FUNCTIONAL OUTCOMES IN ISCHEMIC AND HAEMORRAHAGIC STROKE PATIENTS IN ACUTE STAGE – A COMPARISION

Athar¹, Chitranshi²*

¹Senior Physiotherapist Vrindavan Hospital Greater Noida
²*Assistant Professor, Department of Physiotherapy, Lovely Professional University, Punjab.

ABSTRACT

BACKGROUND- Stroke is consider as a cerebrovascular accident (CNS) which demand immediate rush to the hospital and may lead to long hospital stay depending on severity of stroke and patient recovery. Ischemic and hemorrhagic are two types of stroke which have different mechanism, clinical manifestation and functional outcomes. Because of its frequency, mortality and sequelae of disorder it is a major challenge in the field of medicine.

PURPOSE- The aim of this study is to distinguish between the functional outcomes of ischemic and hemorrhagic stroke in acute stage.

METHOD – In this study 40 subjects of stroke in acute stage was included, 20 ischemic stroke and 20 hemorrhagic stroke and allocated as Group 1(ischemic group) and Group 2 (hemorrhagic group). Functional outcomes was evaluated on the Motor Assessment Scale (MAS) and Functional Independence Measures (FIM).

RESULT - Scores of patients of both groups improved on the Functional Independence Measure with growing time. The functional level was less for hemorrhagic group at the time of admission (mean of FIM=42.1, for ischemic mean =57.5), by the end of fourth week patients of hemorrhagic group improved more functionally than ischemic group (m=104.3, for ischemic m=98) The FIM Gain was more in group II in comparison with group I. On MAS by end of fourth week hemorrhagic group improved more than ischemic group (m=45.9, for ischemic m=41).

CONCLUSION – Its stated through the result of this study, that the hemorrhagic group improved better than the ischemic group. The hemorrhagic group showed greater gains on MAS as well as Functional Independence Measure, although both groups showed consistent improvement.

Key words- Ischemic, Hemorrhagic, acute, stroke, MAS, FIM.
INTRODUCTION

Stroke is considered as a cerebrovascular accident (CNS) which demand immediate rush to the hospital and may lead to long hospital stay depending on severity of stroke and patient recovery. WHO defines stroke as the global neurologic deficit either acute or focal in origin, sudden rupture or occlusion of blood vessel leads to spontaneous subarachnoid hemorrhage.\(^1\)

After the immediate aftermath of a stroke, patients are often concerned about their potential for recovery and being independent for their daily activity. This information is also of interest to families and to those physiotherapists providing or planning healthcare. Outcome studies are being used in treatment guidelines and policies in today’s cost managed health care environment. Prediction of functional outcome following stroke remains a problem to which there is not yet a satisfactory solution. George W. Petty et al studied ischemic stroke subtypes and found that early relapse for ischemic stroke caused by atherosclerosis are higher than those of other subtypes. They also stated that patients with lacunar stroke have better post stroke functional status than those with other subtypes. Survival is worst among those with cardiac source of embolism.\(^2\)

Outcome assessment is a preeminent issue in medicine today. Results of outcome studies are being used in treatment guidelines and policies in today’s cost managed healthcare environment.

Michal A. Doughlas et al explained that mortality in hemorrhagic individuals increases with the ventricular rupture and size of hematoma. Hypertensive intracerebral hemorrhage, unlike aneurysms rarely rebleed. Most survivors can achieve independence and deserve aggressive rehabilitation efforts.\(^4\) To completely describe the impact of stroke on the individual and to monitor or evaluate the progress associated with treatment – FIM and MAS are commonly used.

Statement of Question

Is there a significant difference of patients with ischemic and hemorrhagic stroke in acute stage in functional outcomes?

Functional Outcomes

Functional outcomes will be evaluated on the Motor Assessment Scale (MAS) and Functional Independence Measures (FIM).

MAS proposed by Carr and Shepherd to quantify the improvement of stroke patients. It has a extreme degree of reliability and provides information regarding patients improvement without any specialize equipment.
FIM estimates the cost of debility in terms of safety issues and dependence on others and on the assistive devices.\textsuperscript{3} The FIM is considered equally valid and reliable in the assessment of disability.\textsuperscript{4}

**OBJECTIVE**

The objective of the study to compare the functional outcomes among stroke patient of ischemic and hemorrhagic type in acute stage.

