Early Prognostic Factors for Ischemic Stroke in a Tertiary Care Center

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ABSTRACT:
INTRODUCTION: Stroke is the second most common cause of mortality and the third most common cause of disability worldwide. There is limited information about factors associated with in-hospital death and the impact of neurological complications on early outcome for patients with stroke treated in our settings. So, this hospital based study is aimed at to identify the predictors of early adverse outcome or mortality in hospitalized patients after an acute ischemic stroke.

METHOD: The study was designed as a hospital based prospective study. Patients who presented within 24 hours after symptom onset to National Academy of Medical Sciences, Bir Hospital with a first-ever acute ischemic stroke were prospectively included from July 2015 to June 2016. Ischemic stroke was diagnosed when neurological deficits were accompanied by corresponding abnormal findings depicted on brain computed tomography (CT) and/or magnetic resonance imaging (MRI). Patients brought after 24 hours of stroke and without consent were excluded from the study.

RESULT: Among 181 total patients with first-ever ischemic stroke, 85 (47%) patients were males and remaining 96 (53%) patients were female. The mean age of the total patients was 64.23 years (SD 15.90) ranging from 25-99 years and 31 (17.1%) patients were at the age of 45 years or below.

Smoking was the commonest risk factor (74%) among the patients, followed by hypertension (68.5%), Dyslipidemia (14.4%), diabetes (11.6%), atrial fibrillation (10.5%), rheumatic heart disease (8.8%), use of oral contraceptive pills (4.25 % of female) and prior history of transient ischemic attack (1.66%). Mortality was 22(12.2%).

CONCLUSION: This study showed that age, presence of fever, hyperglycemia, low GCS, hyponatremia, atrial fibrillation and low oxygen saturation are associated with poor outcome in patients with ischemic stroke.

KEY WORDS: Ischemic Stroke, CVD (Cerebrovascular disease), Prognostic factors.

INTRODUCTION

Stroke is the second most common cause of mortality and the third most common cause of disability worldwide.1 Though the incidence of stroke is decreasing in high-income countries, the incidence is increasing in low-income countries.2 Two-thirds of all stroke deaths occur in low- and middle-income countries.3 The development and the establishment of an organized approach of acute stroke care is postulated to reduce the overall burden of stroke on society.4,5,6

The expected benefits of the implementation of specialized stroke services in community settings are more efficient patient care, higher rates of patients receiving intravenous thrombolysis, fewer stroke complications, and a reduced morbidity and mortality after stroke.4 The complications of stroke mostly occur within first four days.7 Risk of death is high in the first week and treatment aimed at ensuring survival in this critical period has high priority.8 Nowadays, up to 10% of patients with an acute ischemic stroke die within 30 days of the ictus.9 Eight-day mortality following a cerebral ischemic event, as determined within France, depends on the level of consciousness on admission.10

The identification of early mortality predictors is of paramount importance for clinicians, so that specific therapies and management strategies can be applied to patients at high risk of death. However, only limited information is available for predictors of short-term mortality after acute ischemic stroke11,12,13,14.
Medical management focus on the prevention of sub-
acute complications of stroke, including malnutrition
aspiration, pneumonia, dys electrolytaemia, urinary
tract infection (UTI), bowel or bladder dysfunction,
deep vein thrombosis (DVT), pulmonary embolism,
contractures and skin breakdown.\textsuperscript{15} Many clinical
variables have been identified as predictor of prognosis
in ischemic stroke like advancing age and severity
of neurological deficits at onset which consistently
related with mortality and morbidity\textsuperscript{16}, other
factors i.e. gender, hypertension, cardiac diseases
including atrial fibrillation, hyperglycemia, vascular
territory, though found unfavorable, but no definite
relation could be established.\textsuperscript{17,18}

Improving clinical outcome is the cornerstone of
both acute stroke treatment and prevention. Early
recognition of possible predictors seems essential for
optimizing therapeutic procedures, especially those,
which are cost- and time-consuming. This is extremely
important in country like Nepal, where financial and
technical resources are limited. To reduce the mortality
due to stroke, prompt recognition and treatment of
complications are necessary. However, only limited
information is available on predictors for in-hospital
mortality and about the impact of serious medical
and neurological complications on early outcome in
patients with stroke in our settings.

