ORIGINAL ARTICLE

Ischemic stroke: prevalence of modifiable risk factors in the Saudi population

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ABSTRACT

Background: Stroke is one of the most common causes of hospital admissions and known to be the second leading cause of death globally. Studies have shown that around 87% of strokes are classified as ischemic. An ischemic stroke occurs when a clot or a mass blocks a blood vessel and cuts off blood flow to a part of the brain. Stroke risks assessment in a population not only aids healthcare givers but also significantly plays a role in selecting a proper treatment for people with elevated risk in clinical trials. The current study aimed to recognize the frequency of modifiable risk factors linked to ischemic stroke patients in Madinah city, Saudi Arabia.

Methodology: A cross-sectional study was carried out including patients of both sexes within the age >25 years. Type of stroke was identified by brain computed tomography scans or magnetic resonance imaging, and risk factors for stroke and other details were noted on a questionnaire.

Results: Out of 200 subjects considered for the present study, 100 were stroke patients, in which 75% were males and 25% were females. All lived in Madinah city and almost 30% were having a family history of stroke. Most of the patients had multiple risk factors which included hypertension (64%), diabetes mellitus (59%), smoking (29%), dyslipidemia (70%), obesity (75%), and coronary artery disease (10%).

Conclusion: Hypertension, dyslipidemia, obesity, and diabetes mellitus are major risk factors for stroke and might be considered as critical factors for primary and secondary prevention of stroke.

Keywords: Ischemic stroke, prevalence, modifiable risk factors.

Introduction

Stroke is a promptly increasing phenomenon of the central nervous system and at times total loss of cerebral function with no apparent cause other than that of vascular origin. World Health Organization (WHO) estimated that 6.2 million people died of a stroke in 2016 [1]. Stroke is the second most common cause of death and the first leading cause of disability in developed and developing countries [2]. In developed countries, about 85%–90% of strokes are caused by ischemic infarction and 10%–15% of strokes are caused by intracranial hemorrhage [3]. Stroke has an increasing annual rate of 2%. There are no large population-based epidemiological studies on stroke conducted in Saudi Arabia. The prevalence of stroke in Saudi Arabia is difficult to estimate accurately due to lack of sufficient data. A prevalence of 178/100,000 was reported in a community-based survey from the Eastern region of Saudi Arabia [4–7]. Stroke and transient ischemic attacks are remarkably prevailing in Saudi Arabia. Hypertension, diabetes mellitus, hyperlipidemia, obesity, atrial fibrillation, ischemic heart diseases, smoking, physical inactivity, transient ischemic attacks, and other cardiac disorders are possibly curable conditions that predispose to stroke [4]. More than 70% of people with hypertension continue to be unconscious of their status and less than 3% have adequately controlled blood pressure. Paradoxically, in general practice, physicians are using incorrect gaps to treat hypertension and this further contributes to under diagnosis, under treatment, and reduced control of

hypertension. This rationally can be a primary potential modifiable risk factor of stroke. Modifiable risk factors prevention remains a significant method to decrease the occurrence, recurrence, incapacity, and mortality of stroke.

Subjects and Methods

This cross-sectional descriptive community-based study was carried out in Madinah city, Saudi Arabia during November 10, 2018 to December 20, 2018. Stroke was defined as a clinical condition described by promptly developing clinical symptoms and/or signs of focal, and at times overall, loss of cerebral function, with symptoms lasting more than 24 hours. Hypertension: Hypertension was identified as a clinical condition in a patient taking anti-hypertensive drugs or having a blood pressure of $\geq$130/80 mmHg, diabetes was identified as a clinical condition in patients who were taking oral antidiabetic drugs or subcutaneous injections of insulin, or having a random venous plasma glucose concentration $\geq$11.1 mmol/l or a fasting plasma glucose concentration $\geq$7.0 mmol/l. A current smoker was defined as a person who smokes at least one cigarette per day for the past 3 months or more or had tobacco in any form. Nonsmoker was identified as a person who did not meet the criteria for a current. Dyslipidemia was measured when a patient had a diagnosis of it and/or was on a diet, or lipid-lowering agents or had total fasting blood cholesterol >200 mg/dl in the hospital stay. Obesity was defined as body mass index (BMI) $\geq$30 kg/m^2. Quantitative variables were expressed as mean ± standard error of the mean. Qualitative variables were analyzed by finding their rates or percentages.

