

## Evaluation of stroke risk factors among hospitalized patients with ischemic stroke in Baghdad

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### Abstract

**Introduction:** Identification of stroke risk factors is of great importance to prevent the disease and its sequels.

**Objective:** Is to analyze the known stroke risk factors and to study the education level, housing condition and economic status as possible relevant stroke risk factors.

**Patients and methods:** 510 patients with ischemic stroke of different types and severity who were admitted to 3 hospitals in Baghdad. The patients were examined and investigated thoroughly. Special emphasis was concentrated on education level, housing condition and economic status.

**Results:** 510 patients were studied, 215 females and 295 males. The study showed 16 % higher male prevalence. Hypertension is commonest risk factor in the present study (75.5%) followed by other risk factors. the study showed a higher number of stroke patients [44.7%] was illiterate, in comparison to [9%] of the patients with the higher

education. The study showed more prevalence of the stroke patients [90.39%] live in crowded small houses. The study showed [36%] of stroke patients belongs to families with below 100 USD monthly incomes.

**Discussion:** Higher prevalence of diabetes mellitus, hypertension, smoking and also poor health awareness in patients with low educational levels, poor economic state and poor housing condition.

**Conclusion:** Stroke is increased in low educational levels, poor economic state and poor housing condition. . There is a high percentage of hypertension not previously diagnosed despite stigmata of chronic hypertension.

**Key words:** stroke, risk factors

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### Introduction

Stroke is a sudden focal neurological syndrome due to cerebrovascular disease<sup>(1)</sup>.it is the commonest neurological disorder admitted in the general medical wards<sup>(2)</sup> it forms 50 % of the neurological wards admission<sup>(2,3)</sup> .Stroke is the second leading cause of death world wide [4], stroke is the commonest cause of morbidity world wide<sup>(1,2,3,4)</sup>.

High mortality and morbidity burden of stroke impacts a high economic and social burden on the families and society<sup>(5)</sup>.

Because of all these impacts added to low frequency of successful acute stroke treatment<sup>(2, 3, 5)</sup>, makes identification and prevention of stroke risk factors is of utmost importance to minimize the whole impacts of stroke.

Stroke risk factors are classified into modifiable factors, which can be identified and treated; fortunately they are more frequent than non – modifiable risk factors. Efforts of researchers are directed to identify more risk factors in their societies and to analyze the difference between these societies.

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The aim of this paper is to re evaluate the known stroke risk factors in hospitalized patients in Baghdad and to study socio- economic status and education level as a risk factor in relation to stroke incidence.

#### **Patients and methods**

510 patients with stroke were admitted in the neurological wards at Alkindi teaching hospital, Al-yarmok teaching hospital and Medical City teaching hospital; during the period between April /2004 to September/ 2006.

All the patients were asked about their detailed present illness, past medical history, drug history, gynecological history for females and social history; special concern was emphasized on monthly income of the patient's family; we divided families into:

- Those with below 100 USD/month incomes.
- Those with 101—200 USD/month incomes.
- Those with 201--300 USD/month incomes.
- Those with 301--400 USD/month incomes.
- Those with 401--500 USD/month incomes.
- Those with more than 500 USD/month incomes.

Then the patients were divided according to their educational level into;

- Illiterate group
- Can read and write group [primary school]
- Secondary school level group
- Higher education level group

Also we asked about house condition whether it is crowded with three members or more of the family living in one room or not crowded with two or less members living in one room.

Detailed medical and neurological clinical examinations were done by neurologist.

All the patients had Brain CT scanning, complete blood picture, serum calcium, serum potassium, serum sodium, fasting blood sugar, fasting total serum cholesterol, blood urea, serum creatinine, pro-thrombin time, partial thrombo- plastine time, ECG, trans -thoracic echocardiography and Doppler of the Carotids.

Anti-cardiolipin antibodies, ANF, Rheumatoid factor, Pethrgy test were done for those below 40 years. Patient diagnosed as Antiphospholipidantibody disease, other connective tissue disease or Behcets disease were excluded from the study because of the direct relation of stroke in those patients to one cause rather than a risk factor.

