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## Original Research Article

# Experience of tenecteplase in acute ischemic stroke from Kutch, Gujarat; Strong interpersonal communication between doctors leads to favorable outcomes

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## ABSTRACT

**Introduction:** Acute ischemic stroke is a major factor cause of severe morbidity and mortality in general population. Newer modality of treatment like IV thrombolysis has been established to prevent long term complications in this condition within 4.5 hours of symptoms onset. The data regarding IV thrombolysis is limited in rural areas. Various factors like lack of awareness among general population, patients reaching hospital beyond window period, cost of treatment pose difficulty in administration of this treatment. This article presents demographic profile of patients undergoing IV thrombolysis for acute ischemic stroke at a hospital from Kutch, Gujarat. This article also highlights the importance of strong interpersonal communication between physician for better outcomes in patients.

**Aim:** The aim of this observational study is to observe demographic profile of patients with acute ischemic stroke receiving intravenous thrombolysis and to estimate the factors which might help in favorable patient outcome.

**Results:** The data was calculated during January 2023 to December 2023. 22 patients were thrombolysed for acute ischemic stroke within 4.5 hours from onset of symptoms. Males were predominant (86.3%), average age of patients was 57.4 years (range 31 – 80 years old). Majority of the strokes were anterior circulation stroke (77.2%). The comorbidities like Diabetes mellitus (36.3%), hypertension (54.5%), dyslipidemia (59%), old coronary artery disease (18%), old cerebro vascular disease (4.5%) were seen. The time from symptom onset to presentation to hospital is approximately 146 minutes. The time from presentation to hospital and IV thrombolysis administration is approximately 49 minutes. 17(77.2%) patients presented to hospital within 3 hours of symptom onset, 13 (59%) underwent IV thrombolysis within 30 minutes of presentation to hospital. Majority of this patients were referred by primary physician to the hospital. Mild stroke (NIHSS < 5) was seen in 1 (4.5%) patient, moderate (NIHSS 5-15) in 11(50%) patients, moderate-severe stroke (NIHSS 15-25)– in 10(45.5%) patients. Large vessel occlusion was seen in 12 (54.5 %), small vessel disease in 4 (18 %), Embolic etiology in 4(18%) and unknown in 2 (9%) of cases. The mean NIHSS at presentation was approximately 16, at 24 hours after IV thrombolysis was approximately 11.3 and after 72 hours of IV thrombolysis is 8.6. Early neurological deficit was seen in 6(27.2%) of cases. 4(18%) of all stroke who underwent thrombolysis required decompression craniotomy. The improving on mRS (grade 0-1) score was found in 16(72.8%) patients at 7 days of thrombolysis.

**Conclusion:** Intravenous thrombolysis with recombinant tissue plasminogen activator is helpful in acute ischemic stroke within 4.5 hours of onset. Early diagnosis and swift evaluation and management helps in prevention of longterm disability.

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## 1. Introduction

Stroke is a global health concern and a major cause of disability and mortality in India. The incidence is

approximately 105-152 in every one lakh population and crude prevalence of stroke ranged from 44.29-559 / lakh population.<sup>1</sup> Population based stroke registry involving urban and rural areas had showed crude incidence of 138.1 / lakh population.<sup>2</sup> The prevalence of stroke has increased by 50% over last 17 years.<sup>3</sup> The management of stroke before NINDS tPA trial was mainly secondary prophylaxis and management of comorbidities. Intravenous tissue plasminogen activator is approved for management of hyper acute stroke. Tenecteplase is a recombinant tissue plasminogen activator has shown benefit in early reperfusion in acute stroke.<sup>4</sup> Several studies from different part of India have shown benefits of thrombolysis within window period and have emphasized that there is a need to improve in door-needle time in stroke. The major factor hindering the rapid administration of rtPA is delay in arrival to the hospital, time taken for imaging and time taken by relatives to consent for administration of drug.<sup>5-17</sup> In this article we publish our experience from Kutch, Gujarat, the western most part of India, where awareness among medical fraternity and a good interpersonal communication between doctors has shown to improve the time taken for thrombolytic therapy ultimately leading to good outcomes.

## 2. Materials and Methods

During the period of January 2023 to December 2023, 216 patients presented to the hospital with symptoms suggestive of acute ischemic stroke. 22 patients with acute ischemic stroke who were treated with intravenous thrombolytic agents within 4.5 hours of symptom onset were included in the study. Among all patients who had stroke, few of them presented to a primary care physician who then refer them for further management with or without initial imaging studies. Telephonic information was passed to the hospital regarding the patient with possible symptoms of stroke. In the emergency room, initial evaluation was carried out with extent possible detailed history, monitoring of vital parameters, NIHSS score. CT brain- plain study was done at the earliest if not already done by patient before arriving to the hospital. Those who had systemic blood pressure more than 185/110 were treated with injection labetalol to reduce their blood pressure. The contraindications for IV thrombolysis were ruled out. Informed consent was taken after benefits and potential risks were explained in native language. Injection Tenecteplase 0.25mg/kg, single bolus injection was administered. Patients were then shifted to intensive care unit with monitoring for next 24 hours for any change in GCS, any fluctuation in blood pressure, glycemic control along with other parameters. Later, imaging was again repeated and those who had no evidence of hemorrhage were started on anti-platelet/ anti-coagulant therapy and statin.

