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Risk factors for medical complications of acute hemorrhagic stroke

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ABSTRACT

Objective: To assess the risk factors leading to medical complications of hemorrhagic stroke.

Methods: We conducted an observational study in neurology, emergency and general medicine wards at a tertiary care teaching hospital in Kadapa. We recruited hemorrhagic stroke patients, and excluded the patients have evidence of trauma or brain tumor as the cause of hemorrhage. We observed the subjects throughout their hospital stay to assess the risk factors and complications.

Results: During period of 12 months, 288 subjects included in the study, 89% of them identified at least 1 prespecified risk factor for their admission in hospital and 75% of them experienced at least 1 prespecified complication during their stay in hospital. Around 47% of subjects deceased, among which 64% were females.

Conclusions: Our study has assessed that hypertension followed by diabetes mellitus are the major risk factors for medical complications of hemorrhagic stroke. Female mortality rate was more when compared to males.

1. Introduction

Stroke is traditionally defined as a clinical syndrome characterized by an acute loss of focal brain function with symptoms lasting more than 24 h or leading to (earlier) death, and it is due to inadequate blood supply to a part of the brain (ischemic stroke) or spontaneous hemorrhage into a part of the brain (primary intracerebral hemorrhage) or over the surface of the brain (subarachnoid hemorrhage)^[1]. Haemorrhagic stroke (HS) is caused by bleeding of a blood vessel supplying the brain. Subarachnoid hemorrhage, which usually occurs due to rupturing of an aneurysm, may also lead to stroke. It tends to more severe and associated with higher early mortality^[2]. HS most commonly occur in association with hypertension. Several factors identified as associated with an increased risk of stroke; see [Table 1](#)^[3].

The hospital mortality and morbidity rate of patients with acute stroke ranges from 7.6% to 30%. From these, neurological deaths constitute about 80% and non-neurological deaths constitute about 17%^[4]. Neurological deaths such as progressive increased intracranial pressure and subsequent herniation were the most common causes of death in both groups within the first 4 days of admission^[5].

Medical complications after stroke are common, present barriers to optimal recovery or related to poor outcomes and are potentially preventable or treatable^[6]. Estimates of frequency of complications range from 40% to 96% of patients, with severity of stroke as the most important risk factor^[7]. The complications have been fatal in some cases, contributing to the hospital mortality^[8].

2. Materials and methods

The departments included General medicine, Emergency medicine and Neurology. Patients required from each department had at least 18 years of age or older and clinical diagnoses of hemorrhagic stroke with a measurable neurological deficit occurring within 7 days and reviewed their progress on a weekly

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Table 1

Risk factors for stroke.

Classification	Factors
Sociodemographic	Age Sex: slightly higher risk in men Ethnicity: higher risk in African Caribbean and South Asian populations Socio-economic status: increasing deprivation is associated with increased risk
Biological	Raised blood pressure: doubling in risk of death from stroke for every 10 mmHg increase in diastolic blood pressure or 20 mmHg increase in systolic blood pressure Hypercholesterolaemia Hyperhomocysteinaemia
Lifestyle	Smoking: 50% increase in risk Excessive alcohol consumption: 50%–100% increase in risk Physical inactivity: 2.5-fold increase in risk Diet: obesity; low potassium; high salt; low fruit and vegetable intake
Other conditions	Diabetes mellitus: doubling of risk Atrial fibrillation: 5-fold increase in risk Ischemic heart disease: doubling in risk Cardiac sources of thromboembolism Hematological disorders: sickle cell disease; raised packed cell volume; hypercoagulability Carotid artery stenosis Migraine
Other factors	Oral contraception: doubling of risk Hormone replacement therapy: doubling of risk Major life events Influenza and other intercurrent infections

basis until discharge from the hospital. Eligible patients had seen and consecutively approached for enrollment, with a target enrollment of 20 patients from all departments. We excluded patients with trauma, brain tumor as the cause of hemorrhage and patient with incomplete follow-ups. Evidence or clinical

suspicions of ischemic stroke patients were also excluded. Each participating site obtained institutional review board approval before the study initiation, and each patient provided written informed consent prior the enrollment. Duration of study participation for each patient was a single site visit. Enrolled patients had clinical and laboratory information abstracted from their medical records by office staff. We utilized a data collection form to assess risk factors and monitor the incidence of complications. Information abstracted from the chart included: sex, age, race, date of recruitment, diabetes, hypertension, hypercholesterolemia, elevated triglyceride levels, low density lipoprotein, current smoker and significant alcohol intake. Glasgow Coma Scale and modified Rankin scale were also recorded.

Following the work by Langhorne *et al.*, modified predefined complications were utilized to monitor the occurrence of complications (Table 2)^[3]. These complications monitored on daily by the physician. The selected potentially life threatening complications are as follows: acute congestive aspiration pneumonia, cardiac arrhythmias, chest infections, deep vein thrombosis, epileptic seizure, falls, heart failure, pulmonary embolism and recurrent stroke. The patient's condition, whether he survived or succumbed to his illness, was noted upon discharge.

3. Results

Two hundred and eighty eight consecutive patients recruited from all departments. There were 152 (52.8%) males. Mean age was (71.0 ± 9.2) years and 218 (75.7%) had their first-ever stroke. Most of these patients were in the age group of 60–80 years (Figure 1). One hundred and twenty three (42.7%) patients admitted to a general neurology, 89 (31%) to an emergency ward and 76 (26.4%) to a general medical ward.

3.1. Risk factors for admission

On admission, the following risk factors were noted among the subjects: hypertension in 217 (75.35%), diabetes mellitus in 76 (26.39%), alcohol consumption > 30 g/day in 88 (30.56%) and current cigarette smoking in 92 (31.94%). One hundred and eighty nine (65.6%) had a Glasgow Coma Scale score ≥ 8. A total of 257 patients (89.23%) experienced at least 1 prespecified

Table 2

Modified predefined complications.

Complications	Follow-up in hospital
Neurological	Recurrent stroke Clinical features lasting more than 24 h consistent with World Health Organization definition of stroke. Epileptic seizure Clinical diagnosis of focal and/or generalized seizure in a previously nonepileptic patient.
Infection	Urinary tract infection Chest infection Clinical symptoms of urinary tract infection or positive urine culture. Auscultatory respiratory crackles and fever or radiographic evidence, or new purulent sputum.
Immobility	Other infection Falls Any pyrexial illness lasting more than 24 h. Any documented falls regardless of cause.
Psychological	Pressure sore/skin break Depression Any skin break or necrosis resulting from either pressure or trivial trauma. Low mood considered to interfere with daily activities or require pharmacological or psychiatric intervention.
Miscellaneous	Any documented complication resulting in a specific medical or surgical intervention (e.g. Gastrointestinal hemorrhage, constipation, episodes of cardiac failure, cardiac arrhythmias and arthritis).

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