

Pre-Hospital and In-Hospital Delay of Acute Ischemic Stroke Patients in India

M. R. Vijaya Kumar

Received: 6 June 2021 Accepted: 4 July 2021 Published: 15 July 2021

Abstract

Diseases that take place in developing countries could owing to poverty, lack of healthcare infrastructure, restricted access to the hospital. Many developing countries like India growing well economically and extending urbanization in recent years despite this large Indian population lives in poverty. However, risk factors for stroke in urban populations are like other developed nations. Stroke is the third common cause of death due to disease in India. The acute ischemic stroke has to be treated within few hours after the beginning of symptoms; if time goes beyond >4.5 after the onset of symptoms, thrombolytic drugs ineffective not only time, other contraindications also equally contribute to thrombolytic therapy. The use of thrombolytic in contraindication patients would further exaggerate the stroke. The various factors could cause a delay the management of acute ischemic stroke from pre-hospital delay to delay in diagnosis and treatment. An effective strategy is needed to meet the challenges in India.

Index terms— acute ischemic stroke, delay, thrombolytic, contraindication.

1 Introduction

stroke is the most complicated global public health complication. Report of the Global Burden of Diseases study conducted in 1990. In developing countries like India, both communicable and noncommunicable diseases are a double burden. Globally, stroke is the third general cause of death after CHD and cancer. In recent times the incidence of stroke in India mounts higher than in western countries in India, the actual incidence rate of stroke is between 145-154/1,00,000 persons in a year. The major reason for increasing stroke incidence in India due to poor medical facilities in rural most populations are living. Few factors are certainly associated with a delay in the management of acute ischemic stroke-like pre-hospital delay due to late arrival, long-distance, rural living, poor knowledge, and Community awareness, along with other factors like delay in a hospital due to lack of CT scan facilities in rural and remote areas, inadequate infrastructure, delays often seen in the treatment of patients with acute ischemic stroke. Thrombolytic therapy for acute ischemic stroke was being approved in 1996 However, only 1% to 2% of patients with ischemic stroke have estimated to be eligible for it because of the time window. The beneficial effect of thrombolytic in acute ischemic stroke up to 4.5 hours of stroke symptom onset; previous guidelines were suggested 3 hours of thrombolytic also have some contraindication so, checking inclusion and exclusion is vital before starting therapy.

2 a) Pre-delay into the hospital

The pre-hospital delay not declined since 2006 in India, with the many patients unsuccessful to arrive before 3 hours. Most population in developing countries like India living in rural areas where the health system is poor. one of the reason for emergency department arrival beyond 3 hours is a delay in transportation, transportation delay in urban areas due to excess of traffic, in the rural area due to shortage of ambulance service and distance from the hospital. Knowledge of stroke is relatively poor among people in India, especially in rural areas. A Study in Northwest India revealed both patients and their relatives did not have enough knowledge about the stroke and its symptoms, ignoring, personally thinking the symptoms would resolve quickly. Living or being

alone during the onset of stroke, Stroke while sleeping, especially at mid-night, also contributes to factors in the pre-hospital delay.

3 b) Delay in hospital

Stroke units in the hospital provide a multiregulated approach by neurologists, stroke physicians, stroke nurses, physiotherapists, speech therapists, and occupational therapists involve in cohesive and organized care of the patients. The number of strokes care hospitals and those with obligated stroke units is not many in India. Insufficiency of imaging facilities and extremely high cost of thrombolytic agents and mechanical thrombectomy are the major hindrances in the proper management of acute ischemic stroke.

4 c) Delay in diagnosis

Indian government hospitals divided into PHC, CHC, SDH, and DH among these; only DH have a CT scan facility. Patients should be transported into DH or medical college hospital or multi-specialty hospital because other categories of hospitals do not have CT scan facility. It is certainly a timely process if patients reach into non-CT scan hospital. CT scan in-hospital admission also the factor causing the in-hospital delays; it is strongly impacted by factors such as patient admission process delay, shortness of staff, the distance between hospital stroke unit or causality, and CT room.

