EFFECT OF GLYCOSYLATED HAEMOGLOBIN ON EARLY NEUROLOGICAL DETERIORATION IN ACUTE ISCHEMIC STROKE PATIENTS TREATED WITH INTRAVENOUS THROMBOLYSIS AND FUNCTIONAL OUTCOME IN A TERTIARY CARE CENTRE

Dr Anantha Padmanabhan A (Senior Resident), Dr Ram Mohan K (Professor) , Dr Chithra P (Professor)
Department of Neurology , Government Medical College , Thiruvananthapuram

AIM & OBJECTIVES

- To evaluate the association between baseline HbA1c levels and Early Neurological Deterioration (END) in acute ischemic stroke patients treated with intravenous thrombolysis, as assessed by National Institute of Health Stroke Scale (NIHSS).
- To compare the functional outcome of diabetic and non-diabetic acute ischemic stroke patients treated with intravenous thrombolysis at 3 months of follow up using Modified Rankin Scale (mRS)
- To determine a HbA1c cutoff for predicting Early Neurological deterioration using an ROC curve

MATERIALS & METHODS

STUDY DESIGN: Prospective Cohort study

STUDY SETTING: Department of neurology, Government Medical College Thiruvananthapuram, Kerala

STUDY POPULATION : Acute ischemic stroke patients underwent intravenous thrombolysis in the department of Neurology, Government Medical College Thiruvananthapuram, Kerala.

INCLUSION CRITERIA :

- Age above 18 years
- Patients with a modified Rankin Scale (mRS) score ≤1 prior to stroke onset
- No further endovascular treatment like mechanical thrombectomy or stenting within 24 hours

EXCLUSION CRITERIA :

- Diagnosis of malignant brain tumour
- Severe hepatic or renal dysfunction
- Severe systemic diseases
- Those who are not willing to give consent

STUDY PEROID

- One Year from the date of getting Institutional Ethics Committee clearance.

Sample Size

Primary outcome Expected proportions – Diabetics 52.6% vs Non-diabetics 20%

Assumptions: α = 0.05, Power = 90%

Calculated sample size: 80

Data Collection

Baseline: Demographics, comorbidities (HTN, DM, AF, CAD, smoking, alcoholism)
Stroke severity: NIHSS at admission & 72h
Biochemical: HbA1c , LDL cholesterol
Classification: TOAST criteria, NIHSS , mRS
Diabetes defined by history/medications
Definitions:
END: NIHSS >1 within 72h
Functional outcome: mRS at 90days
→ Good (0–1), Poor (≥2)

MATERIALS & METHODS

Data Analysis

Descriptive statistics: Mean, SD, median, IQR for baseline comparisons

Associations: χ^2 test for categorical variables (e.g., comorbidities, stroke subtypes)

Predictors: Multivariate binary logistic regression → adjusted OR & 95% CI

HbA1c utility: ROC curve → AUC, optimal cutoff, sensitivity & specificity

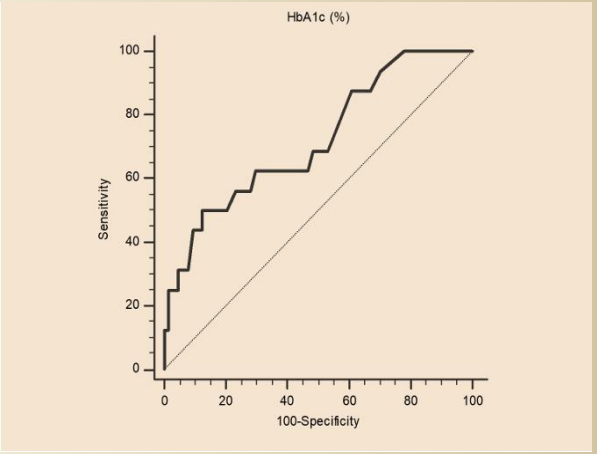
Significance: $p < 0.05$ considered significant

