

Frequency of Stroke and Distribution of Its Subtypes in Nineveh, Iraq, Related to Risk Factors

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Abstract

Background: The second leading cause of death worldwide is stroke, which is also a major global cause of disability. It can be of either type: infarction (ischemic) or bleeding (hemorrhagic). A variety of risk factors related to stroke may be grouped into changeable and unchangeable factors. **Objectives:** The study was designed to categorize the occurrence, types, and risk factors of stroke in Nineveh, Iraq. **Materials and Methods:** It is a descriptive study carried out in hospitals in Nineveh, which examines the recent frequency of stroke in the province of Nineveh from November 2020 to April 2021. Chi-square (χ^2) test of proportion and multiple logistic regression analysis were conducted to determine the association and relationship of risk factors to the cases studied. **Results:** During the period of the study, 137 patients were included, of which 120 (88%) were ischemic strokes. Ischemic and hemorrhagic stroke occur most frequently in the 25–64 years age group. Hypertension was a major risk factor for stroke (89%). Women were less likely to have a stroke compared with men. High blood pressure, hyperlipidemia, and uncontrolled high blood sugar were associated with an increase in stroke frequency, and the relationship between stroke risk and these factors was significant ($P < 0.05$). **Conclusions:** The study found that ischemic stroke is the most common cause; stroke frequency increases with age and peaks among the 25- to 65-year-old age groups.

Keywords: Frequency, 95% confidence intervals, risk factors, stroke

INTRODUCTION

Stroke is the world's second leading cause of death and a foremost global cause of disability. Its growing international impact over the coming decades is expected to be the largest among middle-income countries.^[1-3]

Stroke is a widely considered issue in Asia, which accounts for more than 60% of the world's population, and many countries are economies "in development." The number of stroke deaths is higher in Asia and Iraq than in Western Europe, the United States, or Australasia, except in countries, such as Japan.^[4-8] Worldwide, stroke is one of the leading causes of death and disability, and aftercare has significant economic costs.^[9]

Infarctions or bleeding, that is, ischemic/hemorrhagic are both types of stroke.^[10,11]

Various risk factors associated with stroke may be grouped into changeable and unchangeable factors.

Key risk factors for stroke are tobacco use, alcohol use, age, previous history of stroke, lack of physical activity, and high blood pressure (BP). Other factors include hyperlipidemia, diabetes, heart disease, overweight, nutritional habits, and hereditary factors.^[12,13] Khealani *et al.*,^[14] Shah *et al.*,^[15] and Choi^[16] have previously discussed these factors.

The purpose of this study was to determine the frequency, types, and risk factors of stroke.

This study aimed to estimate the frequency of stroke, its types, and risk factors in Nineveh, based on relevant clinical, laboratory, and other research data.

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MATERIALS AND METHODS

Study settings

It is a descriptive study conducted in hospitals in Nineveh, which examines the recent frequency of strokes in the province of Nineveh from November 2020 to April 2021.

Study sample

All patients who have had a stroke, based on clinical findings and imaging with the use of magnetic resonance imaging (MRI) or computed tomography (CT), have been included in our study, and patients who had a transient ischemic attack were excluded. All participants filled out a formal questionnaire and were medically assessed and examined, including the most precise investigation data. Age groups were defined as 25–65 years and more than 65 years.

Cases are everyone who has a first acute stroke (within 5 days of onset of symptoms and 72h in hospital). Cases were interviewed in as similar a way as possible by investigators, in the hospital. The questionnaire covered patients' demographic data, types of stroke, body mass index, physical activity, smoking for >15 years, alcohol intake, BP $\geq 140/90$ mm Hg, diabetes, if fasting blood sugar >7.0 mmol/L, high cholesterol, especially triglyceride (TG) if >6.2 mmol/L, or on medication for cardiovascular disease.

Statistical analysis

For studies of stroke type, the extent of all strokes of each major pathological type was calculated. The chi-square proportion test (χ^2) was applied to the significance of patients presenting risk factors. Finally, the link between stroke and risk factors has been examined through the use of logistic regression. A *P* value of 0.05 on the two-sided tests was considered to be a level of statistical significance. The data was analyzed using Statistical Package for the Social Sciences version 26 (IBM Corp., Armonk, NY, USA).

Ethical consideration

The study was conducted following the ethical principles that have their origin in the Declaration of Helsinki. It was carried out with patients' verbal and analytical approval before the sample was taken. The study protocol, the subject information, and the consent form were reviewed and approved by a local ethics committee according to document number 0149 dated 14/05/2023 to get this approval.

RESULTS

Within the study period, 137 patients with confirmed acute stroke via CT or MRI were included in this study, of which 120 (88%) were ischemic strokes and 17 (12%) were hemorrhagic strokes. The age distribution of strokes was analyzed, 64% of strokes occurred between the ages of 25 and 65 years and 36% were above the age of 65 years. The highest frequency of ischemic and hemorrhagic

strokes was in the 25–64 years age groups (63% and 76%, respectively), with 63 (46%) females and 74 (54%) males [Table 1].

The risk factors' distribution of stroke was documented in Table 2. Hypertension was a significant risk factor for stroke (89%). Other risk factors, included high cholesterol level (78%), low physical activity (72%), and diabetes (64%).

Table 3 shows that all risk factors are significantly involved in a stroke except for those linked to differences between the sexes (*P* < 0.05).

