Original Article

Assessment of Predictors of Recurrent Stroke and to Analyse the Significance of Golden Hour among the Stroke Patients in a Tertiary Care Hospital

Sarang P[1,*], Adwaitha R[1], Heera Lakshmi A[1], Teena Susan Alex[1], Soumya MK[2]

[1]Pharm.D Interns, Crescent College of Pharmaceutical Sciences, Kannur, Kerala, INDIA.
[2]Assistant Professor, Department of Pharmacy Practice, Crescent College of Pharmaceutical Sciences, Kannur, Kerala, INDIA.

ABSTRACT

Aim: The aim of the study is to assess the predictors of recurrent stroke and to analyze the significance of golden hour among the stroke patients in a tertiary care hospital. **Materials and Methods:** A prospective observational study of six month duration was conducted. All the data were documented and analyzed based on a standard protocol. Data collected were entered into Microsoft Excel. Statistical analysis was done by using Microsoft Excel. **Results:** A total of 100 patients were included in the study. 52% were male and 48% were female in which majority falls between 60-70 years of age. The occurrence of recurrent stroke was found to be 69% and most common co-morbid condition was hypertension (93%). Around 100 samples were included in the study, of which 15 patients (15%) arrived with in golden hour and their NIHSS score was found to be less than 14. Drugs for IVT treatment include alteplase of varying dose. Antihypertensives and antiplatelets are the drugs frequently used. The results even suggest that any efforts made, both pre- and in- hospital, are worthwhile investments in securing the best outcomes for the patient population. **Conclusion:** This study identified various important predictors to better identify patients suitable for thrombolysis. NIHSS and mRS scale were noted before and after the golden hour. This study strongly highlights that treatment in the Golden Hour leads to excellent outcomes in all patients, regardless of age and pre-existing co-morbidity.

Key words: Predictors, Golden hour, Tissue plasminogen activator, National Institutes of Health Stroke Scale, Modified Rankin Scale.

INTRODUCTION

Stroke is a serious medical condition that takes place when the blood supply to the part of the brain is cut off. Like all organs, the brain needs oxygen and the nutrients provided by the blood to function properly if blood supply is restricted or if blocked brain cells begin to die.[1] This can lead to brain damage and possibly death. Relevant scoring systems and scales are being used for the stroke population. Healthcare professionals use the NIH Stroke Scale to measure neurological function and deficits by asking the person to answer questions and perform several physical and mental tests.[2] The Modified Rankin Score (MRS) is a 6 point disability scale with possible scores ranging from 0 to 5 and is the most widely used outcome measure in stroke clinical trials.[3] Acute ischemic stroke, developing from embolic or thrombotic occlusion of an intracranial artery, accounts for 87% of all strokes. The administration of I.V. fibrinolysis with recombinant tissue plasminogen activator (rt-PA) within 3 to 4.5 hr of stroke symptom onset is the only current treatment shown to reduce disability from acute ischemic stroke. Decrease in inability following stroke will therefore require continued endeavors to improve patients' access to hospitals capable of providing rapid evaluation and treatment with rt-PA, coupled with proper patient selection to avoid serious complications (most commonly hemorrhage). The golden hour is the first three and half hour after a traumatic injury, when emergency treatment is most likely to be successful.[4]

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Address for correspondence:
Mr. Sarang P
Department of Pharmacy Practice, Crescent College of Pharmaceutical Sciences, Kannur-670613, Kerala, INDIA.
Phone no: +91 9747429459
Email Id: sarang9936@gmail.com

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MATERIALS AND METHODS

Study site: Study was conducted at inpatient Department of Neurology in a Tertiary Care Hospital, Kannur.

Study design: Prospective, observational and questionnaire study.

Study material: Case sheet of stroke patients, NIH Stroke Scale, Modified Rankin Scale.

Study procedure: Detailed information regarding the study was explained to the participants who were hospitalized due to stroke. Informed consent was obtained from participants who were willing to participate in the study. A data collection form was designed to collect the patient information. The information based on the patient demography, diagnosis, past medical and family history, social habits, co- morbidities, drug allergies, and treatment chart were documented. The different predictors were found out. The patients reached within and after the golden hour were assessed and their treatment plans were recorded.

Ethics and consent: The study was approved by the institutional Human Ethical Committee of Crescent College of Pharmaceutical Sciences filed under 008/2019/CCOPS/IEC-21/10/2019. Permission to conduct the study was obtained from the chairperson of the Institutional Human Ethics Committee.

