



ASSESSMENT OF RISK FACTORS INFLUENCING FUNCTIONAL OUTCOMES IN CEREBRAL STROKE PATIENTS USING MODIFIED RANKIN SCALE

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ABSTRACT

A prospective observational study was conducted at Shivaranjani Superspeciality hospital, Bhimavaram, to assess the functional outcomes in cerebral stroke patients using modified Rankin Scale (mRS)-9Q questionnaire and to evaluate the difference in patient functional improvement according to their age, gender, severity, type of stroke and co-morbid conditions using mRS scores. Data on 90 cerebral stroke patients were analyzed according to patient's age, gender, type of stroke, severity and co-morbid conditions. Initial and final mRS scores and progress in patient's functional abilities were recorded, compared and analyzed. Patients presented with high mRS scores (mean-3.46±0.83) before the initiation of medical therapy

indicating moderately severe disability and was minimally high in the following patients subgroups- age>65 years (3.31±1.20), females (3.44±0.91), hemiplegic patients (3.50±0.81), ischemic stroke patients (3.53±0.83) and patients with 2 or more co-morbid conditions (3.46±0.76). The mean mRS score at the end of the medical therapy was 2.05±1.04 showing significant functional gain of 1.41 in mRS scores. Individual medical therapy if initiated on time and to the extent of patient needs proved to be useful in all the patients regardless of their age, gender, co-morbid conditions, severity and type of stroke.

KEYWORDS: Cerebral stroke, modified Rankin Scale, Functional outcomes.

INTRODUCTION

Stroke is one of the most common neurological disorders in clinical practice and is the leading cause of adult disability. According to WHO, it is second common cause of death worldwide.^[6,7,18,22,30, 34]

WHO defined stroke as “Rapidly developed clinical signs of focal disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than vascular origin”.^[10, 21,37]

The different forms of stroke have different specific causes.

Ischemic Stroke

Ischemic stroke is the most common form of stroke, accounting for about 85% of strokes. This type of stroke is caused mainly through blockages or narrowing of the arteries that provide blood to the brain, resulting in ischemia. These blockages are often caused due to blood clots which can be caused by fatty deposits within the arteries called plaque.^[26]

Hemorrhagic Stroke

Hemorrhagic stroke is caused by the arteries in the brain either leaking blood or bursting open and putting pressure on brain cells and damages them. These ruptures can be caused due to conditions such as hypertension, trauma, blood-thinning medications and aneurysms. Intracerebral hemorrhage is common than subarachnoid hemorrhage.^[1,26]

Transient Ischemic Attack (Tia)

TIA's are different from the before mentioned kinds of stroke because the flow of blood to the brain is briefly interrupted. TIA's are similar to ischemic strokes because they are often caused by blood clots.^[26] TIA's should be regarded as medical emergencies just like the other kinds of stroke, even if the blockage of the artery is temporary because they confer an important short term risk of stroke.^[4] Approximately 15% of ischemic strokes are preceded by a TIA.^[38]

Alves et al., defined disability as a dynamic process that encompasses physical, mental and emotional conditions.^[15] The degree of disability and reduced functional capacity after stroke is etiologically multifactorial.^[8] These risk factors can be broadly divided into modifiable and non-modifiable risk factors. Non modifiable risk factors include age, sex, race/ethnicity, and

family history. Major modifiable risk factors include hypertension, cardiac disease, diabetes, dyslipidemia, cigarette smoking, alcohol drinking and sedentary life style.^[5,20,24,25,27,31]

Functional outcomes, which are measured by means of disability and an individual's loss of independence in activities of daily living, are considered to be among the most meaningful patient outcomes.^[11,15,32] In this study modified rankin scale (mRS) is used as a measure to assess the functional outcome in neurologic patients. It is a clinician reported measure of global disability and has been widely applied for evaluating stroke patient outcomes, degree of disability or dependence in daily activities.^[3,9]

Clinical trial use of the mRS is global and often used by research nurses and professions allied to medicine.^[13,14,19]

In this study we used mRS-9Q questionnaire to assess the patient functional outcome and analyze the possible factors influencing the outcome. It is in the public domain and a free web calculator available at www.modifiedrankin.com.

The present aim of the study is to assess the functional disability in cerebral stroke patients and evaluate the difference in patient improvement before and after medical therapy according to age, gender, type of stroke, severity and co-morbid conditions by using the mRS scores.