The patients considered diabetic when he was known to be diabetic on anti-diabetic treatment or more than [7 mmol/L] 120 mg/dl fasting blood sugar test and random more than 2 hours postprandial blood sugar more than [11.1mmol/L] 200 mg/dl [this is according to WHO criteria of diabetes mellitus] <sup>(7)</sup>, and considered hypertensive when he had tow weeks apart 2 blood pressure readings of systolic BP 160mmhg and /or diastolic BP 95 mmhg. [As in Framingham's study]<sup>(6)</sup>, or if there is history of hypertension and the patient on antihypertensive.

Heart diseases included in this study are disorder of heart rate, ischemic heart disease, valvular heart disease, cardiomyopathy and left sided heart failure.

Total Cholesterol level above 220 mg /dl is considered as a hyper-cholestrolemia [as in Qisilbash metanalysis of 10 studies] <sup>(8)</sup>. PCV above 55% and above 48% in male and female respectively, was considered as polycythemia. Carotid

stenosis of any extent above 50% stenosis by Doppler study is reported in the present study. Obesity was considered if the weight is 20% more than the standard [length in cm -100] (12). The patient was considered as having migraine when he has history of typical recurrent attacks of migraine of more than four hours unilateral or bilateral throbbing headache, that was associated with nausea, vomiting and either photophobia or phonophobia (1).

**Results**

510 patients were studied, 215 females and 295 males, the males are affected more than female by 16% see (Table 1).

As seen from (Table 1) the stroke percentage is higher in male than female by 16 % in patients between 40 and 70 years age ; exception to this is the approximately no gender rates of difference below age of 40 years and above age of 70 years.

The study showed increase the number of patients with older age, especially after age of 50 years there is doubling of the incidence until there is decline of the incidence after the age of 80 years (Table 1).

The maximum stroke estimate is between 71-80 years [34.9%] and the minimum estimate is below age of 40[3.33%] see (Table 1).The present study reported hypertension in 75.5%

of the patients, smoking in 61.5%, other factors prevalence was shown in (Table 1).

The present study showed 28% [110 out of 381 patients] of the hypertensive patients not known to be hypertensive previously but have stigmata of chronic hypertension [retinal changes and ECG strain pattern of hypertension]

The study showed [36%] [184/510] of stroke patients belongs to families with below 100 USD monthly income, 22.4% of the patients belongs to families with monthly income between 101- 200 USD, and 15.2% between 201-300 USD, 10.7% between 301-400USD, 9.4% between 401-500 USD and 6.3% of the patients families with more than 500 USD monthly income see (figure 1).

There is a higher incidence [44.7%] of illiterate patients, in comparison to [9%] of the patients with the higher education. See (figure 2).

There are [461] patients [90.39%] live in crowded small houses and the rest [49] patients [9.6%] live in non-crowded houses.

There are 473 patients [90.39%] having WBCS counts between 4000-11000 cells/mm<sup>2</sup>; 35 patients [6.9%] having more than 11000cells/mm<sup>2</sup> and only 2 patients [0.39%] having below 4000 cells/mm<sup>2</sup>.