Data is collected retrospectively which includes age, gender, comorbid illness, approximate time of symptom

onset, approximate time of symptom onset to thrombolysis, approximate time from door to needle, type of stroke (large vessel disease, small vessel disease, cardio embolic or other etiology) and follow up after 7 days. Statistical analysis was done after recording data in an excel sheet and frequency were analyzed using histogram, pie charts and tables.

## 3. Results

Among 216 patients who presented with acute ischemic stroke during the study period 22(9.8%) patients underwent IV thrombolysis. Males were predominant 19 patients (86.2%), average age was 57.4 year with youngest being 31 years and oldest being 80-years. Patients with age less than 40 years were -3(13.6%), 41-50 were -6(27.2%) and more than 50 years were 14(63.6%).

Hypertension was most common comorbid illness in 12 patients (54.5%) of which 7 (31.8%) were having uncontrolled hypertension requiring anti-hypertensive before thrombolysis. Diabetes was seen in 8(36.3%) of patients, dyslipidemia was seen in 6(27.2%), coronary artery diseases was found in 4(18%), old CVA was seen in 1(4.5%) patients.(Table 1)

**Table 1:** Demographic profile of patients receiving rtPA for acute ischemic stroke.

<b>Number of patients</b>	22
<b>Mean Age (years)</b>	57.4 years
<b>Males (%)</b>	19(86.2%)
<b>Hypertension (%)</b>	12(54.5%)
<b>Diabetes (%)</b>	8(36.3%)
<b>Dyslipidemia</b>	6(27.2%)
<b>Mean NIHSS at presentation.</b>	16
<b>Symptom onset to Door time</b>	146 minutes (approximately)
<b>Door to needle time</b>	49 minutes (approximately)
<b>sICH</b>	3 (13.6%)
<b>mRS ( grade 0-1 ) at day 7</b>	14(63.3%)

Mean NIHSS was 16 at first presentation to hospital, the improvement in NIHSS at 24 hours after IV thrombolysis is seen at approximately 11.3 and after 72 hours of IV thrombolysis is approximately 8.6. The patient with minor stroke (NIHSS < 5) were 1(4.5%) patient, moderate severity of stroke (NIHSS 5-15) were 11(50%), and moderate to severe (NIHSS 15-25) were 10(45.5%). The time from symptom onset to presentation to hospital is approximately 146 minutes. The time from presentation to hospital and IV thrombolysis administration is approximately 49 minutes. The percentage of people who presented to the hospital within 3 hours of symptom onset were 17(77.2%), between 3-4.5hours is 5(22.7%). The percentage of patients who were thrombolysed within 30 minutes were 13(59%), who took more than 30 minutes were 9(41%).

**Table 2:** NIHSS severity among different etiologies of stroke

Etiology	Minor (NIHSS<5)	Moderate (NIHSS 5-15)	Moderate to severe (15-25)
Large vessel occlusion	0	3	9
Small vessel disease	0	4	0
Cardiac embolic	1	3	0
Unknown	0	1	1

Among different etiologies large vessel disease was seen in 12(54.5%), small vessel disease in 4(18%), cardio embolic in 4 (18%), cause was seen or other etiology was seen 2 (9. 5%).Worsening of NIHSS score was found in 6(27.2%). The symptomatic ICH was seen in 3 (13.6%) patients. The improvement in mRS score (grade 0-1) was found in 14(63.3%) patients at 7 days after thrombolysis.(Table 2)

#### 4. Discussion

Stroke is the second leading global cause of death, with 6.6 million deaths from stroke annually, and the third leading global cause of death and disability combined, with over 143 million healthy life years lost each year across the world's population.<sup>18</sup> The advancement in therapeutics like intravenous thrombolysis/ endovascular thrombectomy as effective strategies in treatment of acute ischemic stroke. Intravenous thrombolysis with tissue plasminogen activators has been approved agent of choice in acute stroke within 4.5 hours.<sup>19</sup> India, where a predominant population lives in rural area, the treatment of stroke in these areas is challenging.<sup>5</sup> The awareness of stroke and it's available among the general population, particularly among family physician whose opinion is sought first, who are also the first point of contact for patients will help in specific and prompt management of stroke. This study was carried out at a hospital in Kutch, Gujarat where patients are referred by different physicians in that particular area. This article emphasizes the need for interpersonal communication between patient –doctor, between doctors and judicious use of resources to administer timely treatment in acute ischemic stroke.