So, this hospital based study was aimed at to identify
the predictors of early adverse outcome or mortality
in hospitalized patients after an acute ischemic stroke
in Bir hospital.

\textbf{METHOD}

This hospital based, prospective study was carried out
in the Neurology Unit, Department of Medicine, Bir
hospital. Total 181 patients who presented within 24
hours after symptom onset to National Academy of
Medical Sciences, Bir Hospital with a first-ever acute
ischemic stroke were prospectively included from July
2015 to June 2016.

Ischemic stroke was diagnosed when neurological
deficits were accompanied by corresponding abnormal
findings depicted on brain computed tomography (CT)
and/or magnetic resonance imaging (MRI). Patients
brought after 24 hours of stroke and without consent
were excluded from the study.

The risk factors of stroke were defined in terms of
hypertension, diabetes mellitus (DM), dyslipidemia,
ischemic heart diseases, valvular heart disease,
atrial fibrillation (AF), history of transient ischemic
attack (TIA), smoking and oral contraceptive pill (OCP).
Detailed history was taken and thorough clinical
examinations were done in all cases. The
investigation workups included complete blood
count, ESR, Fasting Blood Sugar, post prandial
blood sugar, Serum urea and Creatinine, Fasting
Lipid profile, Serum Electrolytes, Urine routine
examination, ECG, chest x-ray, Echocardiography, CT
Scan of Brain in all cases. In Some selected cases
MRI of brain, Duplex study of neck vessels, ANA and
other relevant investigations were done. The data
included; age, sex, hypertension, diabetes mellitus,
heart disease, previous stroke, smoking, alcohol
consumption, obesity, serum cholesterol, low density
lipoprotein (LDL), high density lipoprotein (HDL) and
triglyceride (TG) level. Patients were considered to be
hypertensive if patients fulfilled JNC-7 criteria\textsuperscript{20}, or if
the patients were taking antihypertensive medication.
Diabetes mellitus was defined according to American
Diabetes Association (ADA) criteria\textsuperscript{20} or if patient was
under medication. Cholesterol, LDL, HDL and TG were
done during hospitalization after fasting for at least 8
hours. Dyslipidemia was defined according to National
Cholesterol Education Program (NCEP III).\textsuperscript{21} Heart
diseases included atrial fibrillation, rheumatic heart
disease, nonrheumatic valvular heart disease, patent
foramen ovale, congestive heart failure, infective
endocarditis, sick sinus syndrome and ischemic
heart disease. Previous stroke history was defined by
previous diagnosis by a physician. Patients were
followed up daily with detailed clinical examinations
and relevant investigations during the hospital stay. The
patients were monitored for medical and neurological
complications and were managed accordingly.

\textbf{RESULT}

<table>
<thead>
<tr>
<th>Table1: Characteristics of patients and risk factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Patients</td>
</tr>
<tr>
<td>Age (years; mean, SD, range)</td>
</tr>
<tr>
<td>Male (%)</td>
</tr>
<tr>
<td>Female (%)</td>
</tr>
<tr>
<td>Age ≤ 45 years</td>
</tr>
<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>Diabetes</td>
</tr>
</tbody>
</table>
In this study, advanced age (p 0.037), hypertension (p 0.013), fever (p <0.001), low GCS (≤8) on admission (p <0.001), hyperglycemia (p < 0.001), hyponatremia (p 0.012), atrial fibrillation (p < 0.001), were associated with early mortality and poor outcome. No statistically significant association was seen between gender and outcome (p 0.129).

A total of 181 patients with first ever acute ischemic stroke were enrolled in the study and mortality was found in 22 patients (12.2%). Among the population, 85 (47%) patients were males and remaining 96 (53%) patients were female. The mean age of the total patients was 64.23 years (SD 15.90) ranging from 25-99 years and 31 (17.1%) patients were at the age of 45 years or below.