**Hypothesis**

There is a significant difference in patients of ischemic versus hemorrhagic stroke on MAS scale in acute stage.

There is a significant difference in patients of ischemic versus hemorrhagic stroke on FIM scale in acute stage.

**Operational Definitions**

**Ischemic Stroke**

Ischemic stroke defines as transient or persisting intrusion or decrease of blood flow in a focal area of the brain either partial or complete territory of cerebral artery.

**Hemorrhagic Stroke**

Hemorrhagic stroke refers to eruption of blood into the brain parenchyma, with laceration, edema and subsequent necrosis, usually from rupture of small perforating artery.\textsuperscript{5}

**REVIEW OF LITERATURE**

Need for Stroke Outcome Measures

Prediction regarding outcome of stroke patients is often expressed as

“Is the recovery of this patient would be good ?”

The benefits of good prognosis are self evident:

- Patients and family members should know the outlooks of survival, the extent of recovery that likely to occur and the possible residual disability with rehabilitation.
- With this information the rehab care provider can counsel the patient as well as family members.
- Understanding the prognosis of individual patient this helps the healthcare worker to formulate the specific treatment protocol.
- Good prognosis can help to reduce expenses of treatment by choosing the appropriate treatment protocol.

- Classification of Prognostic Variables

The spectrum of prognostic variables consists of age, size of lesion, site of lesion, pathology of stroke, severity of weakness, associated neurological deficit, therapy intervention, psycho-social variables.

Lalit Kalra et al in 2002 published a study to understand the influence of age on benefits of stroke unit rehabilitation. Younger individuals are benefited more in stroke units; greater number of patients of young age group (<75years) are expected to discharge, length of stay (LOS) was reduced. In general ward no significant differences was found in outcome between younger and older stroke patients.6

Functional Outcome in Subarachnoid Hemorrhage: In 2002 Michael W O’Dell described inpatient rehabilitation outcomes in subarachnoid hemorrhage (SAH) patients. The youngest age group (30 – 40yr) had the highest mean FIM score. Aneurysm location has little impact on functional gain. Complications of SAH don’t adversely impact the outcome, however certain researchers claim that hydrocephalus was predictive of outcome to modest levels. No relationship was observed between Hunt and Hess clinical grading scale and Fisher grades with the outcome.7

Functional outcome related to Brain Lesion Profiles (BLP): Chia-ling et al in 2000 lay importance on combination of size and location together to compare functional outcomes in stroke. By limiting brain lesion size used to classify BLP are good or poor varied according to the location, 75cm³ for cortical, 4cm³ for CR, 0.75 for internal capsule, 22 cm³ for putamin and 12cm³ for thalamic region. Motor and functional outcomes associate with brain lesion outlines more than absolute lesion sizes.9

Severity of Weakness

Joel S Feigenson et al in 1977 compared severity of weakness on admission and outcome and found it to be adversely related.10

Associated Neurological Deficits

Susan D Greenberg in 1997 cited the role of associated neurologic deficits with outcome and found:

- Dysphagia and hemisensory loss in addition to hemiparesis did not affect discharge placement.
• Perceptual dysfunction (neglect, apraxia, disorders of body image/scheme, disorientation) or poor motivation adversely affected outcome.

• Coincidence of hemiparesis with any two of variables mentioned above are associated with poor prognosis

• Bladder / bowel incontinence – is adverse prognosis factor for functional outcome.

• Loss of consciousness is negatively related.\(^{11}\)

Classification of Outcome Variables

• The outcome variables are classified as survival, impairments, disability, quality of life and handicap.

Measures of Impairment

• Impairment can be explained in terms of sensorimotor, level of consciousness, cognition, timed performance, instrumented evaluation and other impairments.

• Sensorimotor: Following recovery the neurological deficit is the most significant determinant of residual impairment.

