Original Article

Assessment of Risk Factors and Management of Ischemic Stroke at Ibrahim Malik Teaching Hospital in Khartoum, 2018

Ayat A. Mohammed, Ahmed H. Arbab[1], T. Mohammed T. Abdalla[2]

Departments of Clinical Pharmacy and [1]Pharmacognosy, Faculty of Pharmacy, University of Khartoum, Khartoum, [2]Department of Pharmacognosy, Faculty of Pharmacy, Omdurman Islamic University, Omdurman, Sudan

Abstract

Context: Ischemic stroke is an acute medical condition with life-threatening complications; therefore, understanding its common risk factors, early management, prevention from recurrent attack, and in our population is necessary. **Aim:** The aim of this study is to assess common risk factors and management of ischemic stroke at Ibrahim Malik Teaching Hospital (Khartoum, Sudan). **Methodology:** A retrospective, hospital-based study was conducted at Ibrahim Malik Teaching Hospital Khartoum State. The study included all medical records of patients hospitalized with Ischemic stroke from January 2017 to January 2018. The data were collected using a well-designed data collection form and analyzed with SPSS. **Results:** Out of 116 participants, ischemic stroke was more frequent in males (59.5%), adults over 65 years (57.8%). Forty-four percent of participants had a history of hypertension. Smoking and family history with ischemic stroke were observed only in 10.3% and 5.2% of participants, respectively. Aspirin (100–300) mg plus atorvastatin 40 mg were the most prescribed regimen of 44.8%. The highest type of drug-drug interaction reported was monitor closely (41.4%) and serious (33.6) type drug-drug interactions. While 74.1% of participants were discharged, the rate of death was significantly higher in females and participants over 65 years' age. **Conclusions:** Past medical history of hypertension and elderly age were the major risk factors with ischemic stroke. Aspirin plus statin therapy is the most frequently used regimen with nonadherence to the guidelines regarding the use of thrombolytic therapy and anticoagulants. Serious type drug-drug interactions were detected among prescribed medications.

Keywords: Alteplase, drug-drug interaction, ischemic stroke, risk factor, statins, Sudan

Introduction

Ischemic stroke is the most common type of strokes (85%),[1] and it was ranked as the second leading cause of death after coronary artery disease. By 2020 in developed countries, it is predicted that stroke will be accountable for 6.2% of the total burden of illness.[2] Ischemic stroke is characterized by a sudden loss of blood circulation to an area of the brain, resulting in a corresponding loss of neurologic function.[3] The etiology of ischemic strokes is due to either a thrombotic or embolic event that causes a decrease in blood flow to the brain.[4] The symptoms depend upon the affected region of the brain.[4] The common impairments resulting from ischemic stroke include motor impairment, speech, and language, swallowing, vision, sensation, and cognition.[5] Emergent brain imaging is essential for the evaluation of acute ischemic stroke.[6]

The therapeutic window that is needed to prevent reversible ischemia from becoming irreversible infarction is narrow and stresses the phrase "time is brain."[7] Successful rapid response is crucial to prevent reversible ischemia from becoming irreversible infarction and reversing the neurological symptoms through interventional approaches.[8] Currently, there are many therapeutic and preventive measures for the management of stroke.[9-14] Since the ideal diagnosis and treatment of ischemic stroke is the key in preserving neuronal function and preventing further damage. This study aimed to assess the management of ischemic stroke at Ibrahim Malik Teaching Hospital (Khartoum, Sudan) and to estimate the common risk factors.

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Address for correspondence: Dr. Ahmed H. Arbab, Department of Pharmacognosy, Faculty of Pharmacy, University of Khartoum, Khartoum, P.O. Box 1996. Sudan.
E-mail: arbabssn@gmail.com

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Methodology

Design and Setting

Descriptive retrospective study based on hospital medical records. The study was conducted at Ibrahim Malik Teaching Hospital, which is one of the major hospitals in Khartoum state (Sudan) that provides primary and emergency and medical services to the whole state individuals.

Study population

All patients medical records from the previously hospitalized ischemic stroke patients at Ibrahim Malik Teaching Hospital from January 2017 to January 2018, which were 116 patient's medical records.

Inclusion and exclusion c criteria

All medical records of male and female adults over 18 years diagnosed with ischemic stroke were included in the study. Medical records of patients with transient ischemic attack and incomplete medical records were omitted from the study.

Data collection

The data were collected from the medical records using a data collection form designed in accordance with the objectives of the study. The data collection form was reformulated after pilot study. Data collection form was containing the following variables: demographic data of participants, clinical data (past medical history, family history, and lifestyle), concomitant drug(s) used, and the fate of the patient.

Medscape application: drug interaction checker[15] was used for checking drug-drug interactions.