METHODOLOGY

A Prospective Observational study was conducted in In-patient and Out-patient department

METHODS

Study Site

Shivaranjani Superspeciality Hospital, Bhimavaram.

Inclusion Criteria

Initial or recurrent stroke patients Patients with co-morbid conditions Male and female patients of age 21years and above.

Exclusion Criteria

Pregnant and Lactating Women Children below 18 years of age Patient with disability Patients who are not willing to give the consent form. Patients who are not willing to participate in the study.

Study Design

Prospective – Observational study visit the patients in inpatient and outpatient departments collect data collect the patients data with co-morbid conditions document the mRS compare mRS and analyse assess the functional outcome.

Data Collection

Patients who were coming to the hospital regarding the disease in outpatient and inpatient department were screened based on the inclusion and exclusion criteria, subjects who met the inclusion criteria were enrolled for the study. Informed consent was obtained from the patient or attenders of patient and follow up was done until the date of discharge for inpatients. Details regarding their complaints on admission, past medical history, medications history, current therapy and their functional disability by using mRS-9Q questionnaire were obtained by patient interview and by observing the patient case notes.

Assesment of Functional Outcomes

According to study design, patients functional outcome and possible factors influencing in patient outcome in cerebral stroke was measured by using mRS-9Q questionnaire. Assessment of functional outcome was done by using appropriate questionnaire and analyzed by means of modified Rankin scale.

Statistical Techniques Used

Microsoft excel was used. Descriptive statistical analysis- Mean, Standard deviation as well as percentages has been carried out.

Ethical Consideration

The study was carried out after due permission from the Institutional Ethics Committee and after getting consent (in written form) from all the participating subjects.

RESULTS

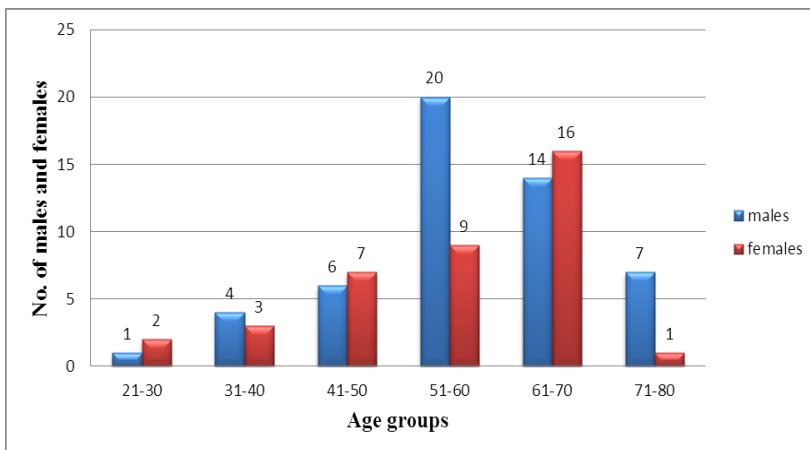


FIG. 1: Age Wise Distribution of Males And Females.

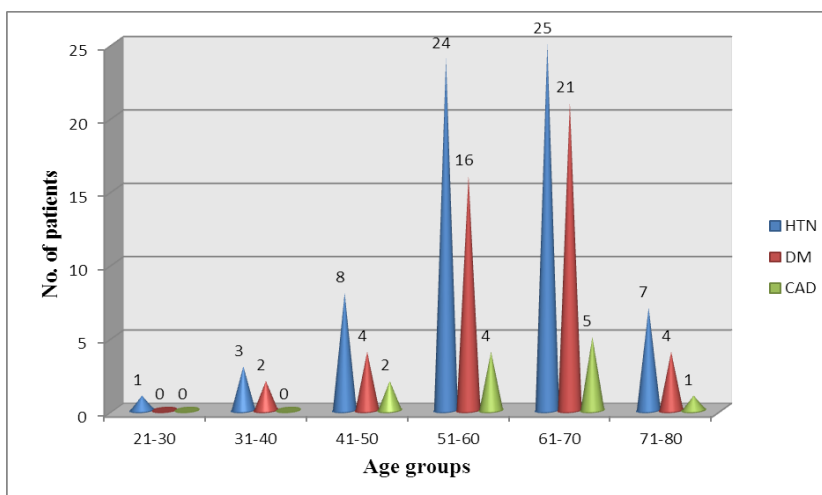


Figure-2: Categorization of stroke patients with Hypertension, Diabetes mellitus and CAD in different age groups.