Various Scales used are as follows:

• Fugl-Meyer Scale
• Motricity Index
• Motor Assessment scale
• Canadian Neurological stroke scale

Cognition: The various components are as follows:

• General
• Memory/ Learning
• Attention / Concentration
• Perception
• Executive Functions
R. Fogeholm et al in 2004 examine the correlation of blood glucose level on patient’s prognostication with intracerebral hemorrhage. There is increased 28-day case mortality rate with high admission blood glucose in both non diabetic and diabetic patients with ICH.¹²

M. Castellanos et al in 2005 undertook a study to determine outcome large intracerebral hemorrhages (ICH). Intraventricular infectivity, deep location, mass effect and greater ICH volume will lead to poor outcome. These predictors are helpful in selection of patients for rehabilitation.¹³

Chen Hallevy et al determined six significant and independent prognostic variables for ICH (Intracranial Hemorrhage) decreased level of consciousness, large hematoma size, age older than sixty, severe hemiparesis, and midline shift and intra ventricular extension on CT.¹⁴

Christian Weimar et al in 2002 conducted a study to predict functional outcome after 100 days 58.4% had completely recovered and 32.1% had incompletely recovered (Barthel Index < 95) and 9.5% had died. The risk of dying was higher in patients with greater age, more neurological impairments at admittance and fever > 38°C within 72 hours after admission within the first 100 days.¹⁶

Jonathan W. Srurm et al in 2002 in North East Melbourne Stroke Incidence Study (NEMESIS) noted at 12 months 31% patients with cerebral infarction and 50% with intracerebral hemorrhage were deceased. Patients with total anterior cerebral infarction were more handicapped than those with other subtypes at 3 and 12 months.¹⁸

Peter J. Kelly et al in 2003 quantifies recovery after rehabilitation. During admission patients with ICH (Intracranial Hemorrhage) had more functional impairment than cerebral infarction but significant differences in FIM motor or discharge FIM cognitive scores were present at time of discharge. No significant difference were present in FIM efficiency between ICH and cerebral infarction.¹⁹

Stefano Paolucci et al in 2003 showed that hemorrhagic patients had significantly higher efficiency and effectiveness.⁵ Recovery after cerebral hemorrhage is greater than after infarction was due to blood tracking between the nerve fibers without destroying them.²⁰

Inouye M et al in 2000 in his study evident that related to nature of stroke there is no difference in functional recovery.²¹

J Stein et al in 2001 studied functional recovery after ischemic and hemorrhagic cerebellar stroke. Patients with cerebellar infarction compared those with cerebellar hemorrhage had higher extent of functional impairment.
at admission and at discharge. They showed a positive correlation between the symptoms of vertigo, vomiting, ataxia and headache and outcome.  

Measurements

Physiotherapy practice involves gaining accurate and objective information about the individual’s performance and abilities in the motor tasks used in persons everyday activities. In the present study Motor Assessment Scale and Functional Independence Measure (FIM) are used to determine the outcomes of stroke patients rehabilitation.

Motor Assessment Scale

Motor Assessment Scale is used to determine the improvement of stroke patients. The MAS was formulated by Janet Carr and Robert B. Shepherd. MAS is briefly and easily administered to avoid delaying of treatment time. It has a highest interrater reliability and provides objective results without the use of expensive equipment. It measures relevant everyday motor activities. Each item is scored on a scale from 0 to 6 MAS was found to be useful for providing feedback to the patients on his progress and it can be used to motivate patients towards recovery. The motor function tested are: supine to side lying, supine to sitting over the side of bed, balance sitting to standing walking, upper arm function, hand activities, advance hand function and general tone.

Catherine Dean and F Mackey conducted a study to investigate outcomes of rehabilitation of following cerebrovascular accident in one Sydney unity. They found motor assessment scale was a valuable tool for evaluating and for documentation of changes in motor performance outcomes following rehabilitation.

Functional Independence Measure

The Functional Independence Measure system started in 1987. It is broadly accepted functional assessment tool in rehabilitation. It was formulated to resolve the long-standing problem for lack of uniform tool on disability and rehabilitation sequels. FIM is applicable preferentially to stroke patients and is probably less preferred for other impairments.

Rober W. Mauthe et al in 1996 conducted a study to rule out the effectiveness of FIM as a predictor of discharge in acute care setting. Bathing, dressing lower body, bowel, toileting, social interaction, and eating were the selected items of FIM scale that predict the early hospital discharge with 70% accuracy.
The FIM is selected in our study because it is a reliable tool to assess functional outcome in terms of functional activity, dependency and need for. The instrument has proven reliable in measuring changes in functional activity with changes in treatment protocol according to patients need. Stroke remains profoundly disabling disease, and efforts to improve treatments options to have better outcomes for individual should continue.

**METHODS**

Sample

A sample of 40 subjects was selected for the study after they fulfil the inclusion criteria and exclusion criteria.