Data analysis

The data were analyzed using the International Business Machines (IBM). Statistical Package for Social Sciences (SPSS) for Windows, Version 23.0 software (Armonk, NY, USA: IBM Corp). Data were represented as frequencies and percentages; the Chi-square test was used to describe the correlation between variables under study. $P \leq 0.05$ was used to consider the relationship is significant. Data were represented as tables and figures.

Ethical consideration

Ethical clearance and approval to conduct the research were taken from the Ministry of Health and Ibrahim Malik hospital administrators. Confidentiality of all data collected was ensured, and remaining information from the sample will not be reused for other purposes.

Results

From the findings of 116 participants, ischemic stroke has a higher frequency in males, elderly patients over 65 years, and it was slightly higher in participant from the rural areas (55.2%) than the urban one [Table 1].

Regarding the lifestyle of participants, it was found that about 89.7% of ischemic stroke patients were a nonsmoker and only 10.3% were smokers. Moreover, while 94.8% of participants had no family history of the disease, only 5.2% of them had a family history of ischemic stroke. Analysis of the past medical history of participants is summarized in Table 2, hypertension was found to be the most frequent factor; alone (21.6%) or in addition to another factor as diabetes mellitus (11.2%) or previous ischemic attack (11.2%). On the other hand, 25% of participants have no past medical history.

Medscape drug interaction checker[15] was applied to detect potential drug-drug interaction. Out of 116 participants, drug-drug interaction was detected in 89 (76.7%) of participants, and monitor closely was the most frequent drug-drug interaction (41.4%) between concomitant drugs used and prescribed medications [Table 3].

As summarized in Table 4, the Chi-square test showed significant association between gender and outcomes ($P = 0.004$). Furthermore, there was a significant relationship between the age of patients and outcome ($P = 0.034$), where the rate of death was higher in elder individuals.

Aspirin at low dose (100-300 mg) once daily and atorvastatin 40 mg once daily was the most frequent regimen prescribed for the management of ischemic stroke patients (44.8%), followed by (low dose aspirin + atorvastatin 40 mg + Enoxaparin 40 mg) once daily [Table 5]. 74.1% of participants were discharged, whereas 25.9% were died [Figure 1]. Importantly, there was

Table 1: Demographic characteristics of the study population (n=116)

Variable	Frequency, *n* (%)
Gender	
Male	69 (59.5)
Female	47 (40.5)
Age (years)	
18-35	4 (3.4)
36-50	11 (9.5)
51-65	34 (29.3)
Above 65	67 (57.8)
Residence	
Urban	52 (44.8)
Rural	64 (55.2)

Table 2: Distribution of the participants according to the past medical history (n=116)

Past medical history	Frequency, *n* (%)
None	29 (25)
Hypertension	25 (21.60)
Hypertension + Diabetes mellitus	13 (11.20)
Hypertension + Previous ischemic attack	13 (11.20)
Atrial fibrillation	12 (10.30)
Coronary heart disease	7 (6.00)
Diabetes mellitus	6 (5.20)
Previous ischemic attack	5 (4.30)
Others	6 (5.20)
Total	116 (100)

Table 3: Categories of drug-drug interaction checked in medications used for participants

Drug-drug interaction	Frequency, *n* (%)
None	27 (23.30)
Monitor closely	48 (41.40)
Serious	39 (33.60)
Minor	2 (1.70)

Table 4: Association between demographic variables and fade of the participant

Variable	Percent	The fate of the participant		*P*
		Discharged (%)	Died (%)	
Gender				0.004
Male	59.5	47.4	12.1	
Female	40.5	26.7	13.8	
Age (years)				0.034
18-35	3.4	3.4	0	
36-50	9.5	6.9	2.6	
51-65	29.3	24.1	5.2	
Above 65	57.8	39.7	18.1	

Table 5: Association between prescribed regimen and fade of the participant (*n*=116)

Prescribed regimen	Discharged (%)	Died (%)
Atorvastatin + Asprin	34.5	10.3
Atorvastatin + Asprin + Enoxaparin	20.6	8.6
Rosusvastin + Asprin	4.3	0.9
Atorvastatin + Asprin + Clopidgrel	5.2	2.6
Atorvastatin + Asprin + Heparin	4.3	0.9
Atorvastatin + Asprin + Clopidgrel + Enoxaparin	5.2	2.6
Total	47.1	25.9

no significant relationship between prescribed regimens for the management of patients and outcomes ($P = 0.329$).

Discussion

This study attempted to investigate the risk common factors and management of ischemic stroke at Ibrahim Malik Teaching Hospital. According to the findings of this study, ischemic stroke is more frequent in males (59.5%) than females. This finding is in concordance with Forster. A., *et al*. study which revealed that slight gender difference in acute ischemic stroke due to difference in etiology and risk factors profiles.[16] The frequency of the disease is moderately higher for older patients (>65 years old), in line with Rojas *et al*. findings who noted that stroke rates doubling every decade after the age of 55 years[17] which mainly due to increased thromboembolic risk factors and comorbidities. The study also showed a higher distribution of the disease in rural areas than urban ones, this may be due to differences in lifestyle, diet, and nutrition.

