

# Assessment of major risk factors among stroke patients

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## ABSTRACT

**الأهداف:** دراسة العوامل التي تزيد من خطر الإصابة بالجلطة الدماغية عند المرضى المصابين بهذا المرض وذلك في محافظة الأنبار، غربي العراق.

**الطريقة:** أُجريت هذا الدراسة المقطعية على 200 مُصاب بالجلطة الدماغية في قسم الأمراض الباطنية بمستشفى الرمادي التعليمي وذلك خلال الفترة من يناير 2009م إلى أغسطس 2009م. لقد تم جمع المعلومات المفصلة الخاصة بتاريخ المرض وتم التركيز على ما إذا كانت العوامل التي تزيد من خطر الإصابة بالجلطة الدماغية موجودة أم لم تكن موجودة، بالإضافة إلى جمع بعض البيانات الديموغرافية الخاصة بالمرضى. خضع المرضى لبعض الفحوصات العامة والعصبية، كما أُجريت لهم بعض الاختبارات المعملية والحيوية الكيميائية، بالإضافة إلى عمل أشعة مقطعية للدماغ.

**النتائج:** لقد كان عدد الذكور 97 مريضاً (48.5%) من أصل 200 مُصاباً بينما كان عدد الإناث 103 مريضات (51.5%)، وأشارت النتائج بأن 166 مريضاً (83%) قد تخطت أعمارهم الخمسين عاماً حيث كان متوسط الأعمار 63.66 عاماً. ظهرت الجلطات الدماغية الاحتشائية في 171 مريضاً (85.5%)، فيما ظهرت الجلطات الدماغية النزفية في 29 مريضاً (14.5%). وفيما يخص العوامل التي تزيد من خطر الإصابة بالجلطة الدماغية فقد كان 138 مريضاً (69%) يعاني من ارتفاع ضغط الدم، وكان 61 منهم (44.2%) ذكوراً، و77 منهم (55.8%) إناثاً. وكان 82 مصاباً (41%) من داء السكري، وكان 37 منهم (45.1%) ذكوراً و45 منهم (54.9%) إناثاً. وقد وصل عدد المصابين المدخنين إلى 66 مريضاً (33%)، كان 50 منهم (75.5%) ذكوراً و16 منهم (24.2%) إناثاً. وقد وصل عدد المرضى الذين يعانون من أكثر من عامل واحد من العوامل التي تزيد من خطر الإصابة بالجلطة الدماغية إلى 146 مريضاً (73%).

**خاتمة:** تشير الدراسة بأن ارتفاع ضغط الدم، وداء السكري والتدخين من أكثر العوامل التي تزيد من خطر الإصابة بالجلطة الدماغية. ويعد الأشخاص الذين يعانون من أكثر من عامل واحد من العوامل التي تزيد من خطر الإصابة بالجلطة الدماغية أكثر عرضه للإصابة بهذا المرض.

**Objectives:** To evaluate the major modifiable risk factors of stroke among stroke patients in Al-Anbar Province, western Iraq.

**Methods:** A cross-sectional study was carried out on stroke patients admitted in the Internal Medical Department, Al-Ramadi Teaching Hospital from January to August 2009. Informative and detailed history was obtained concerning the presence of risk factor(s) and essential demographic data. General and neurological examinations, biochemical and laboratory investigations, in addition to brain CT-scanning were performed.

**Results:** In a total of 200 patients, 97 (48.5%) were males, and 103 patients (51.5%) were females. One hundred and sixty-six patients (83%) were more than 50 years old with a mean age of 63.66 years. Ischemic stroke was found in 171 patients (85.5%), and hemorrhagic stroke was found in 29 patients (14.5%). Hypertension was found in 138 patients (69%). Sixty-one (44.2%) of them were males, and 77 (55.8%) of them were females. Diabetes was found in 82 patients (41%), and 37 (45.1%) of them were males, and 45 (54.9%) of them were females. Smokers was found in 66 patients (33%), and 50 (75.5%) of them were males, and 16 (24.2%) of them were females. Multiple risk factors (>1) were found in 146 patients (73%).

**Conclusion:** Hypertension, diabetes, and smoking were the major risk factors for stroke. People with multiple risk factors are more susceptible to develop stroke.