RESULTS

The study was accomplished in duration of six months in the neurology department of a tertiary care hospital. Based on inclusion and exclusion criteria 100 patients were taken and sorted.

Baseline Characteristics of Patients

Here the study variable table depicts that among 100 participants, 52% were male and 48 % were female in which majority falls between 60-70 years of age. When blood pressure was taken from the net participants, it was found that 62% were having systolic Blood Pressure (<150 mmHg) and 38% with Diastolic Blood Pressure (>90 mmHg). From the study, 69% of study population have recurrent stroke and 31% do not have recurrent stroke.

From the data, 93% of study population have hypertension, along with Diabetes Mellitus (82%), Hyperlipidemia (87%), Atrial Fibrillation (79%), COPD (30%),Asthma (18%), Heart Failure (7%), Thyroid disease (8%) followed by other comorbidities. (Table 1)

Type Wise Categorisation of Stroke

The patients were grouped into two, based on their diagnosis as Ischemic stroke and Hemorrhagic stroke. In our study out of 100 patients, 72 (72%) experienced ischemic stroke and remaining 28(28%) patients were diagnosed with hemorrhagic stroke.

Symptoms

The study illustrates different symptoms manifested in the study population of which Hemiplegia (87%), Giddiness (81%), Fatigue (63%), Headache (61%), Numbness and Deviation of mouth (54%), Drowsiness (52%), Slurring of speech (50%), Dysarthria (48%), Change in speech (43%),Vomiting (42%).

Drugs Prescribed

From the graph, 97% of the study population were given antihypertensives, 91% were given Proton Pump

Table 1: Baseline characteristics of patient according to the main outcome variables.

Study Variables	N(%)
Gender	
Male	52
Female	48
Age Group	
50-60	32
60-70	32
70-80	21
80-90	11
90-100	4
Systolic BP >160mmHg	62
Diastolic BP >90mmHg	38
Recurrent stroke	
Yes	69
No	31
Hypertension	93
Diabetes mellitus	82
Hyperlipidemia	87
Atrial Fibrillation	79
COPD	30
Asthma	18
Heart Failure	7
Thyroid diseases	8
Other comorbidities	23
Family history	
Yes	25
No	75
Social history	
Nil	39
Smoking	20
Alcoholic	25
Smoking and Alcoholic	16

Table 2: distribution based on scale assessment.

Golden Hour	NIHS Scale (Median)		mRS (Median)	
	On Admission	On Discharge	On Admission	On Discharge
Within golden hour	9	0	3	0
After golden hour	13	5	4	2

Inhibitors, 79% were given Antiplatelets, 66% were given both Hypolipidemics and Nootropics, 60% were given hypoglycemic, 39% were given Antiepilepticus, 33% were given Antibiotics, 25% were given both Bronchodilators and Anticoagulants, 20% were given both Antipsychotics and Osmotic Diuretics, 18% were given Antiemetic, 12% were given both H2 Receptor Antagonists and Analgesics, 10% were given Thrombolytics, 8% were given both Vitamins and Ca/K supplements, 2% were given Nitroglycerin and 37% of study population were given other class of drugs.

Percentage of IVT Treatment within the Golden Hour

In our study out of 100 sample populations, only 13% patients were taken IVT treatment within golden hour and 87% patients were without IVT treatment within the golden hour. (Figure 1)

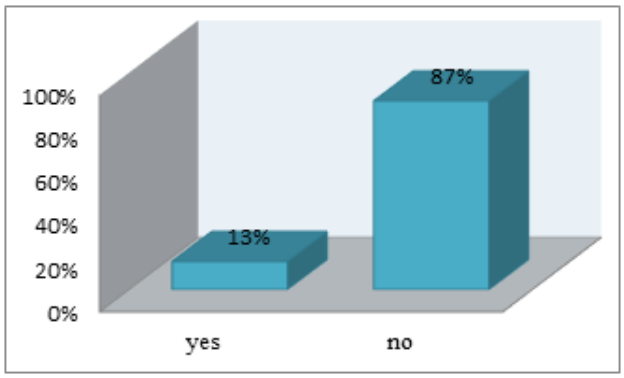

Figure 1: Graph showing percentage of IVT treatment within the golden hour.