**Inclusion Criteria**

- First ever Stroke
- CT based evidence of hemorrhagic or ischemic stroke
- Glasgow Coma Scale of 5 or above
- Age 35 and above
- Manifesting with neurological impairments of hemiplegia
- Patients recruited within 1 week of ictus.

**Exclusion criteria**

- Hemorrhage secondary to trauma or tumors
- Cerebellar, brainstem or subarachnoid hemorrhage.
- Severe cognitive impairment.
- Evidence of severe preexisting physical or mental disability.

20 subjects were present in group I (Ischemic) and 20 subjects were present in group II (hemorrhagic). After dividing the subject in two group based on the type of stroke, each subject receive physiotherapy treatment for four weeks. The physiotherapy treatment is based on Motor relearning programme. After four weeks of physiotherapy treatment the motor performance for functional outcome was compared between two groups through standard scale they are motor assessment scale and functional independence measure.
PROCEDURE

Before including the subject in the study the informed consent was signed by each subject. As soon as the patient was admitted to the ward after diagnosis, history, age, sex, hypertension, date of ictus was noted. First evaluation of motor performance and ADL were taken on performa of standard scale (MAS & FIM respectively). The physiotherapy treatment was started based on the motor relearning program. The next evaluation was done after first week and after four weeks of treatment.

DATA ANALYSIS

The data was analyzed using statistical tests for 35 subjects under guidance of biostatistician. The data collected on forms were transferred to master chart. Two sample t-test with equal variance was used to compare functional outcomes on motor assessment scale and functional independence measure. The chi-square test was used to compare sex ratio, side of cerebrovascular accident (CVA), diabetes, hypertension, coronary artery disease, habit history and family history. The age, size of lesion and initial Glasgow Come Scale (GCS) level were compared with t-test. The level of significance selected for the study was p<0.05. The software programme used was SPSS 13.

RESULTS

The study included 35 subjects 19 of ischemic group and 16 of hemorrhagic group to compare their functional outcomes during acute stage. The results are as discussed below.

Table 8.0 Basic information of patients

<table>
<thead>
<tr>
<th></th>
<th>Group I</th>
<th>Group II</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Patients</td>
<td>19</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Gender M/F</td>
<td>13/6</td>
<td>9/7</td>
<td>NS</td>
</tr>
<tr>
<td>Age (years)</td>
<td>54.05</td>
<td>60.69</td>
<td>NS</td>
</tr>
<tr>
<td>Side right/left</td>
<td>7/12</td>
<td>10/6</td>
<td>NS</td>
</tr>
<tr>
<td>Size of lesion</td>
<td>8.05</td>
<td>6.22</td>
<td>NS</td>
</tr>
<tr>
<td>Initial GCS score</td>
<td>13.26</td>
<td>13.19</td>
<td>NS</td>
</tr>
</tbody>
</table>
Table 8.1 Result on Motor Assessment Scale

<table>
<thead>
<tr>
<th>Group</th>
<th>Zero week</th>
<th>First Week</th>
<th>Fourth Week</th>
<th>MAS Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (Standard Deviation)</td>
<td>P Value</td>
<td>Mean (Standard Deviation)</td>
<td>P Value</td>
</tr>
<tr>
<td>I</td>
<td>17.16 (9.9)</td>
<td>NS</td>
<td>25.32 (1.3)</td>
<td>NS</td>
</tr>
<tr>
<td>II</td>
<td>15.06 (9.5)</td>
<td></td>
<td>24.81 (11.86)</td>
<td></td>
</tr>
</tbody>
</table>

Table 8.2 Result on Functional Independence Measure

<table>
<thead>
<tr>
<th>Group</th>
<th>Zero week</th>
<th>First Week</th>
<th>Fourth Week</th>
<th>FIM Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (Standard Deviation)</td>
<td>P Value</td>
<td>Mean (Standard Deviation)</td>
<td>P Value</td>
</tr>
<tr>
<td>I</td>
<td>57.7 (27.8)</td>
<td>NS</td>
<td>73.1 (34.2)</td>
<td>NS</td>
</tr>
<tr>
<td>II</td>
<td>42.1 (16.7)</td>
<td></td>
<td>58.3 (25.5)</td>
<td></td>
</tr>
</tbody>
</table>

