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TYPES AND RISK FACTORS OF FIRST TIME STROKE:
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ABSTRACT

Background: The purpose of this study was to explore the stroke types and the risk factors of the first-time stroke in the holy city of Madinah Munawarah.

Methods: A prospective hospital-based research study was carried out over the year of 2014. The patients with the diagnosis of the cerebrovascular accident were enrolled in the study. The details of patients' history, demographic data, stroke type, and risk factors were collected.

Results: First-time stroke were determined in 164 patients (91 male and 73 female) during the entire periods of this study with a mean age of 67.52 ± 2.31 years. The prevalence of types of stroke was ischaemic strokes in 133 patients (% 81.1), intercerebral hemorrhage in 24 patients (14.63%), and subarachnoid hemorrhage in one patient (0.6%). The most common risk factors recorded were hypertension (86.6%), diabetes mellitus (63.4%), and ischaemic heart disease (41.5%). There was no significant relationship between the frequency of ischaemic stroke and intercerebral hemorrhage stroke ($p > 0.05$).

Conclusion: The study indicates that hypertension, diabetes, and ischaemic heart disease are critical risk factors for developing stroke and fairly commensurate with the global reported risk factors. Further research is needed to investigate stroke patterns and other possible risk factors concurrently with Saudi national prevention programs.

Keywords: Hospital-based study, Risk-factors, ischaemic stroke, intercerebral hemorrhage stroke.

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INTRODUCTION

Stroke is considered as a significant cause of prolonged disability that negatively impacts 16.9 million people every year, and is one of the leading causes of morbidity and mortality in developed and developing countries [1,2]. Stroke is a devastating health problem with a tremendous cost of care with a budget roughly of \$34.3 billion spendings annually in the United States of America [3]. Stroke burden is anticipated to be substantially higher, most likely in the developing countries [4]. Risk factors and lifestyle of people differ in those countries which necessitate investigation of stroke risk factors and clinical features in different nations to identify the pattern of the disease at a particular population [5-9]. Given that stroke is possibly avoidable, especially when medical information is available, a thorough understanding of risk factors in a specific country becomes fundamental to decrease the incidence of stroke, high costs of rehabilitation, and other negative consequences of stroke.

There is the rarity of data concerning stroke prevalence with its types and risk factors at the holy city named Al- Madina Al- Munawara. The holy city is located at North-Western part of Kingdom of Saudi Arabia [10,11]. We hypothesize that prevalence, types, and risk factors are different than its counterparts in different geographic areas. The purpose of the present study was to explore the types and risk factors associated with first time stroke in the holy city of Al-Madinah Al- Munawarah occurred over the entire year of 2014.

METHODS

A prospective hospital based-study was taken place in governmental and private sector hospitals of Al-Madinah Al- Munawarah city. Data was collected over the entire year of 2014. Patients were rigorously screened to consider those who meet the inclusion-exclusion criteria set for the present study. Inclusion criteria: patients were included irrespective of age and gender if they experienced stroke for the first time with a physician confirming the diagnosis using computerized tomography of the brain, echocardiography, and magnetic resonance imaging. Exclusion criteria: patients were excluded if they have a recurrent stroke or if they are visitors of Al- Madina Al-Munawara for Umrah/ Hajj. The committee of research ethics of college of medical rehabilitation sciences at Taibah University approved the study (approval no. CMR-PT-2014-08). Also, official letters were obtained from every participating hospital.

A complete history of patients with the first-time stroke was taken concerning hypertension, diabetes, ischaemic heart disease, atrial fibrillation, smoking, and previous history of stroke. For the current study, we will define the medical diagnoses supported by its reference to guide readers for a better understanding of the research work. Patients with the first-time stroke, according to the World Health Organization, defined as “those who are rapidly developing clinical signs of focal or global disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular

origin [12].” Patients have been diagnosed with high blood pressure, which is called hypertension, if they were under antihypertensive medication program at any time prior the onset of stroke, or had a systolic pressure, ≥ 140 mmHg or diastolic blood pressure ≥ 95 mmHg throughout the time of hospital stay on two separate occasions [13]. Diabetes mellitus diagnosis was confirmed if patients were on oral hypoglycaemic medications or insulin before the onset of stroke, or if they had a fasting plasma glucose level ≥ 126 mg/dL (7.0 mmol/L), or a casual plasma glucose > 200 mg/dL (11.1 mmol/L) in the setting of symptoms as a result of hyperglycemia during the hospital admission period of the patients on more than one occasion [14]. Patients were identified as smokers if they smoked at least a cigarette per day for the earlier three months from the onset of the stroke or more months as chain smokers, or taken a tobacco form in any means.