*Saudi Med J 2010; Vol. 31 (9): 1028-1031*

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*Received 8th May 2010. Accepted 2nd August 2010.*

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Stroke is defined by abrupt onset of a neurologic deficit that is attributable to a vascular cause.<sup>1</sup> The term stroke is used when symptoms begin abruptly, as a result of either inadequate blood flow, or hemorrhage into the brain tissue (parenchymal hemorrhage), or surrounding subarachnoid space (subarachnoid hemorrhage).<sup>2</sup> Impaired cerebral blood flow causes ischemic stroke, or cerebral infarction.<sup>3</sup> Stroke is the third leading medical cause of death in the West, and the most common cause of morbidity in developed countries, and is the most common disabling neurological disorders in the middle and late years of life.<sup>4</sup> Its incidence increase with age. The rate of stroke among men and women are similar.<sup>5</sup> Approximately 80% of strokes are caused by inadequate blood flow to some, or all of the brain. The remaining strokes are divided between parenchymatous and subarachnoid hemorrhages.<sup>6</sup> Cerebral ischemia may result from thrombotic or embolic occlusion of a major vessel that reduces blood flow within the involved vascular territory.<sup>5</sup> In younger patients (such as, below 50 years of age) unusual causes should be considered, especially if they have no apparent cardiovascular risk factors.<sup>6</sup> Generally, risk factors for stroke can be classified as modifiable and non-modifiable. Well-documented non-modifiable risk factors include age, gender, family history, and ethnicity.<sup>1</sup> The modifiable risk factors for stroke includes: hypertension (HT), diabetes, smoking, hypercholesterolemia, heavy alcohol consumption, connective tissue diseases, and drugs like oral contraceptives, as well as congestive heart failure, cardiomegaly or ventricular aneurysm (CVA), atrial fibrillation (AF), recent intramural myocardial infarction (MI), mitral valve disease, polycythemia, septic emboli, and atrial myxoma.<sup>7</sup> Other factors which participate in the occurrence of hemorrhagic stroke include rupture of arteriovenous malformation of intracerebral vessels, or as a side effect of anticoagulants, antiplatelets, and thrombolytic agents.<sup>8</sup> Stroke is a significant healthcare problem in many countries with major morbidity and mortality rates. A greater understanding of the importance of controlling modifiable risk factors will help in effective stroke prevention,<sup>9</sup> but patients who have had a stroke or transient ischemic attack (TIA) remain at risk for stroke, coronary, and other cardiovascular events.<sup>8</sup> A CT scan study is the most practical and widely available method of imaging the brain. It will usually exclude non-stroke lesions like subdural hematoma and brain tumors, it can also differentiate ischemic from hemorrhagic stroke.<sup>3</sup> Control of HT, treatment of AF, and smoking cessation have reduced the incidence of stroke, but stroke still remains an important public health challenge. A better understanding of the risk factors for stroke is needed to develop additional preventive strategies.<sup>10,11</sup> Despite

the importance of stroke as a leading cause of disability and death, its incidence has been decreased in recent decades, largely because of improved treatment and management of underlying risk factors, as well as establishing the definite diagnosis earlier, supported by predictive criteria for the functional outcome in these cases.<sup>2</sup> Hyperlipidemia is emerging as an independent risk factor for stroke, although some studies<sup>12</sup> have been equivocal. More importantly, several studies have demonstrated impressive stroke risk reductions with statin agents.<sup>12</sup> This study was carried out to determine the major modifiable risk factors of stroke among stroke patients in Al-Anbar Province, west of Iraq.

**Methods.** Patients were eligible for inclusion in the study if they had received a clinical diagnosis of acute stroke. A cerebral CT scan was required before randomization in the study. The CT scan of the brain was carried out during the first few days of hospitalization. Patients with normal CT scan, subdural hematoma or brain tumor was excluded from the study. The study population consisted of 200 patients with diagnosis of stroke who were admitted in the Internal Medical Department of Al-Ramadi Teaching Hospital from January to August 2009. The ethical approval was granted by the Scientific Research Committee of Al-Anbar College of Medicine. Data was collected via a specially designed questionnaire, and included thorough evaluation including history, determining specifically the main complaint, stressing on the onset and duration, as well as the presence or absence of risk factor(s) such as HT, diabetes, AF, ischemic heart disease (IHD), valvular heart disease, previous stroke or transient ischemic attack, connective tissue disease, smoking, and heavy alcohol consumption. History was obtained from close relatives if the patient was unconscious, drowsy aphasic, or making direct communication with patients, if possible. The full general and neurological examination was carried out for those patients. The available investigations were carried out for them including complete blood picture, erythrocyte sedimentation rate (ESR), electrocardiogram, chest x-ray, and echo study of the heart.