Scale Assessment

The study also determined the clinical course of the patients treated with in and after the golden hour. The median of NIHSS (range) of patient reached within the golden hour on admission was found to be 9 (2-14) and at discharge was found to be 0(0-5). The median of NIHSS (range) of patient reached after the golden hour on admission was found to be 13(7-19) and at discharge was found to be 5 (5-10). The median of mRS (range) of patient reachedwithin the golden hour on admission was found to be 3 (1-3) and at discharge was found to be 0 (0-3). The median of mRS (range) of patient reached after the golden hour on admission was found to be 4(1-5) and at discharge was found to be 2 (1-4). Discharge was found to be 5 (5-10). The median of mRS (range) of patient reached within the golden hour on admission was found to be 3(1-3) and at discharge was found to be 0(0-3). The median of mRS (range) of patient reached after the golden hour on admission was found to be 4(1-5) and at discharge was found to be 2(1-4). (Table 2)

Main Causes of Pre-Hospital Onset Arrival Delay

The main causes of pre-hospital onset arrival delay found

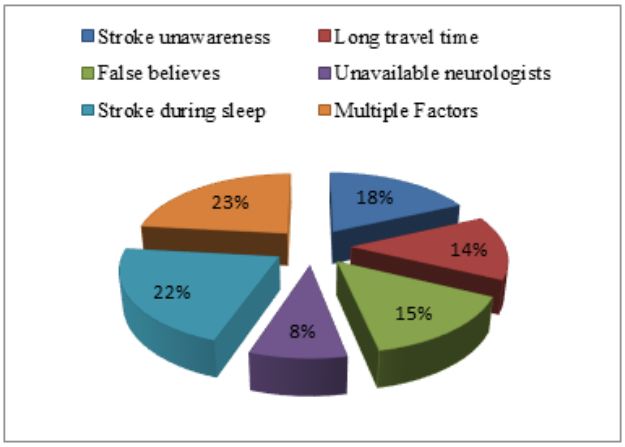

Figure 2: Distribution on main causes of pre-hospital onset arrival delay.

in sample population were multiple factor (23%) followed by stroke during sleep (22%), stroke unawareness (18%), false believes (15%), long travel time (14%) and unavailable neurologists (8%). (Figure 2)

Causes of IV R-Tpa Non Administration Despite Arrival Within Therapeutic Window

The result of the present study shows that, causes of non-administration of IV r-tPA in patients despite their arrival within < 3.5 h from stroke onset were as follows; 41% had prolonged DNT > 60 min, 24% had patient's financial restraints, 14% had non-motor stroke, 9% did

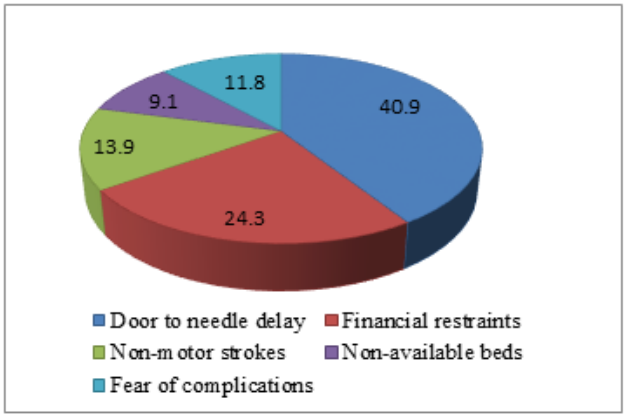

Figure 3: Distribution based on causes of IV r-tPA non administration despite arrival within therapeutic window.

not find available stroke ready beds and 12% had feared of hemorrhagic transformation. (Figure 3)

DISCUSSION

From the study we also came to know that the possibility of stroke was higher in males (52%) than females (48%), similarly when considering age, people between 50-70 years of age are more prone to stroke as it is a disease of aging. When taking account of comorbidities, people who have hypertension (systolic bp >160mm/Hg, diastolic bp >90mm/Hg) are more likely to cause stroke, in our study about 93% of patients are having hypertension, so they are one of the strongest predictors. Life style changes like smoking (20%), alcohol consumption (25%) and both Smoking and Alcohol consumption (16%) had also became the predictors of stroke.

