

Original Article

Risk factors and types of recurrent stroke: a Saudi hospital based study

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Abstract. [Purpose] To identify the risk factors and the stroke types in recurrent stroke patients of Madinah Al-Munawarah city. [Participants and Methods] A prospective research hospital based study was conducted through the year of 2014. The patients were entered in the study when they had recurrent cerebrovascular accident led to hospital admission. All details of patients were obtained include history, demographic data, risk factors and stroke types. [Results] Ninety-four (83.9%) ischaemic strokes, 12 (10.7%) intercerebral hemorrhage strokes and 6 (5.4%) undefined out of 112 patients had recurrent stroke found in this study. Hypertension was the most prevalent risk factors (90.2%) followed by diabetes mellitus (62.5%) and ischaemic heart disease (51.8%). [Conclusion] Hypertension, diabetes, and ischaemic heart disease in particular were exhibited to be crucial risk factors for stroke recurrence in this study. Future studies are needed for secondary prevention planning.

Key words: Recurrent stroke, Risk factors, Hospital based study

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INTRODUCTION

Universally, stroke adversely encounter 16.9 million people in an annual manner, and is of the vital reasons of disability and mortality^{1, 2)}. Stroke is a deleterious health concern with a substantial cost of care about \$34.3 billion expenditure in one year in the United States of America³⁾. Stroke affliction is predicted to be greatly higher, more presumably in the developing countries⁴⁾. Risk factors and lifestyle vary from one country to another. Thus, exploration of stroke factors and clinical features is highly crucial to determine the stroke pattern in a certain population particularly for recurrent events^{5–10)}. Recurrent strokes are more possibly to be debilitating and unfortunate fatal than first strokes¹⁰⁾. Avoidance of recurrent stroke is therefore of extremely valuable process and when data are available, that would be greatly helpful in minimizing the incidence of recurrent stroke and the high expenditures of treatment and rehabilitation.

Stroke types and risk factors were addressed in various studies in the global comprising Saudi Arabia. However, there were no research studies investigated stroke types and stroke factors carried out in Madinah Al-Munawarah city for recurrent stroke patients. Kingdom of Saudi Arabia is in the Middle East, and adjacent to the Arabian Gulf from the east border and the west side by the red sea, whereas, city of Madinah Al-Munawarah lied in the north-western of Saudi Arabia^{11, 12)}. The aim of the current study was to identify the types and risk factors associated with recurrent stroke in Madinah Al-Munawarah city in the year of 2014 commencing at January and ending at December.

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PARTICIPANTS AND METHODS

This study was a prospective hospital based-study conducted in hospitals of Madinah Al-Munawarah city. Data collection took place in the year of 2014 from January to December. Patients were proper for the study if they had recurrent stroke irrespective of the age and gender. Patients excluded from the study if they had first time stroke or they came to Madinah Al-Munawarah city for pilgrimage purposes of Umrah/Hajj. Echocardiography and computerized tomograms (CTs) of the brain were carried out to confirm the diagnosis. Magnetic resonance imaging (MRI) also utilized in our study when further diagnostic clarifications, were indicated. Administrative official letters obtained from the hospitals and methodology of this study also approved by the Medical Ethical committee. The history of patients with recurrent stroke was collected with respect to diabetes, ischaemic heart disease, hypertension, atrial fibrillation, smoking, previous history of stroke.

Patients diagnosed hypertensive (with hypertension) if they were under anti-hypertensive medication programme before the incident of the stroke, or with a systolic pressure ≥ 140 mmHg or diastolic blood pressure ≥ 95 mmHg while the duration of hospitalization on two separate occasions¹³. Diabetes mellitus considered if the patients were formerly on oral hypoglycemic agents or insulin, or if results showed a fasting plasma glucose level ≥ 126 mg/dl (7.0 mmol/l), or a casual plasma glucose > 200 mg/dL (11.1 mmol/l) as a result of hyperglycemia while the duration of hospital admission on more than one possible occasion¹⁴. Smoking considered in the study if the patients had a history of at least a cigarette per day for ≥ 3 months or tobacco form by any means before the incident of stroke.

The data has been collected and represented as descriptive statistics. The statistical data was analyzed by using the software package SPSS 20 (IBM Corp. Armonk, NY, USA). Repeated measures of stroke types and risk factors were analyzed by cross tab χ^2 method¹⁴. The risk factors of diabetics, blood pressure, smoking, ischaemic heart disease and atrial fibrillation also were analysed by crosstab with different types of stroke. Furthermore, Student t-test was used to detect if any significant differences may be existed between the types of stroke, where p values of ≤ 0.05 were considered significant.

RESULTS

The data revealed 112 of recurrent stroke patients admitted in Madinah Al-Munawarah city in the year of 2014 from the beginning of January until the end of December. The patients were organised in Table one with respect to age at a rate of 10 years frequency. A total number of 112 patients (72 male and 40 female) with a diagnosis of recurrent stroke admitted in the hospitals. The mean age of the patients included in this study was 67.70 ± 2 years, with a range between 31 and 95.

The results of stroke types of this study showed 94 (83.93%) patients with ischaemic recurrent stroke, intercerebral haemorrhage 12 (10.71%), and undefined 6 (5.4) patients, whereas no subarachnoid haemorrhage in the stroke cases identified in this study (Table 1). The findings of risk factors revealed hypertension existed in 101 (90.2%) patients, diabetes in 70 (62.5%) patients, ischaemic heart disease in 58 (51.8%) patients, atrial fibrillation in 18 (12.8%) patients and 25 (22.3%) of them were smokers (Table 2). A high proportion of patients in this study also suffered from more than one possible risk factors; 66 (85.93%) of them had high blood pressure and diabetes mellitus; 54 (48.21%) had high blood pressure and ischaemic heart disease, and 17(15.18) had high blood pressure and arterial fibrillation. Moreover, a comparison between the main stroke types (ischaemic and intercerebral haemorrhage) of the patients with respect to risk factors showed no statistical significant difference between them except in the ischaemic heart disease cases ($p < 0.025$) (Table 3).