All data were analyzed by using the Statistical Package for Social Sciences version 14) (SPSS Inc, Chicago, IL, USA). A  $p \leq 0.05$  was considered statistically significant.

**Results.** A total of 200 patients were included in this study. Among them, 97 (48.5%) were males and 103 (51.5%) were females, and the mean age was 63.66 years. Most patients (31%) were in the age group of 51-60 years. The second highest number of patients (28%) were in the age group of 61-70 years (Table 1). According to CT scan findings, it was found that 85.5%

**Table 1** - Distribution of patients according to age group and gender among stroke patients.

Age group	Gender		Total
	Male	Female	
31-40	3 (50.0)	3 (50.0)	6 (3.0)
41-50	10 (35.7)	18 (64.3)	28 (14.0)
51-60	30 (48.4)	32 (51.6)	62 (31.0)
61-70	32 (57.1)	24 (42.9)	56 (28.0)
71-80	17 (42.5)	23 (57.5)	40 (20.0)
81-90	5 (71.4)	2 (28.6)	7 (3.5)
91-100	-	1 (0.5)	1 (0.5)
<b>Total</b>	<b>97 (48.5)</b>	<b>103 (51.5)</b>	<b>200 (100)</b>

**Table 2** - Distribution of patients according to CT scan findings and gender.

CT-scan finding	Gender		Total
	Males	Females n (%)	
Ischemic	85 (87.6)	86 (83.5)	171 (85.5)
Hemorrhagic	12 (12.4)	17 (16.5)	29 (14.5)
<b>Total</b>	<b>97 (48.5)</b>	<b>103 (51.5)</b>	<b>200 (100)</b>

$\chi^2$  (chi-square)=2.3,  $p>0.05$

**Table 3** - Distribution of patients according to risk factors and gender.

Risk factors	Gender		Total
	Males	Females n (%)	
Hypertension	61 (44.2)	77 (55.8)	138 (69.0)
Diabetes mellitus	37 (45.1)	45 (54.9)	82 (41.0)
Smoking	50 (75.8)	16 (24.2)	66 (33.0)
Old cardiomegaly or ventricular aneurysm	31 (52.5)	28 (47.5)	59 (29.5)
Ischemic heart disease	19 (43.2)	25 (56.8)	44 (22.0)
Atrial fibrillation	6 (37.5)	10 (62.5)	16 (8.0)
Heart failure	3 (37.5)	5 (62.5)	8 (4.0)
Others	2 (66.7)	1 (33.3)	3 (1.5)
Undetermined	2 (22.2)	7 (77.8)	9 (4.5)

of patients had ischemic stroke, while hemorrhagic stroke was found in 29 patients (Table 2). There is no association between CT scan finding and gender. The distribution of patients according to risk factor and gender is shown in Table 3. Three patients had risk factors that was referred as other, which include (drugs, connective tissue disorder, polycythemia, alcohol) and 2 of them were males, the first one had polycythemia, and the other one developed hemorrhagic stroke after receiving thrombolytic agent as treatment for acute MI. The third one was a female with connective tissue disease (antiphospholipid syndrome) as she had a history of abortion, deep venous thrombosis, intrauterine death and high ESR. Nine patients were found with no ambient modifiable risk factor, and 6

**Table 4** - Distribution of risk factors according to age groups.

Age group, year	Risk factors								
	H	DM	S	Old CVA	IHD	AF	HF	Others	UD
31-40	5	3	4	1	2	-	-	2	1
41-50	18	8	9	6	5	1	1	-	3
51-60	39	26	17	9	11	5	3	1	4
61-70	41	28	26	19	15	7	2	-	-
71-80	27	15	8	19	7	2	-	-	1
81-90	7	2	2	4	3	1	2	-	-
91-100	1	-	-	1	1	-	-	-	-
<b>Total</b>	<b>138</b>	<b>82</b>	<b>66</b>	<b>59</b>	<b>44</b>	<b>16</b>	<b>8</b>	<b>3</b>	<b>9</b>