The thrombolysis rate was 9.8% in our study. The different studies carried out in India have shown thrombolysis rate around 3.4%<sup>8</sup> to 22%<sup>5</sup> among patients eligible for thrombolysis. This number has been steadily increasing around the country. Studies with Tenecteplase in India as a thrombolytic therapy has shown beneficial effects in acute stroke.<sup>12,14</sup>

There was male predominance -86.3%, in our study. This gender disparity could be attributed to lack of social awareness in population, referral bias among population, financial constraints and reluctance of the family for IV thrombolysis. Such disproportionate results were also seen in other studies.<sup>10,11</sup> Young patients in this study were 13.6%, whereas studies have shown that every fifth patient

of stroke is less than 49 years old.<sup>20</sup>

Hypertension is one of the most common comorbid illness in this study. the prevalence of hypertension in our country is 28.1%<sup>21</sup> and only 8.5% people are on adequate treatment for hypertension. Uniformly studies have shown that hypertension is a major risk factor in stroke. Thus there is need for adequate management of hypertension in individual patients and in overall population in general.

The door to needle time was less than 30 minutes in 13(59 %) patients. American stroke association/ American heart association has recommended the door to needle time <= to 60 minutes.<sup>19</sup> Studies across India have shown Door to needle time ranging from 26.8 minutes<sup>6</sup> to 108 minutes.<sup>5</sup> The comparatively better time taken in our study might be because these patients initially consulted a physician (personally/ telephonically), then they refer them to a stroke center and simultaneously get the imaging of brain done. Thus, as soon as patient enters hospital stroke unit is activated and imaging is available for assessment, thus drastically reducing the time required for administration of rtPA.

The worsening of GCS was seen in 6(27.2%) patients. This is attributable to many factors among them few are symptomatic intracranial hemorrhage, worsening intracerebral edema, seizures, uncontrolled hypertension or myocardial infarction.<sup>22</sup> Symptomatic ICH was seen in 13.6% of patients. Indian studies have shown sICH around 2<sup>15</sup>-17.6%.<sup>13</sup> this could be attributed to large vessel atherosclerotic disease in patients undergoing thrombolysis.<sup>23</sup>

Favorable outcome (mRS score 0-1) was seen in 14 (63.6%) patients at the time of discharge. Similar studies have shown good functional outcome around 50%<sup>13</sup>-79%.<sup>6</sup> This establishes the fact that intravenous thrombolysis in acute ischemic stroke can result on favorable outcomes. Efforts are being made to improve the outcome of stroke at rural areas by developing stroke ready centers in these populations.<sup>22</sup>

Limitation of this study is that the patients in this study were hospital based with majorly referred from physicians of this area thus referral bias and selection bias in data is possible and needs major studies before generalization to common population. Sample size in very low. Many patients were lost to follow up within 3 months thus long term outcomes could not be assessed.

## 5. Conclusion

Intravenous thrombolysis with recombinant tissue plasminogen activator is helpful in acute ischemic stroke within 4.5 hours of onset. Early diagnosis and swift evaluation and management helps in prevention of longterm disability.

## 6. Abbreviations

CT: Computed Tomography; GCS: Glasgow Coma Scale; IV: Intra-Venous; MRI: Magnetic Resonance Imaging; mRS: Modified Rankin Scale; NIHSS: National Institute of Health Stroke Scale; rtPA: recombinant tissue plasminogen activator; sICH: Symptomatic IntraCranial Hemorrhage.

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## 9. Conflict of Interest

None.