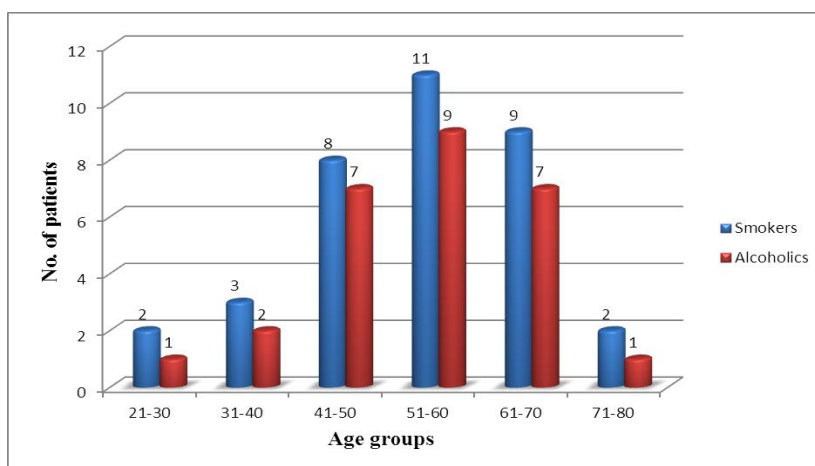


Figure-3: Categorization of smokers and alcoholics in different age groups of stroke patients.

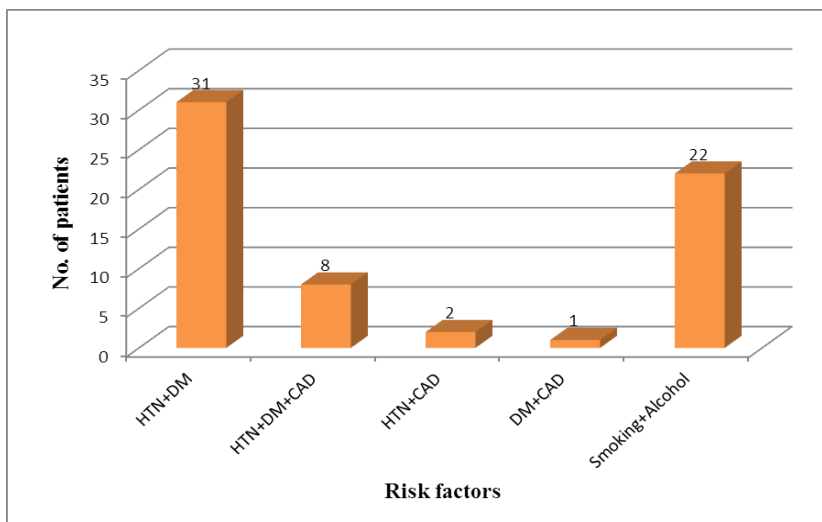


Figure-4: Combination of risk factors in cerebral stroke patients.

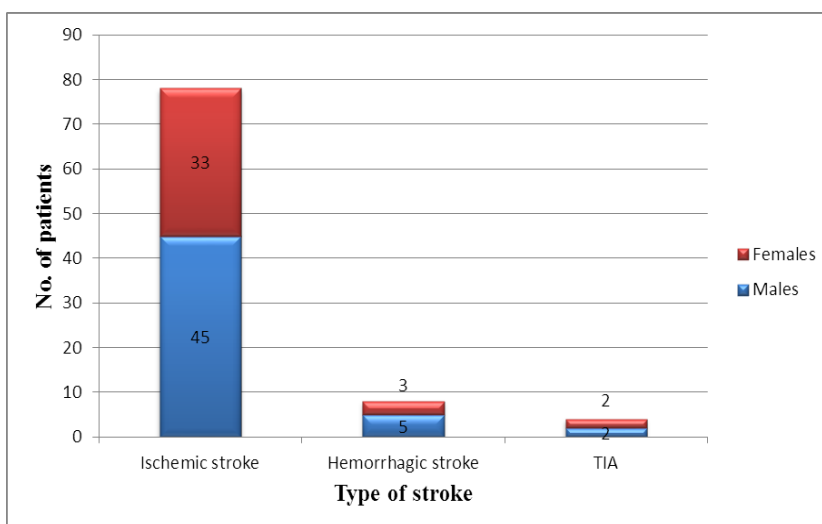


Figure-5: Type wise categorization of stroke patients according to their gender.