Figure 1: The fate of the participates by gender (n:116)

Regarding the lifestyle of the participants revealed that only (10.3%) of the patients were smokers which indicates a weak association between smoking and ischemic stroke in contrast to a meta-analysis review conducted to analyze the relation between cigarette smoking and stroke.[18] This may be attributed to the limited sample size in the current study. Furthermore, the study revealed weak association between previous ischemic stroke history and the disease, only (5.2%) of participants had a family history of ischemic stroke. Our finding is contradictory to a previous study conducted in the United States and included a total of 1886 participants.[19] This difference may be due to the differences in the study population size and genetic variables. Unfortunately, in this study, there was not sufficient data documented in the medical records about physical activity and obesity and other possible risk factors. Investigation of the past medical history of the participants revealed that hypertension was the most common history. This finding is in agreement with Benjamin *et al*. heart disease and stroke statistics 2018 update.[20] It is well-known that controlling blood pressure decreases the risk of ischemic stroke.[21]

From medication point of view, this study utilized Medscape drug interaction checker to detect different categories of inappropriate practice in the utilization and monitoring of drugs. Medscape is a trusted website from the WebMD Health Professional Network.[15] The most frequent type of drug-drug interactions was "monitor closely" (41.4%), followed by serious type of interaction checked between concomitant drugs used (33.6%). In serious type of drug-drug interaction, the use of the alternative drug is recommended. The detected irrational use of drugs in this study indicates deficiencies in utilization practices at Ibrahim Malik Teaching Hospital, where the study was conducted and maybe in the other hospitals in Sudan. Therefore, this high frequency of drug-drug interactions enforces the need for drug utilization risk prevention measures. Also, further studies are needed to detect drugs involved in drug-drug interaction between medications used for ischemic

stroke or between ischemic stroke medications and drugs for co-morbid conditions.

Regarding adherence to guidelines, the followed thrombolytic therapy for the early management of acute ischemic stroke is not in line with American Heart Association/American Stroke Association (AHA/ASA) guidelines, which state that intravenous Alteplase (0.9 mg/kg, maximum dose 90 mg over 60 min with initial 10% of the dose given as a bolus over 1 min) should be used for patients who may be treated within 3 hours of symptoms onset unless the patient is not eligible for Alteplase therapy.[10] Nonadherence to this guideline can be attributed to the nonavailability of intravenous Alteplase in Sudan, and the late diagnosis with brain imaging to exclude the existence of any intracranial hemorrhage, so all regimens prescribed used for the prevention of recurrent attack. In the current study, the regimen of aspirin low dose (100–300 mg) plus atorvastatin 40 mg once daily was the most frequently used regimen for the secondary prevention of ischemic stroke which is in line with international randomized stroke trial which highly recommended aspirin over anticoagulants due to its safety and efficacy,[22] also a systematic review conducted by Manktelow and Potter[13] reported the beneficial value of high dose of atorvastatin after ischemic stroke. Unfortunately, all the remaining prescribed regimens used for the secondary prevention except for the regimen of atorvastatin plus aspirin are nonadherent to AHA/ASA guidelines neither regarding the use of anticoagulant (low-molecular-weight heparins and unfractionated heparin) nor regarding use of a combination of clopidogrel and aspirin. For anticoagulant use, AHA/ASA states that urgent anticoagulation, to prevent early recurrent stroke, halting neurological worsening, or improving outcomes after acute ischemic stroke, is not recommended for treatment of patients with acute ischemic stroke.[23] Furthermore, the benefit of prophylactic-dose of subcutaneous heparin in immobile patients with acute ischemic stroke is not well established for deep-venous thrombosis prophylaxis in ischemic stroke patients.[24] For the use of a combination of aspirin and clopidogrel, AHA/ASA states that combination use must be restricted for secondary prevention after transient ischemic attack.[12]

In terms of outcome, in the current study, out of 116 participants, 86 (74.1%) were discharged, this finding is in line with Xu *et al*., 2016 study.[25] Moreover, in concordance with Seshadri *et al*., 2006 study findings,[26] a statistically significant relationship (P = 0.044) was found gender and outcome, in both studies, a higher percentage of death was observed among female participants. The death rate was also significantly associated with age (P = 0.034). However, there was a nonsignificant relationship between different prescribed regimens for the management and fate of the participant.

Conclusions

The major risk factors with ischemic stroke are the past medical history of hypertension and the elderly age. Aspirin plus statin therapy was the most frequently used regimen (44.8%) with nonadherence to guidelines, especially regarding the use of thrombolytic therapy and anticoagulants. Besides, "monitor closely" type and serious type drug-drug interactions among prescribed medications were around 41.40% and 33.6%, respectively. While 74.1% of participants were discharged, the fate of the participates was significantly associated with the gender and age of the participants.

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Conflicts of interest

There are no conflicts of interest.

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