5 d) Delay in management

The decision-making process for thrombolytic selection should be a factor affecting in-hospital delay. The study revealed that the process of decision-making for intravenous thrombolytic contributed to a prominent factor in-hospital delay. Acute ischemic patients firstly examined by an emergency unit followed by being informed to the neurologist. Once a definite diagnosis made, medical professionals should communicate with their family members, informing the risk of intravenous thrombolytic and collecting information about the present and the previous history of patients to determine inclusion or exclusion criteria are necessary. If a patient contraindication to the thrombolytic agents; a mechanical thrombectomy is an alternative option. It takes more time because it is a surgical procedure. The high cost of thrombolytic therapy and mechanical thrombectomy makes it inaccessible to economically backward patients.

6 e) Management of acute ischemic stroke

The only pharmacological agent approved for the management of acute ischemic stroke is IV-(rt-PA). A reperfusion therapy that should be administered well inside a time 4.5 hrs right after symptom onset. It officially approved for management in acute ischemic stroke in 1996. The limitation on IV-rt-PA treatment beyond 4.5 hrs rules out most stroke patients admitted beyond this time-window as a result, dramatically restrain the eligible population. Tissue plasminogen activator within 4.5 hrs of the onset of symptoms remarkably boosts clinical outcomes in patients with acute ischemic stroke. Thrombolytic dissolve thrombi in the vascular bed by converting plasminogen to form plasmin. Plasmin is a proteolytic enzyme that burst the cross-links across fibrin molecules to break the structure of clots. The most important thrombolytic drugs used in ischemic stroke to stimulate plasminogen are urokinase/streptokinase and tissue plasminogen activators. The major pharmacological agent in tissue plasminogen activators is alteplase, which is converts plasminogen to the proteolytic enzyme plasmin, which is ruptures fibrin to dissolve. Apart from the pharmacological agents, mechanical thrombectomy also an indication in the management of acute stroke if time limits cross 4.5 hrs. In recent times reperfusion therapies also have been performed in mechanical embolus disruption or removal of a fibrin clot. Mechanical thrombectomy devices resolve the ischemic but not fully occluded clot. It is regaining perfusion through the earlier occulted artery. The application of retrievable stents into the ischemic part of blood vessels promptly relieves the block and improves the blood circulation. Now the day's most neurologists prefer mechanical thrombectomy to bring off reliable results similar to those seen by cardiologists in the treatment of myocardial infarction by angioplasty(stent).

7 Less than 3 hrs

If within 3 hrs use intravenous alteplase therapy, well-defined manifestations are observed.

8 to 4.5 hrs

Intravenous alteplase therapies should be provided that treatment initiated within 3 to 4.5 hrs of well-defined manifestations will be observed. Patients in this period will also determine if they are candidates to mechanical thrombectomy.

9 to 6 hrs

Patients within 4.5 to 6 hrs from stroke manifestation onset must not receive intravenous alteplase because of contraindication, but patients might be eligible for mechanical thrombectomy.

10 to 24 hours

Patients beyond 6 hrs from ischemic stroke symptom onset could not entitle for treatment with intravenous alteplase. Nevertheless, mechanical thrombectomy might be eligible if the hospital using an imaging-based selection of patients.

11 Beyond 24 hrs

Patients beyond 24 hrs from ischemic stroke symptom onset could entitle neither alteplase nor mechanical thrombectomy.

So timing is more important in the application of alteplase or mechanical thrombectomy in acute ischemic stroke.

12 II. Inclusion and Exclusion Criteria for Thrombolytics a) Inclusion Criteria

Within 3 hrs of stroke symptom onset: Ischemic stroke diagnosis with mild to severe but impairs stroke symptoms, the onset of symptoms <3 hrs before proceeding treatment, age > 18 years.

Between 3-4.5 hrs after stroke symptom onset:

Age < 80 years, without any previous history of diabetes mellitus and prior stroke, NIHSS score < 25, presently not taking any oral anticoagulants, CT scan Imaging does not establish the involvement of > 1/3 of middle cerebral artery territory.

13 If otherwise eligible:

Blood pressure range below < 185/110 mm Hg, patients taking an anti-platelet drug-like (aspirin or clopidogrel or aspirin and clopidogrel) if the benefit outweighs the small risk of symptomatic intracerebral hemorrhage.