Statistical analysis

Descriptive statistics were used to estimate demographic characteristics and the prevalence of types and risk factors. Repeated measures of risk factors and types of stroke, comparison between the risk factor and other risk factors of stroke were analyzed by Chi-Square [14]. Frequencies and cross-tabulations were run to compare the risk factors of blood pressure, diabetics, smoking, ischaemic heart disease, and atrial fibrillation with types of stroke. Statistical significance was evaluated at $\alpha = 0.05$. SPSS 22.0 was the software used for all data analysis.

RESULTS

A total of 164 patients (91 male and 73 female) classified as the first-time stroke were recorded over the entire year of 2014 from governmental and private hospitals at Al-Madina Al- Munawara city in Saudi Arabia. The mean age of all of these first stroke patients was 67.52 ± 2.31 years, with a range between 20 and 94.

The sample was stratified at ten years strata starting from the age of 45 years up to the 74 years going to the lower end of 20 years old and the upper end of more than 75 years old. (Table 1).

Table 1: Different types of the first-time stroke

Age / Stroke types	Ischaemic Stroke	Intercerebral Hemorrhage	Subarachnoid Hemorrhage	Undefined
20-44	5(5.5%)	3(1.8%)	1(0.6%)	1(0.6%)
45-54	20(12.2%)	1(0.6%)	0(0.0%)	1(0.6%)
55-64	27(16.4%)	4(2.4%)	0(0.0%)	2(1.2%)
65-74	35(21.4%)	9(5.5%)	0(0.0%)	0(0.0%)
75>	46(28.1%)	7(4.2%)	0(0.0%)	2(1.2%)
Total	¹³³ 81.1%	24 (14.6%)	1 (0.6%)	6(3.7)

Regarding stroke types, the ischaemic type was the most prevalent with 81% while the subarachnoid hemorrhage was the least prevalent with only 0.6%. (Table 1).

About risk factors, hypertension was the most common risk factor, with 86.6% while arterial fibrillation was the least common risk factor with 12.8%. (Table 2).

Table 2: The risk factors of the first-time stroke

Age/ Risk Factors	Elevated Blood Pressure	Diabetes	Smoking	Ischaemic Heart Disease	Arterial Fibrilla- tion
	Count (%)	Count (%)	Count (%)	Count (%)	Count (%)
20-44	10 (6.1%)	8 (4.9%)	6 (3.7%)	5 (3.0%)	3 (1.8%)
45-54	15 (9.1%)	12 (7.3%)	5 (3.0%)	8 (4.9%)	4 (2.4%)
55-64	28 (17.1%)	20 (12.2%)	8 (4.9%)	13 (7.9%)	5 (3.0%)
65-74	39 (23.8%)	34 (20.7%)	18 (11.0%)	18 (11.0%)	6 (3.7%)
75>	50(30.5%)	30 (18.3%)	7 (4.3%)	24 (14.6%)	3 (1.8%)
Total	142 (86.6%)	104 (63.4%)	44 (26.8%)	68 (41.5%)	21 (12.8%)

It has been noticed that most patients suffered from multiple risk factors with the highest (56.7%) attributed to high blood pressure and diabetes, while the lowest (4.3%) attributed to smoking and arterial fibrillation. (Table 3).

Table 3: The risk factors and co-morbid conditions

Risk Factor	Diabetes	Ischaemic Heart Disease	Arterial Fibrillation
	Count (%)	Count (%)	Count (%)
Elevated Blood Pressure	93(56.71%)	67(40.85%)	18(10.98%)
Smoking Habits	32(19.51%)	20(12.20%)	7(4.27%)

A chi-square test of independence was calculated comparing the frequency of ischaemic stroke and intercerebral hemorrhage stroke. No significant relationship was found, $p > 0.05$. (Table 4).

Table 4: The risk factors and main stroke types

Risk Factor / Types of Stroke	Ischaemic Stroke	Intercerebral Hemorrhage	Total	χ^2	P-Val- ue
	Count (%)	Count (%)	Count (%)		
Elevated Blood Pres- sure	114(69.5%)	23(14.0%)	137(83.5%)	3.239	0.198
Diabetes	86(52.4%)	16(9.8%)	102(62.2%)	3.862	0.145
Smoking	37(22.6%)	7(4.3%)	44(26.8%)	2.700	0.259
Ischaemic Heart Disease	56(34.1%)	12(7.3%)	68(41.4%)	5.701	0.058
Arterial Fibrillation	18(11.0%)	3(1.8%)	21(12.8%)	1.093	0.579