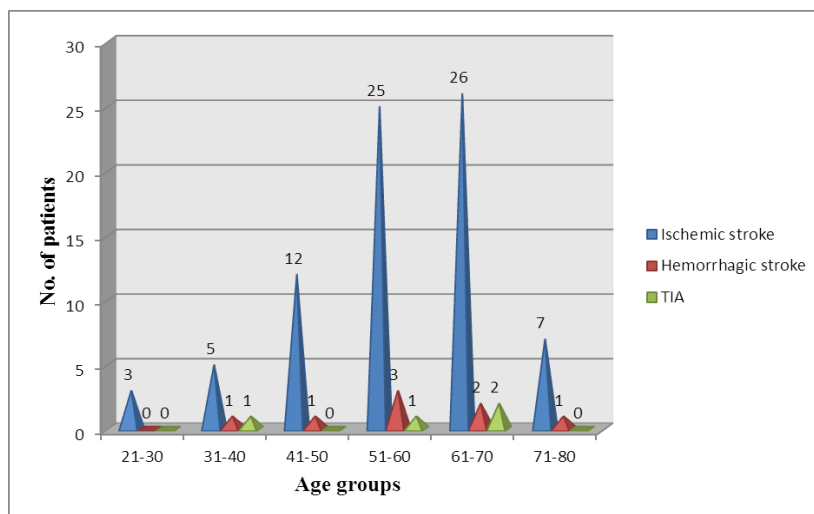


Figure-6: Type wise distribution of stroke patients in different age groups.

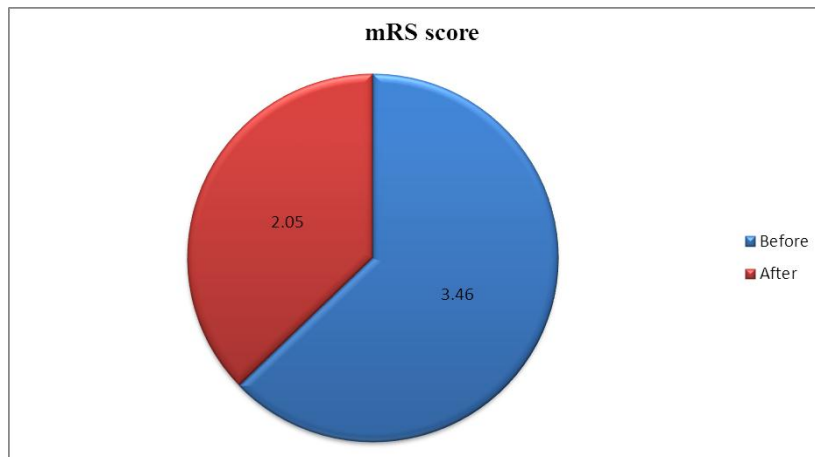


Figure-7: mRS score of stroke patients at initiation (before) & completion (after) of medical therapy.

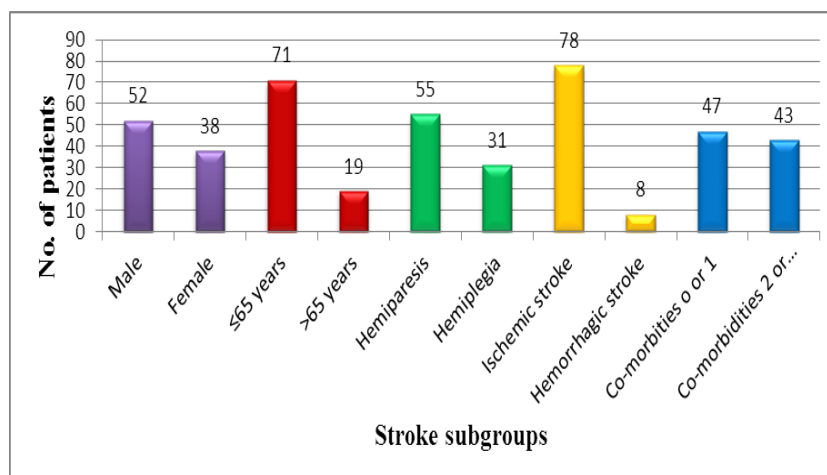


Figure-8: Data representing number and percentage of patients within stroke subgroups.

