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*Research Article*

# A CORRELATION STUDY OF GLASSGOW COMA SCALE AND NATIONAL INSTITUTES OF HEALTH STROKE SCORE IN ACUTE ISCHEMIC STROKE

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## INTRODUCTION

A stroke, also referred to as a cerebrovascular event, is the sudden onset of a neurologic impairment caused by a targeted vascular aetiology. As a result, the clinical definition of stroke is applied, and to confirm the diagnosis, laboratory procedures including brain imaging are carried out. [1] The first recorded diagnosis of stroke was made by the father of medicine, Hippocrates (460–370 BC), almost 2400 years ago. It was formerly known as apoplexy, which is Greek for "being struck down by violence." According to Johann Jacob Wepfer (1620–1695), apoplexy-related deaths may result in an interruption of blood flow to the brain due to severe bleeding into the brain tissue or clogged arteries. [2] Furthermore, it ranks as the second most prevalent cause of disability globally.[1]

According to World Health Organization (WHO) estimates, 15 million people each year suffer strokes. [3,4] No single outcome measure can describe or predict all dimensions of recovery and disability after acute stroke.[5]

**Severity scores**

In the intensive care unit (ICU), severity ratings are crucial therapeutic adjuncts for stratifying clinical research, assessing the quality of healthcare, and forecasting patient outcomes. They are essential for identifying people who have unexpected results and enhancing treatment choices. Despite the difficulties that prediction models encounter, these models can be effectively used to predict the outcome of the patient.
GCS can be used as a valuable prognostic tool in acute stroke is a simple measure, especially in resource poor countries.[6] Assessment of responsiveness with the Glasgow Coma Scale is widely used to guide early management of patients with any kind of acute brain injury. [7]

The NIHSS scale is a simple, validated, easy-to-apply and reliable tool for assessing mortality and functional outcome of patients with ischemic stroke.[8] The NIHSS score is a good predictor of a patient's recovery after a stroke. Assessment of the patient's neurological impairment at the first presentation of an ischemic stroke can be a guide for the physician regarding the prognosis and treatment plan.[9]

With this background, the present study was taken up to evaluate both the scores and co-relate them with each other in the given study population.

**Aim and Objectives:**

**Aim:**

- To co-relate GCS score with NIHSS scale.
- Objectives:
- To compare the different scoring system used for clinical assessment in patients with acute ischemic stroke.
- To determine the potential risk factors associated with acute ischemic stroke.
- To estimate NIHSS, GCS score in patient diagnosed acute ischemic stroke .

## MATERIAL AND METHODS

Place of Study: The study was conducted in the Department of Emergency Medicine Shridevi Institute of Medical Sciences and Research Hospital, Tumkur.
Study Design: A cross sectional study
Study period: June 2022 – March 2023
Study Population: Patients admitted with stroke to the emergency medicine department of Shridevi institute of medical sciences and research hospital, Tumkuru Karnataka.
Sampling technique: Purposive sampling
Study Sample Size: 40

## METHODOLOGY

Patients with stroke attending Emergency medicine department satisfying the inclusion criteria were enrolled into the study.

**Inclusion Criteria**

- Age group of 50 - 75 years.
- Both the gender.

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- An episode of neurological dysfunction caused by focal cerebral ischemic injury based on symptoms persisting > 24hrs.
- Patients/ Attendants who were willing to give informed consent.

**Exclusion criteria**

- Stroke due to trauma , neoplasm ,active infection, immunosuppression agents, hemotological diseases.
- Previous history of stroke and TIA.
- Patients who are heavily sedated , receiving neuromuscular blocking agents.
- Patients/ Attendants who were not willing to give informed consent.

## Procedure

The patients who satisfied the inclusion criteria were enrolled after written informed consent. All the 40 patients were selected by purposive sampling method. The data was collected prospectively by direct observation in specially designed proforma containing the all the detailed investigations. GCS and NIHSS score are calculated on the first day of admission.

GCS score:

| Behavior | Response | Score |
|---|---|---|
| Eye opening | Spontaneously | 4 |
| | To speech | 3 |
| | To pain | 2 |
| | No response | 1 |
| Best Verbal response | Oriented to time, place and person | 5 |
| | Confused | 4 |
| | Inappropriate words | 3 |
| | Incomprehensible words | 2 |
| | No response | 1 |
| Motor response | Obeys commands | 6 |
| | Moves to localized pain | 5 |
| | Flexion withdrawal of pain | 4 |
| | Abnormal flexion | 3 |
| | Abnormal extension | 2 |
| | No response | 1 |
| Total Score | Best response | 15 |
| | Comatose client | 4-8 |
| | Totally unresponsive | 3 |