DISCUSSION

The findings of the current study showed that ischaemic stroke is the most prevalent type with hypertension as the most common risk factor without having any difference between an ischaemic stroke and intercerebral hemorrhage stroke. The study results are in harmony with some studies that were conducted in some regions of Saudi Arabia [15,16] but were different from some other studies [9,17]. Multiple studies were carried out in the Arabic Gulf countries to assess stroke types in Bahrain [18], Kuwait [19,20], and Qatar [21]. These studies revealed that ischaemic stroke was the most common types, ranging from 59 – 80%, whereas intracerebral haemorrhage found in 19–28.4%, subarachnoid haemorrhage in 1 - 1.7%, and undefined in 6.6 – 16%. Similarly, variations were also noted in sever-

al studies conducted in the other Arabic countries from Egypt [22,23], Palestine [24], Libya [25], Jordon [26], and Sudan [27]. These studies showed that ischaemic stroke, ranging from 58.3 to 89.2%, whereas intracerebral hemorrhage found in 6-41.6%, subarachnoid hemorrhage in 1.7 – 4.5%. However, a wide variation of the pattern stroke types was also clearly evident in the studies of developed countries [28].

In Europe, several studies were carried out in Italy [29,31], Holland [32], Bosnia [33], and Croatia [34,35]. These studies showed that the ischaemic stroke pattern ranged from 53.9-89.5%, intracerebral hemorrhage 10-20.2%, subarachnoid hemorrhage 4-22.5%, and undefined 2.6-37%. However, this global variation might partly result from different proportions, timing, and intensity of CT and MRI investigations.

The most important of the risk factors associated with stroke is hypertension. It was the most common risk factors existed among patients of stroke (86.6%) in this study, where this proportion is higher than that obtained from other Saudi Studies (24.9 – 61%) [15-17,36,37]. However, relatively higher rates were reported from other Arabic and Arabic Gulf countries than that from previous Saudi Studies (46.9 – 80%) [18,19,25,27,38,39].

Several studies in the West [40-42] and the Middle East [18-20,27,43] countries have also found diabetes mellitus to be a risk factor for stroke. Locally, the present study showed one-hundred, and four-stroke patients (63.4%) had diabetes, which is relatively similar to the finding of a recent study (65%) in Kuwait state [39]. However, diabetes mellitus was less frequently present in the cases of the other Saudi studies (22.8 – 42%) [16,17,36,37] and other Middle East countries (20 – 52.5%) [18-20,27,43].

Hypertension and diabetes are dangerous, and both globally represent possible risk factors of stroke [44]. They are recognized as substantial emerging clinical and public health enigmas in Saudi Arabia and the Middle East [44-46]. Moreover, many patients of this study had co-morbid conditions as more than one of the possible risk factors. The findings showed that hypertension and diabetes (56.71%) were the most frequent conditions. The possible explanations for a high percentage of hypertension and diabetes in stroke patients among Arabs including Saudi Arabiamight be related to the high proportions of undiagnosed hypertension and diabetic cases, and also the lack of awareness among people about such probable stroke risk factors [45,46].

The current study also demonstrated that smoking constituted a significant risk factor, accounting for 26.8% of all stroke cases. The strokes attributable to smoking were higher than those reported from other investigators in Saudi Arabia (1.8 – 19%) [15,36,37]. However, it was roughly-matched to that stated in a hospital-based study conducted at Jeddah city, Saudi Arabia, that is situated in the western area of Saudi Arabia [16]. The presence of heart diseases such as ischaemic heart disease (41.5%) and atrial fibrillation (12.8%) in this study suggests that cardiac dysfunction probably plays a substantial role in the development of stroke. Previous studies from Saudi Arabia showed less

proportion of stroke patients associated with ischaemic heart disease (8.5 – 17%) [16,37], and atrial fibrillation (4 – 10%) [15-17,37]. However, no genuine diagnosis of heart dysfunction was reported in some studies [17,36].

This study, to the best results of searched literature, was the first piece of work carried out at the city of Al-Madinah Al-Munawarah to investigate the stroke types and risk factors in first-time stroke patients. However, the insufficient number of recent research reports and the dissimilarity of the methodology, adopted in previous studies, had limited the comparison and interpretation.

Findings of the present study indicating that hypertension, diabetes, and ischaemic heart disease, in particular, are in harmony with previous studies being critical risk factors for stroke. It also brought out the necessity for further national studies to investigate the pattern and risk factors of first-time stroke patients in Saudi Arabia. Finally, Saudi community national prevention and educational programs must be addressed for better health planning.

Conclusion: The study indicates that hypertension, diabetes, and ischaemic heart disease are critical risk factors for developing stroke and fairly commensurate with the global reported risk factors. Further research is needed to investigate stroke patterns and other possible risk factors concurrently with a Saudi national prevention program.

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None

Conflict of interest statement

There is no conflict of interest to report.

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