



Impact Of Risk Factors In Prognosis Of Stroke- A Hospital Based Study

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ABSTRACT

Background: Stroke is one of the commonest neurological disorders causing significant morbidity and mortality. There are various risk factors that contribute to the occurrence of stroke and determine the prognosis. **Objective:** To study the recovery of neurological deficit in a patient suffering from stroke with respect to common risk factors associated with stroke.

Materials and Methods: 100 patients of stroke who met the inclusion and exclusion criteria were included in the study. MRS was used for quantitative assessment. Recovery pattern was analysed in correlation with various parameters (Diabetes, Hypertension, Alcoholism and Smoking, size of infarct and volume of bleed in CT/MRI). **Results:** 22.2% of the patients in ischemic stroke with large size infarcts and combination of multiple risk factors had a poor prognosis while 41.11% patients with small size infarct and single risk factor had a good prognosis. In haemorrhagic stroke, large volume bleeds with associated persistent hypertension showed a poor prognosis.

KEYWORDS : Stroke, Modified Rankin scale (MRS), Middle cerebral artery(MCA)

INTRODUCTION:

Stroke is a global health problem. It is the second commonest cause of death and fourth leading cause of disability worldwide¹. The WHO clinically defines stroke as 'the rapid development of clinical signs and symptoms of a focal neurological disturbance lasting more than 24 hours or leading to death with no apparent cause other than vascular origin'. Based on pathophysiology stroke can be either ischemic stroke, caused by sudden occlusion of cerebral vessel accounting for 50%–85% of all strokes worldwide² or haemorrhagic strokes caused by intra-cerebral haemorrhage accounting 7%-27% of all strokes worldwide².

There are various risk factors that contribute to the occurrence of stroke in a person. The major risk factors for stroke in the third world include hypertension, diabetes mellitus, alcoholism and smoking. Recovery after a stroke varies depending upon various other factors also.

OBJECTIVE:

To study the recovery of neurological deficit in a patient suffering from stroke (cerebral vascular accident) with respect to common risk factors associated with stroke. The prognosis of all patients was assessed with Modified Rankin Scale and scores obtained were correlated with co morbid risk factors existing in the patient like hypertension, diabetes mellitus, smoking, alcoholism, family history of stroke and the neuro image findings.

MATERIALS AND METHODS:

Selection of cases

This study is a retrospective study conducted at the Department of Neurology, Tirunelveli Medical College Hospital during the period of August-September 2013.

Inclusion criteria

The stroke patients attending the Neurological OPD for follow up after getting treatment in neurological wards or general medicine wards or in private hospitals were taken for study.

Exclusion criteria

- Patients less than 20 years and more than 80 years.
- Patients who developed neurological deficit due to medical illnesses like end stage renal or liver disease, end stage COPD, severe cardiac failure, malignancy

- Patients with traumatic brain injury, cerebral abscess, meningitis and tumours

A detailed history was taken from all the patients including the time of onset of stroke, the nature of neurological deficit, associated symptoms like seizures, altered sensorium, speech defect etc. All the blood reports, ECG, CT/MRI scan, Doppler studies, and other related investigations available with the patient were scrutinized. The neurological deficit that was present in the patient at the time of acute illness was studied from the records of the patients. The patients were examined and the present neurological status was compared with the original status at the time of onset of illness.

Assessment of prognosis

Modified Rankin scale (MRS) was used for quantitative assessment. (Table 1)

The recovery pattern was analysed in correlation with the various parameters.

The parameters taken for study in *ischemic* stroke were

- Diabetes, Hypertension, Alcoholism, Smoking, Cardiovascular disease,
- Infarct size and site in CT/MRI.

The neuroimaging findings of the enrolled subjects were grouped according to anatomical location. The size of the infarct was determined by the largest diameter of the lesion³. This was then correlated with score of the patient in MRS.

The parameters taken for study in *haemorrhagic* stroke were

- Diabetes, Hypertension, Alcoholism, Smoking, Cardiovascular disease,
- Site and volume of bleed in CT/MRI

The volume of bleed was calculated using the formula $ABC/2$, where A is the greatest haemorrhage diameter by CT/MRI, B is the diameter 90° to A, and C is the approximate number of CT/MRI slices with haemorrhage multiplied by thickness⁴. Values are obtained in cm^3 . According to the standard studies volume has to be mentioned in ml.

