
An Evaluation of Risk Factors for Stroke in Iraqi Patients

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Background: Stroke continues to rank among the top of main causes of death throughout the world, stroke is frequently followed by significant disability.

Objective: To study the relationship of various suspected risk factors to occurrence of stroke.

Methods: This is a cross-sectional study that included 200 patients with stroke and was examined for evidences of presence of risk factors and followed during their hospital admission, the study was carried out in Yarmouk Teaching hospital from Jan 2006 to Sept 2006.

Results: This study showed that age is significantly related to the incidence of stroke, and advancing age (age more than 60 years) showed increased incidence of stroke. Other risk factors included hypertension (HT) detected in 117 patients (55.5%), smoking was detected in 104 patients (52%) , heart diseases were collectively detected in 94 patients (47%) , diabetes mellitus (DM) detected in 60 patients (36.6%) and hypercholesterolemia detected in 50 patients (25%) ,history of previous cerebrovascular accidents 15 patients (7.5%) ,previous transient ischemic attack (TIA) symptoms detected in 10 patients (5%),alcohol consumption was found in 5 patients (2.5%) and polycythemia in 2 patients (1%).

Conclusion: Advancing age ,HT, smoking, heart diseases, DM , and hypercholesterolemia are found to be significant risk factors for the occurrence of stroke ,while history of previous CVA ,old TIA symptoms, polycythemia and alcohol consumption were found to be not significant statistically as a predisposing risk factors to stroke

Keywords: Risk Factors, Stroke

Introduction:

Stroke continues to rank among the top of main causes of death throughout the world^[1]. Mortality rate do not represent its true impact in our communities. However ,stroke morbidity is frequently followed by disability, understanding the cause of stroke is therefore necessary to plan effective strategies for reducing stroke incidence in addition to stroke related morbidity and mortality^[2].

Prevention involves recognizing stroke risk factors, identification of high risk individual and implementing control measures for modifiable risk factors.

Previous studies have identified clearly many factors considered as high risk for stroke, these risk factors such as age, gender and genetic causes are beyond modification, and others including HT, DM, heart diseases (atrial fibrillation, ischemic heart diseases, and heart failure), dyslipidemia, cigarette smoking and alcohol consumption are possible to control.

In this study we try to determine the modifiable risk factors to occurrence of stroke in our community in order to plan a strategy that reduces the incidence of CVA among our peoples.

Patients & Methods:

Two hundred patients with stroke admitted to the medical ward of Yarmouk hospital from Jan 2006-Sept 2006 were studied specially for evidence of risk factors of stroke .Stroke was defined as rapidly developed clinical signs of focal disturbance of cerebral function lasting more than 24 hrs or leading to death with no apparent causes other than a vascular origin^[3]. All the patients were

examined thoroughly, the examination include, questionnaire, physical examination, and investigation.

The questionnaire includes information about age sex, occupation, symptoms and signs of stroke (headache, vomiting, blurred vision, dysarthria, hemiplegia, seizures). Also include symptoms of heart disease (shortness of breath, any history of ischemic heart disease, heart failure, valvular disease and history of arrhythmia), the presence of HT (asked about duration, state of control or compliance to treatment), DM (duration and compliance to treatment), history of TIA symptoms (drop attacks, transient dysphasia, transient monoplegia or hemiplegia), history of previous established stroke (time and disability).

The questionnaire also included asking about detailed history of heavy cigarette smoking (≥ 15 cig /day)^[4], number of cigarettes and duration, history of alcohol consumption (duration and amount), drug history such as contraceptive pills.

Physical examination includes the pulse rate (atrial fibrillation arrhythmia), blood pressure measurement, respiratory rate, temperature, cardiac auscultation, neurological examination, and fundoscopic examination.

The investigations included an electrocardiogram, CXR, echocardiogram, brain CT scan(performed for diagnosis and to decide on management, and blood chemistry which include (fasting blood glucose, blood urea, hemoglobin, packed cell volume, total serum cholesterol, antinuclear factor, LE cell, VDRL(to exclude vasculitis like SLE,PAN and syphilis and other necessary investigations whenever indicated).