Exclusion Criteria (Table ??) Table ?? III. Meeting the Challenges of Stroke in India

Improving stroke knowledge and education, Improving awareness about risk factors and warning symptoms to the general population, sharing of knowledge as well as technical between research institutions, Increasing more number of stroke units and trained professionals to tackle the high Indian population, enhanced quality of care for stroke patients in India by improving guidelines and designated hospitals infrastructure, train research facilities for basic and clinical research regarding stroke.

14 IV.

15 Conclusion

The management of acute ischemic stroke has a time window due to delay by factors like pre-hospital delay and delay in-hospital have contributed into ineligible candidates for the thrombolytic therapy. The factors contributing to delay could not easily minimize because of greater challenges in developing countries like India. The challenges should be meeting by-improving stroke education, infrastructure, and guidelines.

16 Acknowledgment

¹

27. Maria helenabarbosaclinical outcomes of ischemic stroke
actapaulenferm. 2016; 29(6):650-7.
28. Sonubhaskar, peter stanwell reperfusion therapy in
acute ischemic stroke: dawn of a new era bmc
neurology (2018) 18:8 doi 10.1186/s12883-017-
1007-y.
29. Birns, kalrathrombolytic therapy for stroke
10.2217/thy.09.41 © 2009 future medicine ltd.
30. Mònicamillán,

patients after thrombolytic therapy

lauradorado, antonidávalos

- nolytic therapy in acute stroke current cardiology
reviews, 2010, 6, 218-226.
31. Andrew bivard, along tinglin, mark w. Parsons
review of stroke thrombolytics journal of stroke
2013; 15(2): 90-98 [http://dx.doi.org/10.5853/
jos.2013.15.2.90](http://dx.doi.org/10.5853/jos.2013.15.2.90).
32. Mirembe
dialanicolaalteplase researchgate.net /publication
342348009 on 21 june 2020.
33. Radoslavraychev, jeffrey l. Saver mechanical
thrombectomy devices for treatment of stroke
neurology: clinical practice | September 2012.
34. Stephan a. Munich, kunalvakharia overview of
mechanical
neurosurgery/article/85/suppl_1/s60/5512732
guest on 07
A

reed, connor c, kern

thrombectomy techniques
by

Figure 1:

.1 Conflict of Interest

The author declares that there are no conflicts of interest.

[Abraham and Vimalkrishnan (2020)] Siju V Abraham , Vimalkrishnan . ip: 106.197.186.116. *fazilthahafactors delaying management of acute Stroke: an Indian scenario www.ijciis.org on Wednesday, November 4, 2020.*

[Erqing Chai and Jiang ()] *factors affecting in-hospital delay of intravenous Thrombolysis for acute ischemic stroke medicine*, Erqing Chai , Jiang . 2019. e15422. 98 p. 19.

[Guang-Jianzhao and Wang ()] *fan-zhenlin the safety and efficacy of Tpa intravenous Thrombolysis for treating acute ischemic stroke patients with a history of cerebral hemorrhagebrazilian journal of medical and biological research*, Guang-Jianzhao , Wang . 2019. p. 52.

[Felipe de los ríos la rosa, janekhoury eligibility for intravenous recombinant tissue-type Plasminogen activator within a population] *Felipe de los ríos la rosa, janekhoury eligibility for intravenous recombinant tissue-type Plasminogen activator within a population ahajournals*, November 11, 2020.

[Suresh Kumar Kamalakannan ()] *Gudlavalleti Incidence & prevalence of stroke in India: a systematic review Indian j med res*, S V Suresh Kumar Kamalakannan . 2017 aug. 146 p. .

[Hospitals in the country ministry of health and family welfare 24 jul 2018 5:03pm by bypib Delhi] *Hospitals in the country ministry of health and family welfare 24 jul 2018 5:03pm by bypib Delhi*,

[Karkalravishankarnaik challenges in delivering stroke care in India www ijournals.org on Tuesday (2017)] 'Karkalravishankarnaik challenges in delivering stroke care in India www'. ip: 50.101.242.106. *ijournals.org on Tuesday January 17, 2017.*

[Lacy ()] *md; dong-churl suhdelay in presentation and evaluation for acute stroke www.strokeaha.orgstroke*, Clifton R Lacy . 2001. 32 p. .

[Asadmahmood ()] *muhammashrafshariftime to hospital evaluation in patients of acute stroke for alteplase therapy rmj*, Asadmahmood . 2009. 34 p. .