Results

Table 1 shows the demographic and clinical characteristics of stroke patients. Total of 100 cases of ischemic stroke was included in the study, 75% were male and 25% were female patients. The male to female ratio of the study was 2:1. Mean age of the patients was 42. All participants lived in Madinah city and have an encouraging education status, 80% received a university degree. Out of the 100, 30% of them had a family history of stroke (Table 1). Association between stroke type and modifiable risk factors was assessed using Chi-square test and shown in Table 3. Mean BMI of the study population was 25.57 kg/m^2. From BMI values $\geq$25 kg/m^2, 45% females and 30% males were classified as obese (Table 3). Mean systolic and diastolic blood pressure (BP) in males was 141/87.7 mmHg and in females was 131.9/85.4 mmHg (Table 2). Most of the cases had a prevalence of more than one risk factor of stroke (Table 1). Among them, 29% of male patients were current smokers and, no female smokers were found in the study of diabetic mellitus patients with stroke (40% males; 19% of females) (Table 3). It was observed that 64% of the patients were hypertensive. About 30% of patients in the present study had a previous history of stroke.

Table 1. Demographic and clinical characteristics of stroke patients.

Demographics and clinical characteristics of all stroke patients	N (%)

Gender
    Male
    Female
	75 (75%)
	25 (25%)

Age (years) Mean ± SD	42.4 ± 2.1

Residence
    Rural
    Urban
	0 (0%)
	100 (100%)

Educational level
    Secondary
    University
    After University
	10 (10%)
	30 (30%)
	60 (60%)

Following diet
    Yes
    No
	40 (40%)
	60 (60%)

Affected with stroke before
    Yes
    No
	20 (20%)
	80 (80%)

Family history of stroke Yes	30 (30%)

Suffering from
    Hypertension
    Diabetes
    Smoking
    Dyslipidemia
    Obesity
    Lack of exercise
    Coronary artery disease
	64 (64%)
	59 (59%)
	29 (29%)
	70 (70%)
	75 (75%)
	90 (90%)
	10 (10%)

Table 2. Cardiovascular profile of stroke patients.

Variables	Stroke patients	
	Male N = 75	Female N = 25
Body weight (kg)	69.9 ± 1.2	67.8 ± 1.4
Height (m)	1.6 ± 0.007	1.44 ± 0.01
BMI (kg/m^2)	28.7 ± 6.2	30.9 ± 1.3
Systolic BP (mmHg)	141.2 ± 1.9	131.9 ± 2.9
Diastolic BP (mmHg)	87.7 ± 1.4	85.4 ± 2.6

Table 3. Frequency of risk factors of ischemic stroke in the study population.

Variables	Stroke patients		p-value
	Male N = 75	Female N = 25	
Dyslipidemia	50 (50%)	20 (20%)	0.01
Diabetes mellitus	40 (40%)	19 (19%)	0.001
Coronary artery disease	8 (8%)	2 (2%)	0.7
Previous Stroke	14 (14%)	6 (6%)	0.06
Smoking	29 (29%)	0 (0%)	0.02
Obesity	30 (30%)	45 (45%)	0.01

Discussion

Stroke is measured to be a primary cause of mortality and morbidity among adults. Stroke incidence increases with aging, more in males as compared to females, as well as its wide variance amongst different populations. Hypertension was the most common risk factor according to this study. This finding is consistent with that of other various worldwide research studies [2]. Studies have revealed that lowering blood pressure considerably decreases vascular events risks. About 20% of the patients in this study experienced previous attacks of stroke. Among the total, 75% of our participants were obese due to bad eating habits (60% not following a diet), as well as due to lack of physical activity. However, the prevalence of obesity was higher in females (45%) in comparison to male patients (30%). Our results were also parallel with other research studies that revealed that obesity and body fat distribution might be a strong predictor of stroke risk, as obesity is a primary factor of many health problems [8,9].

Conclusion

Results from the current study were clearly showing that obesity, hypertension, dyslipidemia, and diabetes mellitus are the key risk factors of ischemic stroke in Madinah city, Saudi Arabia. Further investigations and research studies are needed for larger sample size since this is a descriptive cross-sectional study, so the results might not be projected to the whole population.

List of Abbreviations

BMI   Body mass index
BP   Blood pressure
WHO   World health organization

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent for publication
Informed consent was obtained from all the participants.

Ethical approval
The research was conducted after the verbal approval of the concerned office at Taibah University.

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