NIHSS score:

| | |
|---|---|
| 1a—Level of consciousness | 0 = Alert; keenly responsive<br>1 = Not alert, but arousable by minor stimulation<br>2 = Not alert; requires repeated stimulation<br>3 = Unresponsive or responds only with reflex |
| 1b—Level of consciousness questions:<br>What is your age?<br>What is the month? | 0 = Answers two questions correctly<br>1 = Answers one question correctly<br>2 = Answers neither questions correctly |
| 1c—Level of consciousness commands:<br>Open and close your eyes<br>Grip and release your hand | 0 = Performs both tasks correctly<br>1 = Performs one task correctly<br>2 = Performs neither task correctly |
| 2—Best gaze | 0 = Normal<br>1 = Partial gaze palsy<br>2 = Forced deviation |
| 3—Visual | 0 = No visual lost<br>1 = Partial hemianopia<br>2 = Complete hemianopia<br>3 = Bilateral hemianopia |
| 4—Facial palsy | 0 = Normal symmetric movements<br>1 = Minor paralysis<br>2 = Partial paralysis<br>3 = Complete paralysis of one or both sides |
| 5—Motor arm<br>Left arm<br>Right arm | 0 = No drift<br>1 = Drift<br>2 = Some effort against gravity<br>3 = No effort against gravity<br>4 = No movement |
| 6—Motor leg<br>Left leg<br>Right leg | 0 = No drift<br>1 = Drift<br>2 = Some effort against gravity<br>3 = No effort against gravity<br>4 = No movement |
| 7—Limb ataxia | 0 = Absent<br>1 = Present in one limb<br>2 = Present in two limbs |
| 8—Sensory | 0 = Normal; no sensory loss<br>1 = Mild-to-moderate sensory loss<br>2 = Severe-to-total sensory loss |
| 9—Best language | 0 = No aphasia; normal<br>1 = Mild-to-moderate aphasia<br>2 = Severe aphasia<br>3 = Mute; global aphasia |
| 10—Dysarthria | 0 = Normal<br>1 = Mild-to-moderate dysarthria<br>2 = Severe dysarthria |
| 11—Extinction and inattention | 0 = No abnormality<br>1 = Visual, tactile, auditory, spatial, or personal inattention<br>2 = Profound hemi-inattention or extinction |
| Score = 0–42 | |

Grading of NIHSS scale:

| Grade | Severity |
|---|---|
| 0 | No stroke |
| 1-4 | Minor stroke |
| 5-15 | Moderate stroke |
| 16-20 | Moderate to severe stroke |
| 21-42 | Severe stroke |

## RESULTS

Table showing the demographic details:

| Parameter | Sub group | Frequency | Percentage |
|---|---|---|---|
| Age | 50-59 years | 12 | 30 |
| | 60-69 years | 21 | 52.5 |
| | 70-75 years | 7 | 17.5 |
| Gender | Male | 26 | 65 |
| | Female | 14 | 35 |

Table showing the risk factors of stroke:

| Risk factor | Frequency | Percentage |
|---|---|---|
| Hypertension | 34 | 85 |
| Diabetes | 24 | 60 |
| Smoking | 26 | 65 |
| Hyperlipidemia | 25 | 62.5 |
| Obesity | 21 | 52.5 |

There was a statistically significant difference between the means of GCS and NIHSS based on the outcome with P value of <0.00001. Lower the GCS, lower the chances of survival. Higher the NIHSS, lower were the chances of survival.

Table showing the outcome

| Outcome | Frequency | Percentage | GCS | NIHSS |
|---|---|---|---|---|
| Death | 14 | 35 | 4.25± 3.56 | 34.56± 6.8 |
| Survived | 26 | 65 | 10.54 ± 1.56 | 11.25 ± 4.68 |
| Total | 40 | 100 | <0.00001 | <0.00001 |

Table showing the distribution of the scores based on utcome:

| Group | Subgroup | Total | Survived | Death | Chi square test P value | AUC |
|---|---|---|---|---|---|---|
| GCS | 3-8 | 16 | 2 | 14 | 0.000003 | 0.90 (0.79 -1.01) |
| | 9-13 | 22 | 20 | 2 | | |
| | 14-15 | 2 | 2 | 0 | | |
| NIHSS | 1-15 | 19 | 19 | 0 | 0.0000005 | 0.95 (0.9 -1.01) |
| | 16-20 | 7 | 4 | 3 | | |
| | 21-42 | 14 | 1 | 13 | | |

The AUC for GCS was 0.9 and for NIHSS was 0.95 making NIHSS more accurate than GCS for predicting the outcome.
Figure showing the ROC for GCS:

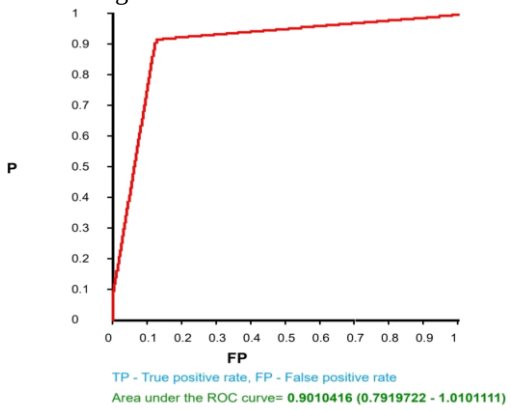
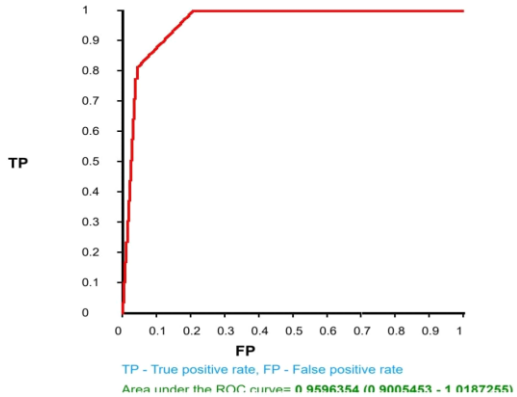