DISCUSSION

The current study was conducted to identify different types and risk factors associated with recurrent stroke in Madinah Al-Munawarah city, Saudi Arabia in the year of 2014 commencing at January and ending at December. The incidence of ischemic recurrent stroke was 83.93%, which is relatively comparable with the reported rate in Egypt (80%)¹⁵, but less markedly percentage was reported in a Saudi study¹⁶ and a study from Bahrain¹⁷ 77% and 59% respectively. However, these latter two studies did not show whether these percentages yielded from first time or recurrent stroke.

It was reported that the risk of recurrent stroke substantially rises following increased levels of blood pressure¹⁸. Stroke possibility recurrence also increases 4-fold in hypertensive patients and about 60–75% of the strokes take place in these conditions¹⁹. However, data that support this claim are limited.

Hypertension is the most highly notable risk factor in this study as it found in 90% of our patients, which is compatible with the findings of stroke recurrent studies in Turkey 89% and 88% respectively^{20, 21}. Higher rate was reported from Egypt study 100%¹⁵ and lower rate reported from study in Spain 80%²². In contrast, the findings of some other studies such as in Scotland²³ and Thailand²⁴ demonstrated that hypertension was not identified as a risk factor of stroke recurrence.

Another factor that is most commonly associated with stroke recurrence is diabetes^{24–26}. The findings of the current study also showed diabetes mellitus to be the second most common risk factor with a rate of 62.5%. Furthermore, a remarkable higher rate (95%) was found in the study of Egypt. These may be due to hyperglycemia which is associated with endothelial dysfunction and elevated platelet aggregation²⁷.

Hypertension and diabetes mellitus are major clinical and public health problem in Kingdom of Saudi Arabia and the

Table 1. Different types of recurrent strokes

Stroke types	Ischemic stroke	Intercerebral hemorrhage	Subarachnoid hemorrhage	Undefined
Age (years)				
20–44	7 (6.3)	0 (0)	0 (0)	1 (0.9)
45–54	16 (14.3)	1 (0.9)	0 (0)	0 (0)
55–64	7 (7.3)	3 (2.7)	0 (0)	1 (0.9)
65–74	35 (31.3)	6 (5.4)	0 (0)	2 (1.8)
>75	29 (25.9)	2 (1.8)	0 (0)	2 (1.8)
Total	94 (83.9)	12 (10.7)	0 (0)	6 (5.4)

Data are the number of cases (%).

Table 2. Risk factors of recurrent strokes

Stroke types	Elevated blood pressure	Diabetics	Smoking	Ischaemic heart disease	Arterial fibrillation
Age (years)					
20–44	7 (6.3)	7 (6.3)	1 (0.9)	6 (5.4)	3 (2.7)
45–54	17 (15.2)	15 (13.4)	5 (4.5)	11 (9.8)	7 (6.3)
55–64	8 (7.1)	5 (4.5)	2 (1.8)	4 (3.6)	2 (1.8)
65–74	39 (34.8)	25 (22.3)	13 (11.6)	20 (17.9)	5 (4.5)
>75	30 (26.8)	18 (16.1)	4 (3.6)	17 (15.2)	1 (0.9)
Total	101 (90.2)	70 (62.5)	25 (22.3)	58 (51.8)	18 (12.8)

Data are the number of cases (%).

Table 3. The risk factors and stroke type

Types of stroke	Ischemic stroke	Intercerebral hemorrhage	Total
Risk factor			
Elevated blood pressure	87 (77.7)	3 (2.7)	90 (80.4)
Diabetes	59 (52.7)	7 (6.3)	66 (58.9)
Smoking	20 (17.9)	3 (2.7)	23 (20.5)
Ischaemic heart disease*	52 (46.4)	3 (2.7)	55 (49.1)
Arterial fibrillation	16 (14.3)	1 (0.9)	17 (15.2)

*Significant difference ($p < 0.05$). Data are the number of cases (%).

Middle East^{28–30}). The findings of this study showed also a high proportion of recurrent stroke patients had both of them as coexistent risk factors. However, this may be due to undiagnosed hypertension and diabetes mellitus and lack of people awareness^{29, 30}).

Evidence revealed that risk for stroke recurrence was somewhat higher in smokers compared to non-smokers²⁶). It also showed in this study that smoking may be a contributing factor accounted 22.3% of recurrent stroke patients. Furthermore, higher percentages were found in Spain (29%)²²) and Egypt (52.5%)¹⁵). Interestingly, the current study showed ischaemic heart disease in 51.8% patients, atrial fibrillation in 12.8% patients, indicating that cardiac dysfunction may participate in the occurrence of recurrent stroke. This also was supported in studies of Turkey²¹) and Egypt¹⁵) where 36% and 31.25% of recurrent stroke patients found with ischaemic heart disease and 11% and 21.25% with atrial fibrillation respectively.

The current study had a limitation where the size of the study population with recurrent stroke was small. Inadequate research papers with various methodologies were also noted which may hinder the comparison. However, the findings of this study highlighted the importance of conducting further studies in screening for stroke recurrence risk factors and planning for secondary prevention. In conclusion hypertension, diabetes, and ischaemic heart disease in particular were found to be crucial risk factors for stroke recurrence, thus future prospective studies are required to assess whether effective treatment methods with close monitoring, and educational health strategies of these risk factors can prevent or minimize the risk of stroke recurrence.

Conflict of interest

No conflict of interest to report.

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