Table 8.3 Sub-score of Motor Assessment Scale

<table>
<thead>
<tr>
<th>Sub categories of Motor Assessment Scale</th>
<th>Zero Week</th>
<th>First Week</th>
<th>Fourth Week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (Standard Deviation)</td>
<td>P Value</td>
<td>Mean (Standard Deviation)</td>
</tr>
<tr>
<td>Sup-Iy Group- I</td>
<td>2.4 (2.2)</td>
<td>NS</td>
<td>4.8 (1.9)</td>
</tr>
<tr>
<td>Sup-Iy Group- II</td>
<td>2.8 (2.2)</td>
<td></td>
<td>5.1 (1.6)</td>
</tr>
<tr>
<td>Sup-Sit Group- I</td>
<td>3.3 (2.2)</td>
<td>NS</td>
<td>4.8 (1.6)</td>
</tr>
<tr>
<td>Sup-Sit Group- II</td>
<td>3 (2.6)</td>
<td></td>
<td>5.6 (61)</td>
</tr>
</tbody>
</table>

NS = Not Significant  
* = Significant
<table>
<thead>
<tr>
<th>Sub categories of Functional Independence Measure</th>
<th>Zero Week</th>
<th>First Week</th>
<th>Fourth Week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (Standard Deviation)</td>
<td>P Value</td>
<td>Mean (Standard Deviation)</td>
</tr>
<tr>
<td>Self care</td>
<td>Group-I</td>
<td>11.5 (11.2)</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>Group-II</td>
<td>8.2 (7.5)</td>
<td></td>
</tr>
<tr>
<td>Sphincter Control</td>
<td>Group-I</td>
<td>7.1 (6)</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>Group-II</td>
<td>6.1 (5.5)</td>
<td></td>
</tr>
<tr>
<td>Transfers</td>
<td>Group-I</td>
<td>6.2 (4.6)</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>Group-II</td>
<td>3.5 (1.6)</td>
<td></td>
</tr>
<tr>
<td>Locomotion</td>
<td>Group-I</td>
<td>3.3 (2.8)</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>Group-II</td>
<td>2.3 (1.5)</td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>Group-I</td>
<td>10.5 (5)</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>Group-II</td>
<td>10.5 (4.8)</td>
<td></td>
</tr>
<tr>
<td>Social Cognition</td>
<td>Group-I</td>
<td>14.7 (7.4)</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>Group-II</td>
<td>11.8 (8.1)</td>
<td></td>
</tr>
</tbody>
</table>

Table 8.4 Sub-score of Functional Independence Measure
Graph 8.1 Group Wise Mean Values of Motor Assessment Scale (MAS) Scores over 4 weeks period of study

Graph 8.2 Group Wise Mean Values of Motor Assessment Scale (MAS)- Supine to lying subscore over 4 weeks period of study
Graph 8.3 Group Wise Mean Values of Motor Assessment Scale (MAS)-Supine to Sitting subscores over 4 weeks period of study

DISCUSSION

The Purpose of this study was to compare the functional outcomes in ischemic and hemorrhagic stroke patients in acute stage. In this study Functional Independence Measure (FIM) and Motor Assessment Scale (MAS) were used to measure functional outcome of patients. The results show that hemorrhagic group improved better than the ischemic group. The hemorrhagic group has showed greater gains on MAS as well as Functional Independence Measure, although both groups showed consistent improvement.

Jany et al and Papo stated outcome following the amount of tissue destruction in intracranial hemorrhage is mainly related with mass effect of hematoma rather than any increase in level of intracranial pressure. In this study patients of hemorrhagic group had greater impairment on MAS at admission than the ischemic group. However, by the second week both groups showed no difference in impairment level and by end of fourth week there is more improvement in hemorrhagic group. The functional level was less for hemorrhagic group at the time of admission), however at the end of fourth week patients of hemorrhagic group improved more functionally than ischemic group. The initial neurologic deficit from intracerebral hemorrhage may be because of compressed brain tissue. As the hematoma resolves, neurologic functions recover. Because hemorrhages rarely occur at the same site, these patients make excellent neurologic and functional recovery.
Relevance to Clinical Practice

The results of the study would be helpful for counselling and guidance of the patients and the relatives with regard to the functional outcome, for therapists for stratification of patients for rehabilitation, for calculation of cost effectiveness of treatment.

CONCLUSION

With the results of this study its concluded that there is a visible difference in functional outcome on Motor assessment scale in ischemic and hemorrhagic stroke. Also there is difference in functional independence measure in both the types of stroke in acute stage. Therefore the proposed hypothesis for this study holds true.