Smoking was the commonest risk factor (74%) among the patients, followed by hypertension (68.5%), Dyslipidemia (14.4%), diabetes (11.6%), atrial fibrillation (AF, 10.5%), rheumatic heart disease (RHD, 8.8%), use of oral contraceptive pills (4.25 of female), prior history of transient ischemic attack (TIA, 1.66%). Rheumatic heart disease was more common in young stroke (≤ 45 years) patients. The mean duration of hospital stay was 6.81 days (±3.251), 4.50 days (± 4.009) and 6.81 days (± 3.251) in total patients, deceased and survivors respectively.

### Table 2: Predictors of in-hospital mortality in patients with ischemic stroke.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Survival N (%)</th>
<th>Death N (%)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>81 (84.4%)</td>
<td>15 (15.6%)</td>
<td>0.129</td>
</tr>
<tr>
<td>Male</td>
<td>78 (91.8%)</td>
<td>7 (8.2%)</td>
<td></td>
</tr>
<tr>
<td>Age, mean±</td>
<td>63.65±</td>
<td>68.41±</td>
<td>0.037</td>
</tr>
<tr>
<td>SD</td>
<td>15.805</td>
<td>16.393</td>
<td></td>
</tr>
<tr>
<td>GCS ≤8</td>
<td>5 (27.3%)</td>
<td>16 (72.7%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Fever</td>
<td>13 (37%)</td>
<td>17 (63%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hyperglycemia</td>
<td>8 (44.6%)</td>
<td>10 (55.6%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hyponatremia</td>
<td>6 (42.9%)</td>
<td>8 (57.1%)</td>
<td>0.012</td>
</tr>
<tr>
<td>Desaturation</td>
<td>3 (12%)</td>
<td>22 (88%)</td>
<td>0.056</td>
</tr>
<tr>
<td>AF</td>
<td>9 (45%)</td>
<td>11 (55%)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**DISCUSSION**

In the acute phase of stroke, prognosis depends on various factors such as stroke severity, patient age, comorbid conditions, epidemiologic factors, complications of stroke etc. So, this hospital based study was conducted to identify the predictors of early adverse outcome or mortality in hospitalized patients after an acute ischemic stroke in our setting.

Smoking was the commonest risk factor (74%) among the patients, followed by hypertension (68.5%), Dyslipidemia (14.4%), diabetes (11.6%), atrial fibrillation (10.5%) in our study. The finding was similar to study done by Bak et al in Denmark. Similarly an earlier retrospective in Nepal found that risk factors were smoking (58.3%), hypertension (47.2%), alcohol (41.4%), atrial fibrillation (12.5%) and diabetes mellitus (11.1%).

In this study of 181 patients with first-ever stroke, the in-patient mortality was 22 (12.2%) whereas mortality was reported to be 5% to 6.9% in developed countries. The estimated worldwide 30-day case fatality rate after first ischemic stroke ranges from 16 to 23 percent, though there is wide variation in reports from different countries. Increased mortality in our patients compared to western data may be due to late arrival of the patient to hospital and unavailability of thrombolytic therapy.

This study found that fever (p <0.001) and hyperglycemia (p <0.001) were significantly associated with increased mortality. In a prospective study of 177 patients with acute cerebral infarction admitted within 24 h of stroke onset Castillo et al. determined that temperature and other variables like increased plasma glucose significantly influenced morbidity. The detrimental effects of hyperglycemia can be attributed to tissue acidosis secondary to anaerobic glycolysis,
in-hospital outcomes, while most of the prognostic studies assess one month outcome.

CONCLUSION

This study shows that smoking, hypertension, dyslipidemia, diabetes mellitus, hypercholesterolemia, atrial fibrillation and rheumatic heart disease were the most common risk factors in our patients with ischemic stroke. This study done in first-ever ischemic stroke patients indicates that age, presence of fever, hyperglycemia, low GCS, hyponatremia, atrial fibrillation and low oxygen saturation are associated with poor outcome in patients with ischemic stroke. Further studies with larger populations and longer duration may help to clarify the role of these parameters as poor predictors for stroke outcome so that prompt intervention can be done to decrease the mortality and poor outcome in ischemic stroke patients.

REFERENCES


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