Software: JAMOVI 2.6.26

RESULTS

- Mean HbA1c: **Diabetics 9.3 ± 1.4% vs Non-diabetics 5.2 ± 0.3%**
- Baseline NIHSS: **mean ~11.0 vs 10.7** (no significant difference)
- **END incidence: 16/80 (20%)** experienced END within 72 hr out of which 9 were diabetics and 7 non diabetes
- **90-day outcome (mRS): Good outcome (mRS 0–1): 62.5% non-diabetics vs 37.5% diabetics** (p = 0.025)
- **Predictors of poor 90-day outcome (multivariate):** Age >60 (aOR **4.02**, p=0.013) ,SICH post thrombolysis(aOR-3.1,p=.006) **HbA1c >9.5% (aOR 21.96, p=0.005)**
- **Predictors of END (multivariate): HbA1c (aOR 8.4, p=0.009)**; **Dyslipidemia (aOR 6.5, p=0.023)**; baseline high BP showed a protective effect (aOR 0.06, p=0.024)
- **ROC (HbA1c → END): AUC 0.719**; **cutoff >9.5%** → Sens 50%, Spec 87.5%, NPV 87.5%

DIAGRAMS



95% Confidence interval	0.607 to 0.814
Youden index J	0.375
Optimum cut off	**>9.5**
Sensitivity	50
Specificity	87.5
+LR	4
-LR	0.57
PPV	50
NPV	87.5

DIAGRAMS

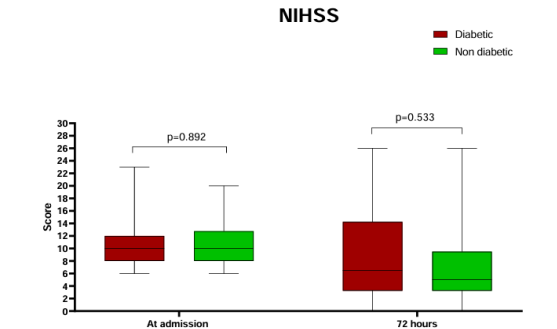


Figure 7: Box plot diagram describing NIHSS score.

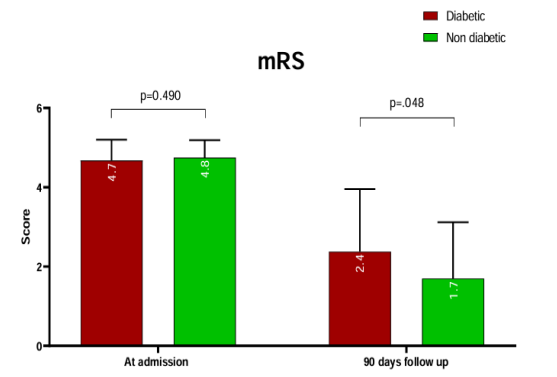


Figure 6: Bar diagram depicting mean mRS at admission and 90 days of follow-up in diabetic and non-diabetic patients

CONCLUSION

- This prospective cohort of 80 thrombolysed AIS patients (40 DM/40 non-DM) found that **chronic hyperglycaemia (HbA1c>9.5%)** sharply increased odds of early deterioration and poor 90-day recovery — even after adjusting for age, ICH and other variables.
- Elevated HbA1c is a **powerful independent predictor** of both **Early Neurological Deterioration (END)** and **poor 90-day outcome** after IV thrombolysis in AIS.
- **HbA1c >9.5%** is particularly associated with adverse outcomes.
- Routine **HbA1c screening** in acute stroke may help risk stratification and guide prognostication.
- Findings highlight the **importance of long-term glycaemic control** in improving stroke recovery.

REFERENCES

- Lin Han, Zhangyan Hou, Mingwei Ma, Dongxue Ding, Dapeng Wang, Qi Fang- Impact of glycosylated haemoglobin on early neurological deterioration in acute mild ischemic stroke patients treated with intravenous thrombolysis 2023 Jan 12:14:1073267.doi: 10.3389/fnagi.2022.107326716
- Role of HbA1c at Admission on Severity and Functional Outcome of Ischemic Stroke in Patients with Diabetes Mellitus January 2016 Journal of Neurology & Neurophysiology 7(3) DOI:10.4172/2155-9562.100037717.
- Wang L, Cheng Q, Huang YW, et al. HbA1c ≥7% predicts poor outcome in acute ischemic stroke: findings from Frontiers in Neurology. 2022;13:999536. DOI: 10.3389/fneur.2022.999536
- Xiong X, Chen M, Li S, et al. Diabetes status modifies thrombolysis outcomes in ischemic stroke. Neurological Sciences. 2021;42(2):545–552. DOI: 10.1007/s10072-020-04774-1
- Diabetes, hyperglycaemia, and acute ischaemic stroke Luitse, Merel JA et al. The Lancet Neurology, Volume 11, Issue 3, 261 – 271