Causes of subarachnoid hemorrhage and TIA were not included in our study.

Results:

Table (1) present the age and sex distribution of the studied cases which showed that males are more than females 111 (55.5%), 89 (44.5 %) respectively. Age was significantly related to the incidence of stroke, and the study showed increased incidence of stroke with advancing age (P value 0.001), only 6 patients were less than 40 years of age, 7 patients were between 40-49 years, 29 patients were between 50-59 years, 76 patients there age were between 60-69 years and 82 patients were above 70 years of age. Table 2 present the prevalence of each risk factor and the number of cases and showed clearly that the most important risk factor is HT which was detected in 117 patients (55.5 %) , 105 of them have systolic and diastolic

HT, 12 having isolated systolic HT ,smoking (more than 15 cigarettes / day) was detected in 104 patients (52 %), heart diseases were collectively detected in 94 patients (47 %), (ischemic heart disease 34 patients, heart failure 40 patients, atrial fibrillation 7 patients and miscellaneous conditions 11 patients), DM was found in 60 patients (36.6 %), hypercholesterolemia(≥ 200 mg/dl)(5) was found in 50 patients (25 %), history of old CVA found in 15 patients (7.5 %) , previous TIA symptoms detected in 10 patients (5 %) , polycythemia(>0.54 in male and more than 0.47 in female)(5) was detected in 2 patients (1%) and alcohol consumption detected in 5 patients (2.5 %) . As shown from table 2, the significant risk factors were HT ,smoking, heart disease, DM, and hypercholesterolemia where the P value were (0.0001, 0.00032, 0.00122, 0.0025, 0.0035) respectively.

Table 1: distribution of the cases according to age and sex

Age	<40	40-49	50-59	60-69	≥ 70	Total
Male	4	6	18	51	32	111
Female	2	1	11	25	50	89
Total	6	7	29	76	82	200

The age: P value 0.001 Sex (male, female) P value 0.231

Table 2: analyses of relation between studied factors and stroke risk

Risk factors	No. of patients	Percent%	P value
Hypertension	111	55.5	0.0001
Smoking	104	52	0.00032
Heart diseases	94	47	0.00122
Diabetes mellitus	60	36.6	0.0025
Hypercholesterolemia	50	25	0.0035
Old CVA	15	7.5	0.087
Old TIA symptoms	10	5	0.523
Polecythemia	2	1	0.846
Alcohol consumption	5	2.5	0.702
total	200		

Other risk factors included old CVA, old TIA symptoms, polycythemia and alcohol consumption were found not significant statistically, P value (0.087, 0.523, 0.846, 0.702) respectively.

Table 3 showed the distribution of risk factors in male sex 111 patients, the 1st significant risk factor was smoking which was detected in 98 patients (88 %), HT was detected in 56 patients (50.5 %), heart diseases was detected in 50 patients

(45%), DM was detected in 34 patients (30%), hypercholesterolemia was detected in 30 patients (27 %), alcohol consumption was detected in 5 patients (4.5 %), previous CVA was detected in 10 patients (9.6 %), history of TIA symptoms was detected in 6 patients (5.4 %) and polycythemia was detected in 2 patients (1.9%).

Table 4 show the distribution of risk factors in female sex 89 patients, which showed that the most

prevalent risk factor is HT which was present in 55 patients (61%), heart diseases detected in 44 patients (49.4%), DM was found in 26 patients (29.2%), hypercholesterolemia was detected in 20 patients (16.8%), smoking was detected in 6 patients (6.7%), previous CVA in 5 patients (5.6%), previous TIA symptoms was found in 4 patients (4.5 %).