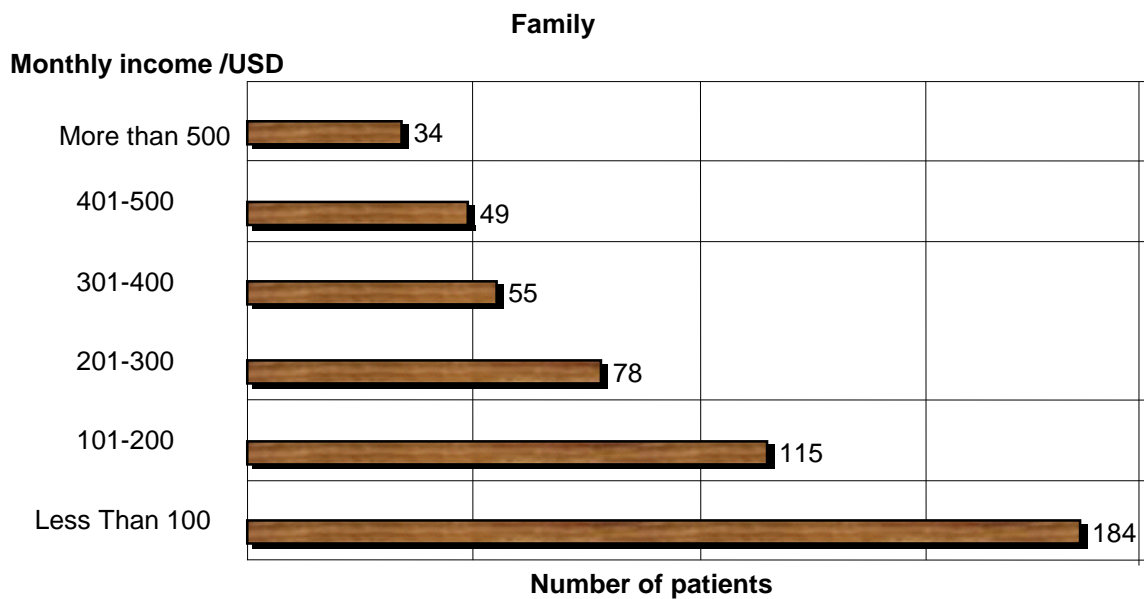
**Table 1: age/ gender distribution**

Age /years	male	female	total
---40	10 [59%]	7 [41%]	17 [3.33%]
41-50	18 [62%]	11 [38%]	29 [5.7%]
51-60	51 [61%]	32 [39%]	83 [16.27%]
61-70	102 [67%]	50 [33%]	152 [29.8%]
71-80	91 [51%]	87 [49%]	178 [34.9%]
80---	23 [46%]	28 [54%]	51 [10%]
Total	295 [58%]	215 [42%]	510

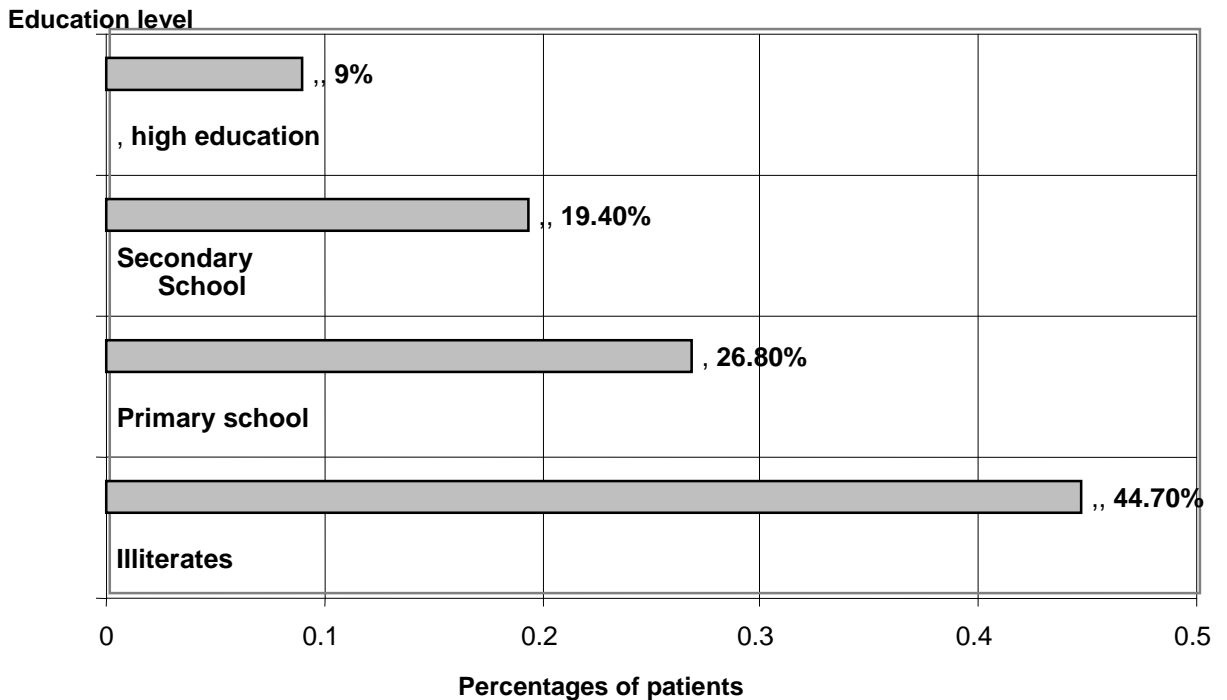
$\chi^2 = 12.702$  DF = 5, P-Value = 0.026