Incidence of stroke increases steadily with certain symptoms like Hemiplegia (87%), Giddiness (81%) were the symptoms most commonly exhibited by the patients at high rate. Around 100 samples were included in the study, of which 15 patients arrive with in golden hour and their NIHSS score was found to be less than 14.[5,6]Drugs for IVT treatment include alteplase of varying dose. Usual dosing includes, 0.9 mg/kg IV; not to exceed 90 mg total dose; administer 10% of the total dose as an initial IV bolus over 1 min and the remainder infused over 60 min. In general route of administration for this drug is IV and here the dose for each patient is strictly administered as per r-tPA dosing requirements (i.e. 5mg IV bolus and 45mg IV infusion). Since these patients are having high blood pressure, there's a risk for intracerebral haemorrhage (Jauch EC, 2013). So in order to reduce the risk of haemorrhaging complications, IV treatment with labetalol is used. A dose of 10-20mg IV labetalol is administered.

Proper management of disease decreases the incidence and progression of stroke. The study shows that there was higher incidence of utilization of antihypertensive drugs followed by antiplatelet. Out of 97% of antihypertensives, the CCBs (60%) are the highly used and among this amlodipine are used frequently. 79% of antiplatelets were used in our study. The majority of antiplatelets used were monotherapy with aspirin (32%) followed by clopidogrel (24%). In case of utilization of hypolipidemic drugs (60%), atorvastatin (60%) is highly used in our study than rosuvastatin (40%).

The study had declared the median of NIHSS (range) of patient reached within the golden hour on admission was found to be 9 (2-14) and at discharge was found to be 0(0-5) whereas the median of NIHSS (range) of patient reached after the golden hour on admission was found to be 13(7-19) and at discharge was found to be 5 (5-10). Also shows that the median of mRS (range) of patient reached within the golden hour on admission was found to be 3(1-3) and at discharge was found to be 0(0-3) whereas the median of mRS (range) of patient reached after the golden hour on admission was found to be 4(1-5) and at discharge was found to be 2(1-4). From which it shows there is an excellent outcomes associated with IVT treatment in the Golden Hour in all age groups suggests that all efforts should be made to ensure treatment within this opportune therapeutic window.[7,8] These results also suggest that any efforts made, both pre- and in- hospital, are worthwhile investments in securing the best outcomes for the patient population.

The study had even declared that, the greater percentage of pre-hospital onset arrival delay were multiple factor (23%) followed by stroke during sleep (22%), stroke unawareness (18%), false believes (15%), long travel time (14%) and unavailable neurologists (8%). From this it is evident that most people are having multiple factor and also most strokes were occurred during sleep time.[9]

The results of this study also revealed that, the main causes of non-administration of IV r- tPA in patients despite their arrival within < 3.5 h from stroke onset were prolonged DNT > 60 min (40%) due to greater time taken in emergency hospital assessment, Neurology Emergency Room assessment and imaging transfer time. The economic constraints (24%) may be a serious obstacle that decreased the usage of IV r-tPA.[10]

CONCLUSION

From our study, we conclude that among 100 patients diagnosed with stroke, majority were males and belong to an age group 50 to 70 years. It is also clear that

strongest predictors of stroke cause to patients having hypertension, diabetes mellitus, hyperlipidaemia and so on. Major risk factors of this case include smoking and alcohol consumption. Hemiplegia and giddiness were the most common symptoms exhibited by the patients. We have also analysed both golden hour therapy and after golden hour therapy with which we were able to conclude that golden hour therapy have better life expectancy in patients. Here 15% of the patients arrived within golden hour. In our study we proved the importance of two stroke scales which had a direct influence on finding out which treatment would have neurological improvement among patients. Antihypertensives and antiplatelets are the drugs frequently used. This study strongly highlights that treatment in the golden hour leads to excellent outcomes in all patients, regardless of age and pre-existing co-morbidity.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

IV r-tPA: Intravenous Recombinant Tissue Plasminogen Activator; **NIHSS:** National Institutes of Health Stroke Scale; **mRS:** Modified Rankin Scale; **IVT:** Intravenous Thrombolysis; **CCB:** Calcium Channel Blocker; **DNT:** Door to Needle Time; **EMS:** Emergency Medical Services.

SUMMARY

A prospective observational study was performed in stroke patient to assess the predictors of recurrent stroke and to analyse the significance of golden hour among the stroke patients in a tertiary care hospital. NIHSS and mRS scale were noted before and after the golden hour. The outcomes associated with IVT treatment in the Golden Hour in all age groups are excellent which suggests that all efforts should be made to ensure treatment within this opportune therapeutic window.

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