Table 3: risk factor according to male sex

Risk factor	No. of cases	Percent %
Smoking	98	88
Hypertension	56	50.5
Heart diseases	50	45
Diabetes mellitus	34	30
Hypercholesterolemia	30	27
Alcohol consumption	5	4.5
Previous CVA	10	9.6
Old TIA symptoms	6	5.6
Polecythemia	2	1.9
total	111	

Table 4: risk factor according to female sex

Risk factor	No. of cases	Percent %
Hypertension	55	61
Heart disease	44	49.4
Diabetes mellitus	26	29.2
Hypercholesterolemia	20	16.8
Smoking	6	6.7
Previous CVA	5	5.6
Old TIA symptoms	4	4.5
alcohol	0	0
Polecythemia	0	0
Total	89	100

Table 5 & 6 showed the distribution of DM and HT in all cases and point to the relation with duration and occurrence of stroke. As regard to diabetes, in-hospital diagnosis of DM was found in 6 patients (10 %), 5 patients (8.3 %) duration of DM less than 5 year, 15 patients (25 %) the duration of DM between 5-10 years and 34 patients (56 %) the duration of DM more than 10 years, the duration of DM as a risk factor was significant statistically as shown in table 5 specially with duration more than 10 years (P value 0.0012). In hypertensive patients 23 subjects (20.7 %) with

duration of less than 5 years, 48 subjects (43 %) with duration between 5 – 10 years, and 40 subjects (36 %) with duration of HT more than 10 years. The relation of duration of HT to occurrence of stroke was not significant statistically (P value 0.986). Regarding compliance to therapy, in diabetics, 25 patients (41%) were compliant and 35 patients (59 %) were non – compliant as shown in table 7. In hypertensive patients, 61 subjects (54.9%) were non-compliant to their therapy, while 50 patients (45.1%) were compliant to anti hypertensive drugs.

Table 5: DM according to duration of the disease

Duration	Recent	< 5	5-10	> 10 years
No. of patients	6	5	15	34
Percent %	10	8.3	25	56

P value of DM patients > 10 years = 0.0012

Table 6: hypertension according to duration of the disease

Duration	< 5	5-10	> 10 years
No. of cases	23	48	40
Percent %	20.7	43	36

P value 0.986

Table 7: hypertension and DM patients and their compliance to therapy

	Compliance	Non compliance
DM	25 (41 %)	35(59 %)
HT	50 (45.1 %)	61 (54.9 %)

Discussion:

The age was clearly the strongest determinant for occurrence of stroke, in our study we showed that the incidence of stroke increased with increasing age, more in old age group > 60 years (P-value 0.001). Data from the Framingham study showed that the incidence of stroke rises (1-2) per 1000 in the 45-54 years old age group to nearly 10 per 1000 in 65-75 years age group (6). This study also showed that men are at greater risk for stroke than women but the difference is not significant statistically (P value 0.231), according to Framingham study the difference was also not significant but stroke mortality was higher for men than women [6]. HT was also found to be a significant risk factor for the occurrence of stroke (P value 0.0001). In Framingham study where the attributable stroke risks for hypertension ranged from 35-50% [6], vs. 55.5% in our study. In the study by Stessen et al 2001 [7], they showed a significant relationship between control of hypertension and reduction of the incidence of stroke. A meta-analysis of 9 prospective studies that include 420000 individuals followed for 10 years, found that stroke risk increased by 46% for every 7.5 mmHg increasing in diastolic blood pressure [8]. In study from Rochester minn, increasing control of hypertension has an inverse linear relationship with the incidence of stroke [9]. All the above studies are in agreement with what was concluded from our study. The reasons why the stroke events occur more in chronically hypertensive patients is because of the irreversible changes in the microcirculations and diffuse atherosclerotic disease.

Regarding smoking, in our study we showed that there is significant relationship between heavy smoking and occurrence of stroke (P value 0.00032). Acceleration of atherosclerosis is one possibility to the relationship between smoking and stroke [10], cigarette smoking was found to be independent determinant of carotid artery thickness [11], and the strong predictor of severe extracranial carotid artery atherosclerosis [12]. In cohort studies such as Honolulu heart study [13] and nurses health study [14], relative risk are 2.5 for men and 3.1 for women, data from the Framingham study showed the relative risk of 1.5-2.9 regarding the occurrence of stroke in smokers [6].