**Table 2: Risk Factors in the Present Study**

				age/year					
		-40	41-50	51-60	61-70	71-80	80-	total	%
<b>hypertension</b>		15	17	61	115	130	42	380	74.5%
<b>SMOKING</b>		9	23	55	98	113	16	314	61.5%
<b>heart diseases</b>		5	11	45	85	97	40	283	55%
<b>diabetes mellitus</b>		2	5	50	90	95	25	267	52%
<b>TIA</b>		3	16	35	69	81	25	229	45%
<b>hypercholestrolemia</b>		14	8	15	45	75	15	172	33.7%
<b>carotid stenosis/dopplar</b>		1	2	23	40	61	15	142	28%
<b>polycythemia</b>		2	7	12	33	24	8	86	17%
<b>carotid bruit</b>		0	1	19	22	25	8	75	15%
<b>obesity</b>		2	15	12	25	17	3	74	14.5%
<b>migraine</b>		8	12	6	0	0	0	26	5%
<b>Alcoholism</b>		3	5	5	2	2	1	18	3.5%
<b>Pill</b>		2	1	0	0	0	0	3	0.58%



**Figure 1: Relation of stroke incidence to the monthly income of the patients**



**Figure 2: Relation of stroke incidence to Level of education of the patients**

**Discussion**

Stroke is the most common preventable neurological disease<sup>(9)</sup>.

The low frequency of treatment options in comparison to the grave high disease burden on the families and public health<sup>(9)</sup>; all these makes most of the efforts to be directed toward recognition of modifiable risk factors ,in order to prevent and to reduce the disease occurrence to minimal incidence rates .

Scientist and neurologist all over the world try to find new risk factors; most of the researchers based their work on the Framingham study[10].

Age is the most powerful predictor of stroke<sup>(11)</sup>; The present study showed that below age of 80 years there is an exponential increase of stroke percentage with the raise of age (Table 1), this increase with increasing age is in agreement to Suleiman, Khalil and Almedhawi study [12], Abu-nayla-Salman study[13], North Manhattan

stroke study [15] and Framingham study [14] .

The study shows a decline of stroke percentage after the age of 80 years. And this is contrasting Suleiman, Khalil and Almedhawi study [12], Abu-nayla and-Selman study [13], North Manhattan stroke study [15] and Framingham study [14] in which there are doubling of stroke rates after the age of 80 higher than the younger ages. The more frequent age affected by stroke in the present study is between 71-80 years; and this is in approximate to white American age result in North Manhattan study which reveals the mean age of stroke in white American is [80 ± 9 years] population and [67 ± 12 years] Hispanic American.

The present study showed [16%] higher male affection than female between 40-70 years, and this result is agreeing the results of Suleiman, Khalil and Almedhawi study [12] , Abu-nayla-Salman study[13] .According to

American heart association, men's incidence of stroke exceeds women's by 19% <sup>(16)</sup>; this figure is in approximation to 16% difference in the present study. Sacco and Chong report 24 -30% greater male incidences; which is higher than the gender disparity of the present study. The higher male rate in the present study is contrasting the results of the Framingham study, which showed non-significant gender difference <sup>(14)</sup>. The present study shows a non significant gender difference at the extremes of age, as seen from (figure 1) there is nearly equal gender affection below age of 40 years and above age of 70 years; this non significant gender difference above 80 years in the present study is in agreement to result of American heart association <sup>(16)</sup> but contrast results of Suleiman, Khalil and Almedhawi study [12] and, Abu-nayla-Selman study [13]. Hormonal changes in the elderly female with decrease and loss of the protective effect of progesterone may lead to nearly equal rates of stroke in both genders.