[Amitkumar ()] *onkarnathrai study of risk factors among stroke patients in a tertiary hospital of northern India int j adv med*, Amitkumar . 2017 apr. 4 p. .

[Pandian] Jeyaraj D Pandian . 10.1161/strokeaha.107.496869. *velandaisrikanth poverty and stroke in India stroke.ahajournals.org*,

[Jeyarajduraipandian ()] 'paulinsudhan stroke epidemiology and stroke care services in India journal of stroke'. Jeyarajduraipandian . *neurology asia* 2013. 2006. 15 (3) p. . (Tapas kumarbanerjee, shyamalkumar das epidemiology of stroke in India)

[Pm dalal burden of stroke Indian perspective japisep ()] *Pm dalal burden of stroke Indian perspective japisep*, 2004. 52.

[Meena K et al. (2020)] *potential for a comprehensive stroke education: assessing awareness about stroke among community health workers www.jfmpc.com on Tuesday*, . S Meena K , Murthy , Thomas . November 10, 2020. (ip: 106.198.2.4.)

[WilliamJ (2018)] *Powers, chair; alejandro a 2018 guidelines for the early management of patients with acute ischemic stroke American heart association/ American stroke association*, WilliamJ . march 2018.

[Srivastava (2020)] 'Prasad a study of factors delaying hospital arrival of patients with acute stroke www'. A K Srivastava . *neurologyindia.com on Wednesday November 4, 2020.*

[Rajesh iyerprevalence and reasons for pre-hospital delay after acute ischemic stroke: data from a single tertiary care centre in Coimbatore, south India. Aanpublication monday, april 2020.] *Rajesh iyerprevalence and reasons for pre-hospital delay after acute ischemic stroke: data from a single tertiary care centre in Coimbatore, south India. Aanpublication monday, april 2020.*

[Rajiv ratansingh, shiv shankertripathi factors associated with delayed admission to hospital of ischemic stroke patients-a cross sectional observational study ijsr, 2/feb-2017.] *Rajiv ratansingh, shiv shankertripathi factors associated with delayed admission to hospital of ischemic stroke patients-a cross sectional observational study ijsr, 2/feb-2017.*

[Robert mikulík, pavlakadlecovafactors influencing in-hospital delay in treatment with intravenous thrombolysis stroke.ahajournals.org, 2012. American heart association.] *Robert mikulík, pavlakadlecovafactors influencing in-hospital delay in treatment with intravenous thrombolysis stroke.ahajournals.org, 2012. American heart association.*

[Joachim ()] *Sebastian thilemann, alexandrospolymeris reasons for prehospital delay in acute ischemic stroke j am heart assoc*, Joachim . Doi: 10.1161/jaha.119.013101. 2019. 8 p. e013101.

[Srinivasraokambam pharmacoepidemiology and clinical research advpharmacoepidemiol drug saf ()] *Srinivasraokambam pharmacoepidemiology and clinical research advpharmacoepidemiol drug saf*, 2017. 6 p. 3.

[Tapas kumarbanerjee, shyamalkumar das fifty years of stroke researches in india Anals of Indian academy of neurology ()] 'Tapas kumarbanerjee, shyamalkumar das fifty years of stroke researches in india'. *Anals of Indian academy of neurology* 2016. p. .

- 186 [Tomoko yanagida, lpn, shigerufujimoto causes of pre-hospital delay in stroke patients in an urban aging society journal of clinica
187 *Tomoko yanagida, lpn, shigerufujimoto causes of pre-hospital delay in stroke patients in an urban aging*
188 *society journal of clinical gerontology & geriatrics*, 2014. 5 p. .
- 189 [Kanagalakshmi and En (2014)] *zestroke care challenges in rural India: awareness of causes, preventive*
190 *measures and treatment options of stroke among the rural communities Indian journal of community health*,
191 Kumaranviswanath Kanagalakshmi , Chan En . oct -dec 2014.
- 192 [Gurav ()] ‘Zirpeimpact of ”stroke code”-rapid response team: an attempt to improve intravenous thrombolysis
193 rate and to shorten door-to-needle time in acute ischemic stroke www’. Sushma K Gurav . *ijccm.org* 2018. 22
194 p. .