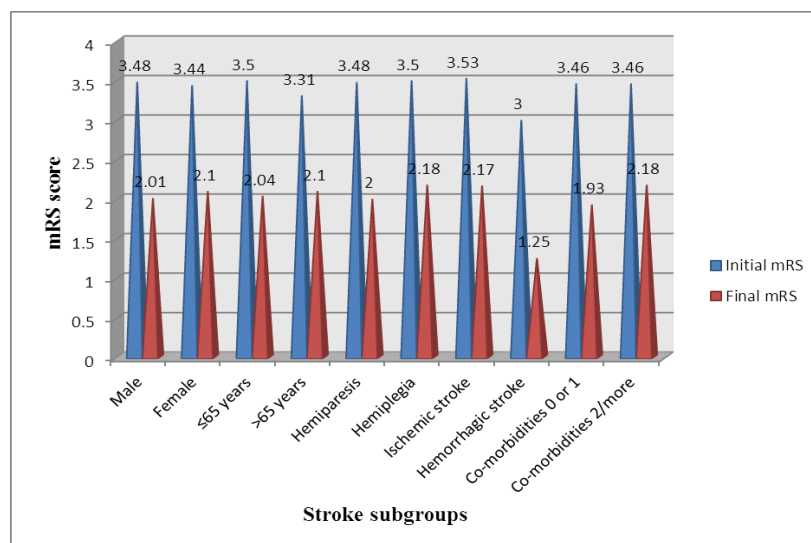


Figure-9 Initial and Final mRS score in stroke patients.

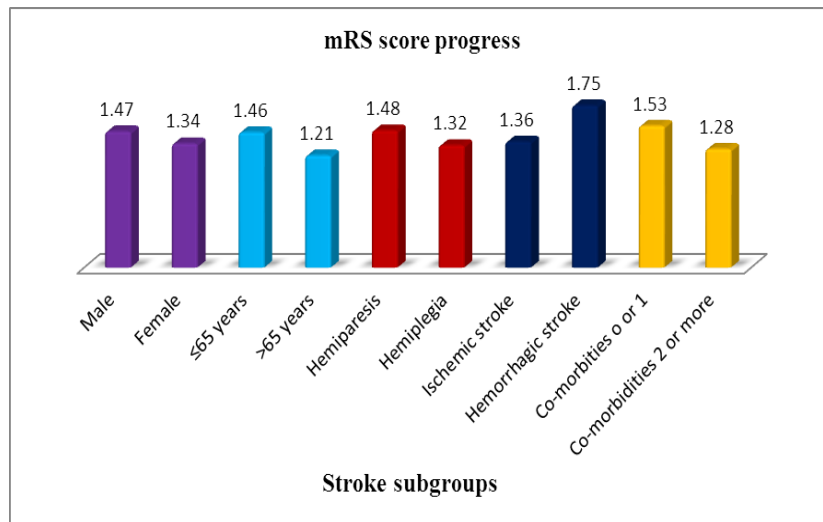


Figure-10 Differences in mRS score progress between stroke subgroups of the patients.

DISCUSSION

Stroke is a sudden neurologic deficit manifested either by vascular occlusion from thrombosis or from embolism, or from hemorrhage into the brain due to a blood vessel rupture by hypertension. It involves a group of modifiable and non modifiable risk factors.^[20,24] The present study involves the observation of various risk factors influencing the functional outcome in cerebral stroke.

The present study highlights the risk factors, functional disability at initiation (before) and completion (after) of medical therapy thus analyzing the risk factors influencing the outcome in cerebral stroke patients by using modified Rankin scale scores.