Elevation of systolic blood pressure above 160 mmhg and /or elevation of diastolic blood pressure above 95mmhg are the commonest risk factors we have seen in the present study; it is found in 74.5% of the patients in this study. The result of hypertension frequency in the present study is similar to the result of north Manhattan stroke study, which reveals 63% among white American stroke patients and 79% among Hispanic American stroke patients <sup>(18)</sup>. The result of hypertension in the present study is higher than that of Suleiman, Khalil and Almedhawi study <sup>(12)</sup> , Abu-nayla-Selman study [13] and Framingham study in which the attributable stroke risk for hypertension ranged from 35-50% <sup>(4)</sup>. This higher rate of hypertension in comparison to the above studies is

explained on the increased frequency and prevalence of hypertension in our society in the later years.

The present study showed 28% [110out of 381 patients] of the hypertensive patients not known to be hypertensive previously but have stigmata of chronic hypertension [retinal changes and ECG strain pattern of hypertension]; in fact this is very high rate of undetected hypertensive patients indicate either or both poor health awareness of the general population or poor health care service; and support the name of silent killer for the hypertension <sup>(19)</sup>. There is a lot of studies prove the significant relationship between control of blood pressure [even with in normal range] and the reduction of the incidence of stroke <sup>(20)</sup>; the joint national committee on prevention, detection, evaluation and treatment created a new category of pre hypertension may be at high risk for stroke.

The present study showed a significant number of patients having a WBC count more than 11000cells /mm<sup>2</sup>; and we raise the role of WBCS as risk factor for stroke or as a factor predicting the stroke progress; we think this need further analysis of the role of WBCS in relation to stroke and stroke outcome.

Smoking is the second most common risk factor in the present study, [61.5%] of the patients is smoker. The present study smoking rate is higher than that of North Manhattan study [18%], abu-nayla and Selman study [23%]<sup>(13)</sup> and in Suleiman, Khalil and A-lmedhawi study [29%] <sup>(12)</sup> Framingham study [20-40%] <sup>(14)</sup>. The effect of smoking is same in the different age groups in the present study and this contrasting the diminished smoking as a risk factor of stroke with increasing age proved by Shinton and Beever metaanalysis <sup>(21)</sup>.

In a metaanalysis of 32 studies there is relative pooled risk for stroke in the smoker of 1.5 also there is dose – response relationship.

We think that removal of restriction on cigarette import resulting in its lower price added to higher monthly income of wide part of Iraqi population in the later years; all these lead to expansion of the smoking problem as seen from present study.

Heart diseases were reported in 55% of the present study, heart diseases rate was approximately similar to the result of 61% tare of cardiac diseases in White Americans in the North Manhattans study and higher than 32% of the stroke patients in Hispanic American by North Manhattans study of white American (22). Also heart disease rate in the present study is higher than that of [25%] in Suleiman, Khalil and Almedhedawi study[12] and the [28%] in Abu-nayla-Salman study [13] and Framingham study [14].

The present study shows [52%] of the stroke patients were diabetic type 1 or 11; this rate is in agreement to Abu-nayla-Selman study which showed [50%] of the patients are diabetic [13] the estimate of diabetes mellitus in the present study is higher than [32.3%] percentage of patients having diabetes mellitus in Suleiman, Khalil and Almedhedawi study [12]. North Manhattan stroke study showed diabetes mellitus frequency of 41% among Hispanic American and 26% in white American.

Lindegurd and Hillbom have suggested that diabetic women had a greater risk of stroke than diabetic men (23).

More stressful life event in our country makes diabetes and hypertension was at higher prevalence than other countries.