$1000cm^3 = 1 \text{ litre}$

$1cm^3$ converted to millilitre = 1.00ml.

Hence in this study the bleed volume calculated in cm³ was recorded as ml. This was then correlated with score of the patient in MRS.

Table 1: Modified Rankin scale (MRS)

SCORE	SYMPTOMS AND DISABILITY
0	No symptoms at all.
1	No significant disability despite symptoms; able to carry out all activities.
2	Slight disability; but able to look after own affairs without resistance.
3	Moderate disability requiring some help; but able to walk without assistance.
4	Moderate severe disability ; unable to walk without assistance and unable to attend to own bodily needs without assistance.
5	Severe disability; bedridden, incontinent, and requiring constant care and attention.

OBSERVATION AND RESULTS:

Among 100 stroke patients assessed, 80%was males and 20% was females. Out of 100 patients 90 had ischemic stroke and 10 patients had haemorrhagic stroke.

ISCHEMIC STROKE

Table 2: Risk factors in association with MRS in ischemic stroke in males

RISK FACTOR	Score 5	Score 4	Score3	Score2	Score1	Score 0
DM	1	0	0	0	2	0
DM+ alcohol+ smoking	0	0	0	2	2	0
HT	0	0	0	2	13	0
HT+ smoking + alcohol	7	2	4	5	3	0
DM + HT	0	0	0	2	0	0
DM+ HT+ smoking + alcohol	6	1	6	4	2	0
Smoking +alcohol	2	1	0	0	5	0
Nil risk	0	0	0	0	1	1

Table 3 Risk Factors in association with MRS in ischemic stroke in females

RISK FACTOR	Score 5	Score 4	Score3	Score2	Score1	Score 0
DM	0	0	1	0	0	0
HT	0	0	0	4	3	0
DM+HT	0	0	0	2	3	0
Nil risk	0	0	1	0	4	0

Out of 90 patients with ischaemic strokes 72 patients were males and 18 patients were females.

On assessment with MRS 36 (40%) patients had a **score of one**, 26(28.9%) males and 10(11.1%) females. Among males with score one; HT was the major contributing risk factor in 13 patients. Other risk factors like Diabetes Mellitus (DM), DM with smoking and alcohol had a lesser contribution comparatively (Table 2). Majority of the males had an infarct in MCA territory with 11 being in Right MCA and 9 in left MCA territory. Lesser incidence of infarcts was also seen in left Posterior Cerebral Artery territory (PCA), right and left posterior watershed areas. Among females no risk factor was found in 4 patients. CT in females also showed a higher incidence of infarct in the MCA territory with right MCA territory in 3 patients and left MCA territory in 4 patients.

In patients with MRS **score of two**, 16.67% (15) were males and (6.67%) 6 were females. Among males, Hypertension with smoking and alcohol was the major indicated risk factor and all risk factor together also contributed to about stroke in 4 patients (Table 2). Recurrent stroke had a higher incidence in males with score 2 who had hypertension with smoking and alcohol as their risk factors. Most males had a left MCA territory infarct. Among 6 females with score two, 4 had hypertension as their risk factor and 2 had a co existing DM and Hypertension (Table 3). Two out of four females with HT had recurrent attacks of stroke. 3 females had left MCA territory

infarct and two had Right MCA territory infarct and one had a normal CT.

Twelve (13.3%) patients had a **score of three** in MRS with 10(11.1%) males and two(2.2%) females. Among males, 6 had all risk factors DM, Hypertension, smoking and alcoholism, out of this six, three had a family h/o stroke in their parents and an associated Ischemic Heart Disease and 4 males had Hypertension associated with smoking and alcoholism(refer table 2). Most males showed an infarct in left MCA territory. Out of 2 females DM was the risk factor in one patient with an infarct in left MCA territory and one with no risk factor had a normal neuroimaging study.