AGE AND GENDER WISE CATEGORISATION OF STROKE PATIENTS

In our study the mean age of the patients was 57.35 years. This finding was closely related with the study done by R P Eapen et al^[21] and Vijaya Raj Bhatt et al^[20] who found that mean age was 57 and 61 years. Most common age groups experiencing stroke were between 51-70 years (65.5%). These findings were in concordance with the study done by Javed Akhter Rathore et al^[33] and R P Eapen et al^[21] where maximum frequency of stroke was seen between ages 55-74 years and 51-60 years. Age is the single most important risk factor for stroke. For each successive 10 years after age 55, the stroke rate doubles in both men and women.^[23,25] Our study found that the occurrence of stroke was more in males (58%) than in females (42%). Study done by V.R Bhatt et al^[20] and R P Eapen^[21] also suggest that incidence of stroke events are more in males than in females. The most common gender difference in stroke is due to lifestyle factors such as cigarette smoking and alcohol consumption in males.

Thus our study shows that increasing age after 50 years and being a male are the non-modifiable risk factors associated with the incidence of stroke.

TYPE WISE DISTRIBUTION OF STROKE

Out of the total patients in our study, most of them are diagnosed with Ischemic stroke (87%) compared to Hemorrhagic stroke (9%) and TIA (4%). These findings were similar to the study done by S.Moslavac et al^[3] and Javed Akhter Rathore et al.^[33]

ASSESSMENT OF RISK FACTORS

Knowledge of stroke risk factors among stroke survivors helps in secondary prevention of stroke.^[28] Our present study identified that the most common risk factors associated with cerebral stroke are Hypertension (75.5%) followed by Diabetes mellitus (52.2%), Cigarette smoking (38.8%), Alcohol consumption (30%) and CAD (14.4%). Similar findings were found in the study done by Monaliza et al^[18] where HTN (58.45%) was the most commonly reported risk factor followed by alcohol consumption (48.82%), tobacco use (48.39%) and DM (43.68%). Our findings about risk factors also correlated with the study observed by V.R. Bhatt.^[20]

Thus our study shows that HTN is the leading cause of stroke followed by DM, cigarette smoking, alcohol consumption and CAD. These findings suggest that the above modifiable risk factors are responsible for increased incidence of stroke in general population.

ASSESSMENT OF FUNCTIONAL DISABILITY BY USING MODIFIED RANKIN SCALE-9Q QUESTIONNAIRE

The modified Rankin scale (mRS) defines 6 levels of disability and one for death. Level 0- no symptoms at all. Level 1- no significant disability despite symptoms, able to carry out all usual duties and activities. Level 2- slight disability, unable to carry out all previous activities but able to look after own affairs without assistance. Level 3- moderate disability, requires some help but able to walk without assistance. Level 4- moderately severe disability, unable to walk without assistance and unable to attend to own bodily needs without assistance. Level 5- severe disability, bedridden, incontinent, and requiring constant nursing care and attention and Level 6- dead.^[10] mRS level 6 is not considered in our study because the present study focuses on the disability outcomes among stroke survivors. Individual scores in the mRS describe clinically distinct functional states of the stroke patients.

In our study patients presented with higher mRS scores at initiation (3.46) of medical therapy indicating moderate to moderately severe disability thus requiring the need of proper medical therapy including occupational or physical therapy. After completion of the therapy patients presented with reduced mRS score (2.05) indicating slight disability where the patients are able to look after their own affairs without assistance.

Thus our present study revealed significant effect of medical therapy on functional outcomes in cerebral stroke patients. Patients made statistically significant improvement with a mean difference in mRS score of 1.41 thus indicating change in more than one level of functional gains.

FACTORS INFLUENCING FUNCTIONAL OUTCOMES

Gender

Males (1.47) had better functional outcome when compared to females (1.34). A study found that the rate of mortality from any cause was higher for women than for men, due to various confounding factors.^[6] This cause of higher dependency in women is not clear but raises the possibility that the lack of the neuroprotective effect of estrogen in postmenopausal women might play a role.^[7] These results correlates with the study done by Ji-Sun Kim et al^[6] and Malgorzata Wiszniewska et al.^[7]

Age

Patients with age ≤ 65 years (1.46) had better outcome than patients >65 years (1.21). A number of studies provide strong evidence that younger age is associated with a better outcome after stroke rehabilitation. This is due increased physical health problems such as chronic diseases like HTN, DM, heart disease etc.^[1] These findings are similar to the study conducted by Malgorzata Wiszniewska et al.^[7]

Severity of Stroke

Hemiparesis (1.48) had better functional outcome when compared to patients with Hemiplegia (1.32). These results are in concordance with the study done by S. Moslavac et al.^[3] Hemiplegia means paralysis of one side of the body. Hemiparesis means partial loss of movement or weakness on one side of the body. Mild to moderate nerve or brain damage will produce hemiparesis, while moderate to severe nerve or brain damage will result in hemiplegia. Thus hemiplegia in its most severe form had lesser functional outcome when compared to hemiparesis.

