of Nguyen Duy Cuong et al. (2014) in which the age group 70-79 is the highest (32,10%), followed by the age group 60-69 (29,5%), the age group over 80 is 18.90% [6]; and the results of the study of Ovbiagele et al. (2011 showed that patients with a nearly two-fold increased risk of brain stroke for every 10 years (RR=1,97, 95%CI 1,79-2,16) [7]. Similarly, the meta-analysis results of Boehme et al. (2017) showed that the older the age, the higher risk of both intracerebral hemorrhage and cerebral infarction [1].

Cerebral stroke has serious consequences. In our study, patients with hemiplegia accounted for more than 50%, in details: left hemiplegia accounted for 28,24%, right hemiplegia accounted for 22,14%, movement restriction rate was 46,56%. The results of the analysis also showed that human paralysis accounted for a higher

proportion in the cerebral hemorrhage group than in the cerebral infarction group. Treatment results also showed that 4 cases did not recover and 1 patient asked for hospital discharge. Patients usually stayed at hospitals in periods ranging days to months of hospitalization. One of the most common effects is hemiplegia/ movement disorder. Studies indicated that at the age of 65 and above, about a half of patients suffered hemiplegia in a 6-month period. It has also been shown that medical equipment is needed in 30% of post-stroke patients to be able to move [4].

It was shown that 49,62% of stroke patients had smoked and 53,44% had used alcohol. There was a difference between alcohol consumption and smoking between 2 groups of cerebral hemorrhagic stroke and cerebral infarction, in which alcohol and tobacco use in the cerebral hemorrhagic group was higher (p<0.01). According to a study by Ovbiagele et al. (2011), the risk of brain hemorrhage in the smoking group was OR=1.31 (95%CI 1.02-1.67), the alcohol-using group was OR=4.11 (95%CI 2.54-6.65) [7]. In addition, the study of Boehme et al. (2017) demonstrated that alcohol and tobacco rise the risk of brain stroke [1].

Our study results showed the prevalence of patients contracting diabetes mellitus were 23,66%, hypercholesterolemia 64,89%, hypertension 72,52%, heart disease 15,27%, kidney disease 9,16%, bacterial infections 21,37%, blood clotting disorders 15,27%. Our study also showed that in the cerebral hemorrhage group there was a higher incidence than in the cerebral infarction group in terms of the incidence of diabetes mellitus, hypercholesterolemia, hypertension (p<0,01). While sepsis and coagulopathy were higher in the cerebral

infarction group (p<0.01). Our study is similar to Nguyen Trong Hung's results in that hypertension accounted for the highest proportion (67%) of brain stroke [5]. Our study is similar to the results of Nguyen Duy Cuong et al. (2014) in which hyperlipidemia among cerebral stroke patients accounted for 53,5%, diabetes mellitus and atrial fibrillation accounted for 8,4% and 6,8% respectively [8]. Our study is similar to that of Ovbiagele et al. (2011) showing that inflammatory and infectious manifestations pose a risk of cerebral infarction, whereas cerebral hemorrhage is present in hypertensive patient populations [7]. Research by Boehme et al. (2017) also showed that the risk of cerebral infarction is alcohol consumption, diabetes mellitus, cardiovascular, while the risk of intracerebral hemorrhage is hypertension, smoking [1].

V. CONCLUSIONS AND RECOMMENDATIONS

The cross-sectional description study on 131 cerebral stroke patients indicated that 57,25% were cerebral infarctions and 42,75% were cerebral hemorrhages. The incidence of hemiplegia in patients is more than 50% of brain stroke patients. The study also found the potential risk factors of brain stroke including gender, age, alcohol use, smoking, diabetes, hypercholesterolemia, hypertension, heart disease, kidney disease, bacterial infections, coagulation.

Research results showed that for elderly patients, hypercholesterolemia and hypertension need to be regularly examined and monitored to take measures to prevent stroke.

Patients using alcohol, tobacco, patients with diabetes mellitus, hypercholesterolemia,

hypertension should be monitored and prevented intracerebral hemorrhage. While patients with bacterial infections and coagulation disorders should be monitored and prevented cerebral infarction.

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