All four (4.4%) patients who had a **score four** in MRS were males. Hypertension associated with smoking and alcohol was the major risk factor in 3 patients(refer table 2), of which two had a infarct in Left MCA territory and one had a Left Anterior Cerebral Artery infarct and one patient who had smoking and alcohol as the risk factor had an infarct in left PCA

Of 16(17.8%) patients who **scored 5**, all were males with Hypertension, smoking and alcoholism in 7 patients and a combination of all risk factors existing in 6 patients. Smoking and alcoholism alone contributed in 2 patients and diabetes alone in one patient (Table 2). Post stroke seizures were present with patients of score five, all 6/6 patients who had all risk factors (Diabetes Mellitus + Hypertension + smoking and alcoholism). A recurrent attack of stroke was also noted at higher rates in patients with score five having Hypertension associated with smoking and alcoholism. Score 5 patients too showed a maximum number of infarcts in MCA territory with 8 in right MCA and 7 in left MCA territory.

Only one patient with no risk factor got a prognostic **score of zero**.

HAEMORRHAGIC STROKE

Out of 10 haemorrhagic stroke patients 7 were males and 3 females.No patient had a score of zero or one in modified Rankin scale.

Three (30%) patients had **score two** in MRS of which two were males with Hypertension as risk factor (Table 4) and bleed in thalamic region with volume of bleed less than 15ml. One (10%) was a female with Diabetes Mellitus and Hypertension as risk factor (Table 4) and a bleed in parietal region with volume of bleed being less than 10ml.

Table 4 Risk Factors in association with MRS in haemorrhagic stroke

RISK FACTORS	SCORE 5	SCORE 4	SCORE 3	SCORE 2	SCORE 1	SCORE 0
HT	2*	0	0	2	0	0
HT+ SMOKING+ ALCOHOL	1	0	4	1		
DM+ HT	0	0	0	1*	0	0

All 4(40%) patients who had a **score three** in modified Rankin scale were males with Hypertension associated with smoking and alcohol as the major risk factor in them.

(Table 4). Volume of bleed amounted between 15-20ml.

Three patients had a **score of five** of which two were females and one was a male (Table 4). Both females had Hypertension as the risk factor with bleed in thalamic region each amounting volume of more than 25 ml. The other male patient had Hypertension associated with smoking and alcoholism as the risk factor with bleed in temporoparietooccipital region of volume >25ml.

DISCUSSION

The present study was designed to correlate the risk factors associated with the observed variations in the prognosis of stroke.

Ischemic stroke

On assessment with risk factors like hypertension, DM, smoking and alcohol, poor prognosis with MRS score of 5 or 4 was seen in males in whom multiple risk factor combination like hypertension associated with smoking and alcoholism with or without DM. Only presence of smoking and alcoholism was enough to worsen the prognosis in 3 patients. While those patients with good prognosis with lower scores of 1 or 0 had hypertension as the only risk factor.

Hence a combination of risk factors was most likely to produce a bad prognosis. Patients with single risk factor were found to have better prognosis. The results of the study confirm previous observation on the importance of co-existing hypertension on the prognosis of stroke⁵. Females were found to have better prognostic results with hypertension as the major risk factor in most of them.

The modesty of the correlation between CT infarct size and prognosis could be considered as somewhat useful as CT infarct size of >3cm was usually associated with poor prognostic scores while CT infarct sizes of 0.5-1cm had a good prognosis.⁶.

Haemorrhagic stroke

Hypertension is the major risk factor found in 70% of haemorrhagic stroke patients. Hypertension with smoking and alcoholism associated with bleed volume 15-20 ml was found give a moderate prognosis in males. Volume of bleed more than 20 ml was found in females in whom hypertension was the only risk factor had a bad prognosis. This study also confirms the coexistence of high levels of blood pressure in haemorrhagic stroke⁷. Volume of bleed less than 10 ml was associated with mild disability. These results correlate with previous studies reported⁸.

CONCLUSION

In ischemic stroke existence of a combination of multiple risk factors with hypertension being one of them was associated with bad prognosis as against the better prognosis of stroke in patients with single risk factor. Infarct sizes of more than 3cm were associated with worse prognosis and smaller infarcts of average size of 0.5 to 1cm were usually associated with good prognosis.

In haemorrhagic stroke persistent high levels of blood pressure in hypertensives was the major factor affecting prognosis of the patients. Volume of bleed more than 20ml was found to have worse prognosis while smaller bleeds had a good prognosis.

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