Type of Stroke

Hemorrhagic stroke (1.75) had better functional outcome than Ischemic stroke (1.46). Thus many authors reported that patients with hemorrhagic stroke made greater physical or functional gains when compared to ischemic stroke [Tiotrefis G. Fernandes et al^[16] and Eric Y. Chang et al.^[1] This might be due to increased neurological recovery and compensatory capacity in hemorrhagic stroke than in ischemic stroke.

CO-MORBID CONDITIONS- Patients in this subgroup are categorized into 2 groups

- 0 or 1 co-morbidities.
- 2 or more co-morbidities.

Patients with 0 or 1 co-morbidities (1.53) had better functional outcome compared to patients with 2 or more co-morbidities (1.28). Javed Akhter Rathore et al conducted a study which signifies the association of risk factors with stroke. Targeted interventions that reduce the patient specific risk factors could substantially reduce the recurrence of stroke and increased functional outcomes in patients.^[33] Thus greater medical complexity contributes to the severity of functional impairment following a stroke and may impede functional recovery.

CONCLUSION

1) The incidence of stroke was high in age groups around 51-70 years which compromised about 66% of entire study population. Stroke affects people of all ages but increasing age has greater risk of getting stroke because of increased risk factors or co-morbid conditions such as HTN, DM and heart diseases.

2) The incidence of stroke was high in males (58%) than in females (42%) which can be due to:

- Life style factors such as tobacco smoking and alcohol consumption in males.

3) Out of the total study population 87% of the patient's experienced Ischemic stroke, 9% patients experienced Hemorrhagic stroke and 4% patients experienced TIA. Thus Ischemic stroke is more prevalent than Hemorrhagic stroke according to our study.

4) Males are more prone to Ischemic stroke and Hemorrhagic stroke than females. This is due to lifestyle factors i.e., cigarette smoking and alcohol consumption.

- Smoking is a major risk for stroke because smoking causes your blood to clot easier and increases the build-up of plaque in your arteries. It also leads to narrowing of the arteries thus leading to increased blood pressure as a result of nicotine.
- Chronic alcohol consumption can lead to increased blood thickness and platelet levels thus leading to ischemic stroke.

5) Decreased blood supply to the brain is the major cause of stroke. Therefore the incidence of Ischemic stroke was highest followed by Hemorrhagic stroke.

6) The modified Rankin scale (mRS) functional outcome score before initiation of the therapy is 3.46 and after completion of the therapy is 2.05. Thus results of our study demonstrated significant functional gains in rehabilitation process of stroke patients.

7) Our study shows that there is minimal difference in mRS progress in patient subgroups according to gender, age, severity, type of stroke and co-morbid conditions.

8) Females had lower functional outcomes than males which can be attributed due to:

- Menopause is tied to hormonal fluctuations which may hamper functional outcome in females.
- Lack of the neuroprotective effect of estrogen predominantly in postmenopausal women in our study population might play a role in decreased functional outcome.

9) Patients with age >65 years had decreased functional outcome which is due to:

- Increased incidence of physical health problems such as chronic diseases like HTN, DM or heart diseases due to increasing age.

10) Patients with hemiplegia had lower functional outcome when compared to hemiparesis patients. This might be due to severity of hemiplegia when compared to hemiparesis which resulted in minimal functional variation.

11) Hemorrhagic stroke had better functional outcome than Ischemic stroke. This might be due to increased neurological recovery and compensatory capacity in hemorrhagic stroke than in ischemic stroke.

12) Patients with 2 or more co-morbid conditions had decreased functional outcomes than in patients with 0 or 1 co-morbid condition.

Our study presents that there is minimal mRS score progress in the patient subgroups. Thus, individually adjusted medication therapy, if initiated on time and to the extent of the needs of the patients, proved useful in all stroke patients regardless of their age, gender, co-morbidity, type and severity of stroke.

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