Table 4 shows associations of stroke according to the types with the most frequent risk factors (high BP, high cholesterol level, and diabetes). The interpretation would be that individuals with elevated BP levels have a 1.9286 greater odds of developing ischemic stroke compared with individuals with normal BP levels. Whereas those with high cholesterol levels have 3.9596 times [95% confidence interval (CI) = 1.37–11.41] more likely to develop ischemic stroke compared with those who with no high cholesterol level, the persons with diabetes also have 1.30 times (95% CI = 0.46–3.67) higher probability of getting ischemic stroke than those without diabetes.

Table 1: Types of stroke and patient demographics in Nineveh

Demographic characteristics		N	%
Types of stroke	Ischemic stroke (clot)	120	88
	Hemorrhagic stroke (bleeds)	17	12
Age (years)	25–64	88	64
	≥ 65	49	36
Sex	Male	74	54
	Female	63	46

Table 2: Risk factor distribution in patients with stroke

Risk factors		N	%
BMI ≥ 30	Yes	46	34
	No	91	66
Physical activity	Yes	98	72
	No	39	28
Smoking	Yes	53	39
	No	84	61
Alcohol	Yes	1	1
	No	136	99
High BP	Yes	122	89
	No	15	11
High cholesterol	Yes	107	78
	No	30	22
Diabetes	Yes	88	64
	No	49	36
CVD	Yes	56	41
	No	81	59

BMI: body mass index, BP: blood pressure, CVD: cardiovascular disease

Table 3: Analysis of stroke types and risk factors

Variables	χ^2 test	P value
Age	11.1022	0.0009
Sex	0.8832	0.3473
BMI $\geq$ 30	14.781	0.0001
Physical activity	25.4088	<0.0001
Smoking	7.0146	0.0081
Alcohol	133.0292	<0.0001
High BP	83.5693	<0.0001
High cholesterol	43.2774	<0.0001
Diabetes	11.1022	0.0009
CVD	4.562	0.0327

BMI: body mass index, BP: blood pressure, CVD: cardiovascular disease

Table 4: Associations^a of stroke according to the types with the most prevalent risk factors

Variables	Types of stroke		OR	95% CI
	Ischemic	Hemorrhagic		
Total	120	17		
High BP				
No	12	3	1.9286	0.4841–7.6830
Yes	108	14		
High cholesterol				
No	22	8	3.9596	1.3736–11.4139
Yes	98	9		
Diabetes				
No	42	7	1.3000	0.4613–3.6639
Yes	78	10		

^aOR: odds ratio, CI: confidence interval

DISCUSSION

Stroke increased in Nineveh as the city expanded. In the cases discussed here, ischemic stroke is the most common type (88%). The findings of this study are in line with earlier local studies that have shown that ischemic stroke is the most frequent type in Nineveh.^[8] These findings are consistent with those of other countries.^[17-19] In South America, a higher proportion of hemorrhagic strokes have been observed than the population depicted here.^[20] Whereas in Argentina similar age categories were found,^[20] which is much lower than in high-income countries, such as the in the United States (69.2 years)^[21] and of the European Union (age 73 years).^[22] Both types of stroke, ischemic and hemorrhagic, are most common in the 26–65 years age groups (63% and 76%, respectively). In high-income countries, however, the highest frequency is above the age of 65 years.^[21,22]

In this study, we found that men had more frequent strokes than women (54% compared with 46%), which was also seen in India in 2017.^[23]

In the study, high BP was the most commonly reported modifiable risk factor (89%), which was in line with other studies conducted in Jordan,^[24] and with the results of studies carried out elsewhere.^[24,25] Hyperlipidemia is the second most common risk factor (78%), followed by DM (64%), as well. Bahou *et al.*^[24] recently found hyperlipidemia to be the second most frequent complication. This pattern has also been observed in recent studies in our region and other regions.^[26,27] The relationship between stroke danger and risk factors is significant ($P < 0.0001$ for hypertension and hyperlipidemia, whereas $P = 0.0009$ for diabetes mellitus).

This may be because conventional ischemic risk factors, such as high BP and hyperlipidemia, are less controlled at Nineveh compared with high-income countries.

However, 39% of patients in our study reported smoking, also Jordan's studies have reported a high prevalence (35% and 40%).^[28] This may be in part because there were no tobacco taxes in my country. These results have a major impact on public health policies and sociocultural changes.

Concerning the subtype of stroke, we found that hypertension was more frequent in patients with ischemic stroke, whereas hyperlipidemia was found in 65% of ischemic stroke patients and 59% of hemorrhagic stroke patients and we have also identified differences in risk factor profiles and subtypes of stroke especially for those having high cholesterol level, in whom the liability to get ischemic stroke 3.9596 time than getting hemorrhagic stroke with a 95% CI of 1.3736–11.4139, this may be attributed to the fact that our patients suffered of hyperlipidemia, which affect vessels of the brain. Intracranial atherosclerosis appears to be much more common in Asia compared with the Western population, which has been ascribed to differences in vascular risk factors from various races.^[29]

CONCLUSION

The study finds ischemic stroke is the most frequent type in Nineveh, stroke frequency increases with age, but in our population, it has peaked in the most productive age group of 25–65 years. Women were at a lower risk for stroke than men, high BP, hyperlipidemia, and uncontrolled diabetes mellitus were associated with increased frequency of stroke. The relationship between stroke danger and these risk factors is significant.

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Conflicts of interest

There are no conflicts of interest.

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