TIA preceding stroke was present in [45%]; this result is in agreement with Herman-Lyman study but higher than Suleiman, Khalil and Almedhedawi study

[35.5%][12], Abu-nayla-Selman study [6.5%] [13]. Bigger sample of the present study than Suleiman, Khalil and Almedhedawi study [only 61 patients][12], Abu-nayla-Selman study [only 250 patients][13]; explains the higher TIA rate in the present study, which is in approximation to Fisher CM who found 42% of stroke patients had preceding TIA(24).

Hypercholesterolemia was seen in [33.7%] of the present study stroke patients; this result is higher than Suleiman, Khalil and Almedhedawi study [9.7%][12]; this result is nearly equal to 29% of White American having Hypercholesterolemia and 35% of Hispanic American. The result of hypercholesterolemia in the present study is statistically highly significant. The relationship between high cholesterol and stroke is less clear than the relationship with ischemic heart disease in other studies; in large metaanalysis including over 450000people found no association between cholesterol and stroke. Clinical trials using statins showed a substantial decrease in stroke incidence (24).

Carotid stenosis by Doppler study was seen in 28% of the present study patients. Carotid bruit was seen in 15% of the patients, all of them had stenosis by Doppler more than 60% of the carotid artery lumen; these results are higher than Suleiman, Khalil and Almedhedawi study [6%][12].

Polycythemia was seen in [17%] of the patients in the present study; this figure is higher than Suleiman, Khalil and Almedhedawi study [5%] [12], Abu-nayla-Salman study [2.4%] [13]. . All these high PCV were attributed to smoking and its chronic obstructive pulmonary disease sequel.

Obesity was a feature of [14.5%] of the present study; this is similar to 15% in Suleiman, Khalil and Almedhedawi study .a case control study from North Manhattan found that men with waist-hip ratio greater than 0.93 and women greater

than 0.86 were at higher risk of stroke, and this ratio had a greater risk at younger age group [24]. Obesity as measured by body mass index also considered as a risk factor for stroke (25). Some investigators considered obesity as secondary stroke risk factors because obesity was associated with higher incidence of hypertension and diabetes mellitus (26).

Migraine rate in the present study is [5%] of the patients, other study done in Iraq not searching for migraine as a risk factor for stroke as in Suleiman, Khalil and Almedhawi study [12] , Abu-nayla-Salman study[ 13].

Alcoholism was seen in [3.5%] of the present study patients, this is lesser than Suleiman, Khalil and Almedhawi study which reports 19.4% of the patients were alcoholics (12), and lesser than [7.6%] in Abu-nayla-Salman study[13]. Among patients 39 years and older who were hospitalized for acute stroke, found [37%] and [23%] of Hispanic American and white American respectively were alcoholics; and this low rate of alcoholism in our patients in compares to American patients is related to religious prohibition of alcohol in our society. Frequency of patients taking pills [0.58%] is in agreement to that seen in Suleiman, Khalil and Almedhawi study [0.25%] [12].

The present study showed a highly significant correlation with low income, there is inverse relationship between stroke estimate and the monthly income. And this is related to non-healthy dietary habit, poor health awareness and non-compliance with treatment of other medical disease.

The present study shows a significant association of stroke with crowded house; this association is related to poverty, stressful life and lack of exercises.

There was a highly significant increase of stroke rate with low education level especially the illiterate patients; this

association is attributed to poor health awareness and poor health access.

#### Conclusion

1. There is grave expansion of the stroke risk factors estimate in our community later years in comparison to previous studies in the previous years.
2. There is strong relationship of the increased stroke frequency with the low income, crowded houses and low educational background.
3. There is large percentage of the hypertensive patients was undetected; either because of lack of access to health care or due to inefficient health care.

#### Recommendation

1. We need a wide national health program to educate about the risk factors of stroke and its primary and secondary prevention.
2. We need advanced centers specialized in the treatment and researches of stroke to improve our understanding of the real dimensions of the problem in our country and than to ease its control.
3. We need to improve our primary health centers to increase the detection of risk factors; as this will lead to reduction of the stroke as well as ischemic heart diseases and definitely this will reduce so much the heavy burdens of these diseases.

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