Cardiac diseases particularly atrial fibrillation, valvular heart diseases, myocardial infarction, coronary heart disease, and congestive heart failure had been connected with increased risk of ischemic stroke, in our study it ranks as 4th significant risk factor for stroke (P value 0.000122). In Framingham study only 13.6% of patients were free of any cardiac disease, 32.7% had prior coronary heart disease, 14.5% had cardiac failure and 14.5% had atrial fibrillation, cardiac diseases increases the estimated relative risk of stroke by 2-

4 times [6]. In old age the proportion of stroke associated with atrial fibrillation approach 36%, it is nearly 5 folds increased in stroke risk than those who have no atrial fibrillation [14, 15].

In different studies, DM had been associated with increased stroke risk [16], in our study DM was a significant risk factor for the occurrence of stroke (P value 0.0025), in Framingham study the risk of diabetes as a cause for stroke was about 4 times that found in normal individuals (non-diabetic). In Honolulu heart program, diabetic subjects experienced 62.3 stroke per 1000 compared with 32.7 strokes per 1000 in non-diabetic subjects during the 12 years of follow up [16]. Our study showed that stroke prevalence was more in patients with long history of the disease and was more in patients with uncontrolled diabetes or the non-compliant (P value 0.0012), this is in agreement with other studies which shows that the prevalence of stroke in diabetic become higher with increased duration of the disease and age of the patients and was increased with badly controlled disease [17]. The reason why DM is an important risk factor is because of the diffuse atherosclerotic disease in diabetics.

Hypercholesterolemia in our study was a significant risk factor (P value 0.0035) for the occurrence of stroke. In Framingham study, hypercholesterolemia found in 35% of stroke patients, statin therapy reduces the incidence up to 30% even in people with low cholesterol level [6]. It is clear that hypercholesterolemia is responsible for diffuse atherosclerosis in the vascular tree making those patients more prone for stroke events.

In this study only 5 patients (2.5%) had history of alcohol consumption, it was not a significant risk factor (P value 0.823), probably because most of our patients are not drinker because of religious reasons and many are from rural area that usually don't drink. According to other studies, alcoholism as a risk factor is controversial ranges from definitive independent risk factor in men and women to a risk factor in men only [18], to no effect after controlling of other confounding risk factor as cigarette smoking [19]. According to Framingham study, light to moderate alcohol consumption may have a protective effect against stroke but excessive consumption increase the risk of stroke up to four times [6].

Previous TIA symptoms were found in 10 patients (5%) in our study which was not significant statistically (P value 0.523), this small number was probably because patients were unaware of their trivial symptoms. In another study significant increase in stroke incidence in connection with TIA symptoms had been observed, which showed that there was history of previous TIA in 42 patients of total number of 126 stroke patients (33.3%) [20].

Polecythemia was present in 2 subjects of our patients (1 %), this small percentage was not significant statistically (P value 0.846), may be attributed to inefficient laboratory technique in detecting polecythemia. Other studies showed that 29 patients out of 184 stroke patients had polecythemia and 29 patients out of 213 patients with minor stroke had polecythemia [20].

History of previous stroke in our study was found in 15 patients (7.5%) who were not significant statistically as a risk factor (P value 0.087). The American Canadian co-operative study showed that 26 % of stroke patients had previous history of stroke [21]. The reason is probably that many patients with acute stroke in our country do not survive the first stroke, or they will die soon after it. The presence of multiple risk factors were more important than any single risk factor, the Framingham study showed significant incidence of occurrence of stroke if there were more than a single risk factor [6].

So in conclusion age, HT, smoking, heart diseases (including atrial fibrillation, heart failure, ischemic heart disease, and valvular disease), DM, and hypercholesterolemia were identified as significant risk factors for the occurrence of stroke, while previous history of CVA, previous history of TIA symptoms, alcohol consumption and polecythemia were identified as insignificant risk factors for the occurrence of stroke.

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