## References

- Kamalakkannan S, Gudlavalleti A, Gudlavalleti V, Goenka S, Kuper H. Incidence & prevalence of stroke in India: A systematic review. *Indian J Med Res.* 2017;146(2):175–85.
- Rangamani S, Huliappa D, Kulothungan V, Saravanan S, Murugan PK, Mahadevan R, et al. Stroke incidence, mortality, subtypes in rural and urban populations in five geographic areas of India (2018-2019): results from the National Stroke Registry Programme. *Lancet Reg Health Southeast Asia.* 2023;23:10884975. doi:10.1016/j.lansea.2023.100308.
- Kalita J, Bharadwaz MP, Aditi A. Prevalence, contributing factors, and economic implications of strokes among older adults: a study of North-East India. *Sci Rep.* 2023;13:16880. doi:10.1038/s41598-023-43977-z.
- Warach SJ, Dula AN, Milling TJ. Tenecteplase Thrombolysis for Acute Ischemic Stroke. *Stroke.* 2020;51(11):3440–51.
- Pandian JD, Sethi V, Dhillion R, Kaur R, Padala S, Chakravorty R, et al. Is intravenous thrombolysis feasible in a developing country? *Cerebrovasc Dis.* 2005;20(2):134–6.
- Padma M, Singh M, Bhatia R, Srivastava A, Tripathi M, Shukla G, et al. Hyperacute thrombolysis with IV rtPA of acute ischemic stroke: efficacy and safety profile of 54 patients at a tertiary referral center in a developing country. *Neurol India.* 2007;55(1):46–9.
- Huded V, De Souza R, Nagarajiah RK, Zafer SM, Nair R, Acharya H, et al. Thrombolysis in acute ischemic stroke: Experience from a tertiary care centre in India. *J Neurosci Rural Pract.* 2014;5(1):25–30.
- Pidaparthy L, Kotha A, Aleti VR, Kohat AK, Kandadai MR, Turaga S, et al. Factors influencing nonadministration of thrombolytic therapy in early arrival strokes in a university hospital in. *Ann Indian Acad Neurol.* 2016;19(3):351–5.
- William AG, Pannu A, Kate MP, Jaison V, Gupta L, Bose S, et al. Quality Indicators of Intravenous Thrombolysis from North India. *Ann Indian Acad Neurol.* 2017;20(4):393–8.
- Ramasamy B, Karri M, Varghese AP, George M, Thomas RK, Wilson D, et al. Outcome of thrombolysis with alteplase in acute ischemic stroke. *J Med Sci Clin Res.* 2019;7(3):494–8.
- Veeramalla M, Owais M, Chandrasekhar V. Our Experience with Stroke Thrombolysis at a Tertiary Care Center in South India. *Med J Dr DY Patil Vidyapeeth.* 2020;13(5):437–40.
- Subir A, Krishnadas NC, Ghafoor PF, Rafeeqe M, Rajmohan V. Thrombolysis with novel tenecteplase in acute ischemic stroke: A prospective observational study from a rural tertiary care center in South India. *IP Indian J Neurosci.* 2021;7(2):119–23.
- Khan J, Wani IY, Mufti S, Asimi R. Intravenous thrombolysis in acute ischemic stroke: A prospective cross-sectional observational study in Kashmir. *CHRISMED J Health Res.* 2022;9(1):93. doi:10.4103/cjhr.cjhr\_87\_20.
- Karri M, Ramasamy B. Tenecteplase for Thrombolysis in Acute Ischemic Stroke and Its Outcome—An Indian Experience. *Journal of Stroke Medicine.* 2022;5(1):56–61.
- Sanjeev VK, Thomas AG. Acute ischemic stroke thrombolysis—experience from a rural hospital in Kerala, India. *IP Indian J Neurosci.* 2022;8(1):39–42.
- Shah A, Diwan A. Stumbling Blocks to Stroke Thrombolysis: An Indian Perspective. *Indian J Crit Care Med.* 2023;27(9):616–9.
- Kurhade D, Murthy JM. Thrombolysis in Acute Ischemic Stroke: The Barriers and Delays: A Study from South India (P05.215). *Neurology.* 2012;78(1):P05.215.
- Feigin V, Brainin M, Norrving B, Martins S, Sacco RL, Hacke W, et al. World Stroke Organization (WSO): Global Stroke Fact Sheet 2022. *Int J Stroke.* 2022;17(1):18–29.
- Powers WJ, Rabinstein AA, Ackerson T, Chair V, Ackerson T, Adeoy OM, et al. Guidelines for the Early Management of Patients With Acute Ischemic Stroke: 2019 Update to the 2018 Guidelines for the Early Management of Acute Ischemic Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke.* 2019;50(12):344. doi:10.1161/STR.000000000000021.
- Singla M, Singh G, Kaur P, Pandian JD. Epidemiology of Young Stroke in the Ludhiana Population-Based Stroke Registry. *Ann Indian Acad Neurol.* 2022;25(1):114–9.
- Varghese JS, Venkateshmurthy NS, Sudharsanan N, Jeemon P, Patel SA, Thirumurthy H, et al. Hypertension Diagnosis, Treatment, and Control in India. *JAMA Netw Open.* 2023;6(10):2339098. doi:10.1001/jamanetworkopen.2023.39098.
- Srivastava M, Mehndiratta MM, Kaul S. Expert Consensus on Improving Stroke Care Ecosystem in India. *Journal of Stroke Medicine.* 2024;7(1):30–44.
- Fekete KE, Héja M, Márton S, Tóth J, Harman A, Horváth L, et al. Predictors and long-term outcome of intracranial hemorrhage after thrombolytic therapy for acute ischemic stroke—A prospective single-center study. *Front Neurol.* 2023;14:1080046. doi:10.3389/fneur.2023.1080046.

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