H - hypertension, DM - diabetes mellitus, S - smoking, CVA - cardiomegaly or ventricular aneurysm, IHD - ischemic heart disease, AF - atrial fibrillation, HF - heart failure, UD - undetermined

**Table 5** - Distribution of patients according to number of risk factors and gender.

Risk factors	Gender		Total
	Males	Females n (%)	
No	2 (22.2)	7 (77.8)	9 (4.5)
One	22 (48.9)	23 (51.1)	45 (22.5)
More than one	73 (50.0)	73 (50.0)	146 (73.0)
<b>Total</b>	<b>97 (48.5)</b>	<b>103 (51.5)</b>	<b>200 (100)</b>

of them were above 60 years old (Table 3). As shown in Table 4, we found that the frequencies of most risk factors (HT, DM, smoking, old CVA, IHD, and AF) were higher in the age group 61-70 years old. Table 5 shows the distribution of patients according to number of risk factors and gender.

**Discussion.** It was found that there was a predominance of women cases in this study. It is interesting to note that women predominance was also recognized in a study by Ikram et al<sup>13</sup> among stroke patients in Rotterdam, which showed that 59% of patients were women. The predominance of women in the current study may be in part due to an unpleasant situation in Iraq during the last 30 years. The current study showed that 52% of patients were 60 years and older, and this is not in total agreement with the standard results worldwide, in which 95% of stroke occur in people 45 years and older, and two-thirds of stroke occur in those over the age of 65 years,<sup>14</sup> and stroke affect men and women nearly equally.<sup>5</sup> Most patients fall in the age group 51-60 years as shown in Table 1, and this result is not parallel to that of a UK study, in which half of all cases occur in people above 75 years.<sup>15</sup> This is due to inappropriate primary and secondary preventive measures in order to decrease the

influence of modifiable risk factors of stroke, and this explains the development of stroke at an earlier age.<sup>1</sup>

According to CT scan findings, the current study shows that 85.5% of stroke are ischemic in origin, while hemorrhagic variety constitute only 14.5%, in contrast to Western country figures, which are 80% ischemic, and 20% hemorrhagic in origin.<sup>6</sup>

The frequency of HT in this study is 69%, which is higher than that in Iran 45%.<sup>16</sup> This may be due to the difference in lifestyle as high salt and fatty meal intake incorporate in the high incidence of HT in our society, and poor control of this disease are the causes of high frequency of HT in stroke patients. The frequency of DM among the studied patients is 41%, which is also higher than that in Iran (15%).<sup>16</sup> This can be explained by a high prevalence of this disease in our community compounded by ineffective and poor management and control of this disease. The frequency of smoking in our study was 33%, which was higher than that of a Rotterdam study (23%),<sup>13</sup> and lower than Iranian figure (40.7%),<sup>16</sup> and this may be due to our patients who have denied smoking, specially among women. The recurrence rate of stroke in patients with previous stroke or TIA is higher than in Turkey, which was 16.1%,<sup>17</sup> and this is due to inadequate or ineffective secondary preventive measures, and lack of cooperation of patient's with low education level. Past history of IHD was found to be lower than in Turkey, which was 57.5%,<sup>17</sup> and it may be due to short longevity of our patients after developing ischemic heart attack as compared to others in the developed countries, and short longevity after developing coronary heart disease. The incidence of AF in this study was 8%, while that in Turkey was 23.3%.<sup>17</sup> This can be attributed to the fact that the most common cause of AF in the elderly is IHD, and our patients die prematurely from IHD owing to inadequate health service.

There were few limitations of the present study to be recognized including lipid profile, which should be carried out for every patient with stroke, in addition to duplex ultrasonography, and transcranial Doppler study of cerebra circulation.

In conclusion, HT, diabetes, and smoking were the major risk factors. Peoples with more than one risk factors are more susceptible to develop stroke. We recommend that health authority should establish strategies for stroke prevention, including better awareness and control of hypertension, treatment of AF, and smoking cessation, to reduce the disease burden. In addition, achieving good diabetic control, encouraging people to avoid alcohol consumption, quit smoking, maintaining

ideal body weight to decrease the chance of having cerebrovascular events. A better understanding of the risk factors for stroke is needed to develop additional preventive strategies.

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