Figure showing the ROC curve for NIHSS




## DISCUSSION

### Demographic characteristics and Risk factors

The present study included 40 patients, out of which majority of them belonged to age group of 60-69 years (52.5%) and were males(65%). The most common risk factor identified was hypertension (85%), followed by smoking (65%), hyperlipidemia (62.5%) and diabetes (60%). The findings of the present study can be compared with the following studies:

In the study done by **Mansour OY *et al* [2015][10],** the mean age was 62.40 ±1.11years (range 25–95) and 53.5% were females. In an another study done by **Dusenbury W *et al* [2023][11].,** the mean age was 62±14 years, with 56% males. The risk factors enlisted in the study were Hypertension (86%), followed by diabetes mellitus (35%), smoking (34%) and hyperlipidemia (32%)

### Outcome

Out of the total study population, 65% survived.
The findings of the present study can be compared with the following studies:
In the study done by **Malviya DK *et al* [2023][12],** 51.2% survived.
In an another study done by **Dusenbury W *et al* [2023][11].,** 76% survived.

### Mean GCS and NIHSS

The mean GCS was 10.54 ± 1.56 and 4.25± 3.56 among the survivors and dead respectively. The mean NIHSS was 11.25 ± 4.68 and 34.56 ± 6.8 among the survivors and dead respectively. There was a statistically significant difference between the means of GCS and NIHSS based on the outcome with P value of <0.00001. Lower the GCS, lower the chances of survival. Higher the NIHSS, lower were the chances of survival.

The findings of the present study can be compared with the following studies:

In the study done by Malviya DK *et al*[2023][12], where in the mean GCS in Death group was 5.56 ± 4.412, mean NIHSS score in Death Group was 32.45±6.486 and the mean of GCS in Survival group was 11.41 ± 4.413, mean NIHSS score in Survival Group was 14.09±8.099.

### Area under Curve

The AUC for GCS was 0.9 and for NIHSS was 0.95 making NIHSS more accurate than GCS for predicting the outcome.

The findings of the present study can be compared with the following studies:

In the study done by Mansour OY *et al* [2023][10], the GCS score had an AUC of 0.86 which is slightly less than the NIHSS score which had the AUC 0f 0.88.

In an another study done by Dusenbury W *et al* [2023][11]., admission NIHSS (C-statistic: 0.91; 95% CI, 0.89–0.93) predicted better than GCS (0.78; 95% CI, 0.75–0.81) discharge poor functional outcome with P value of <0.001
In the study done by Malviya DK *et al* [2023][12], the GCS score had an AUC of 0.886 which is slightly less than the NIHSS score which had the AUC 0f 0.913

## CONCLUSION

GCS and NIHSS were equally predicting the outcomes. The AUC for GCS was 0.9 and for NIHSS was 0.95 making NIHSS more accurate than GCS for predicting the outcome.
Conflicts of Interest: None
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## References

Powers AC, Niswender KD, Evans-Molina C, Jameson JL, Fauci AS, Kasper DL, Hauser SL, Longo DL, Loscalzo J. Harrison's principles of internal medicine, 20e.2020 ;(2):3068

Lyden P, Lu M, Jackson C, Marler J, Kothai R, Brott T, Zivin J. Underlying structure of the National Institutes of Health Stroke Scale: results of a factor analysis. Stroke. 1999 Nov;30(11):2347- 54.

E.D. Murray, N. Buttner, B.H. Price. Depression and psychosis in neurological practice. W.G. Bradley, R.B. Daroff, G.M. Fenichel, J. Jankovic (Eds.), Bradley's neurology in clinical practice, Elsevier/Saunders, Philadelphia (2012), p. 100

S.C. Johnston, S. Mendis, C.D. Mathers. Global variation in stroke burden and mortality: estimates from monitoring, surveillance, and modelling. Lancet Neurol, 8 (4) (2009), pp. 345-354

S.A. Mayer, L.J. Dennis, S. Peery, B.F. Fitsimmons, Y.E. Du, G.L. Bernardini, et al. Quantification of lethargy in the neuro-ICU: the 60-Second Test. Neurology, 61 (4) (2003), pp. 543-545

Miah, Md & Hoque, AKM & Khan, Raihan & Nur, Zannatun & Mahbub, Md. Shahriar & Rony, Rabiul & Tarafder,

Binoy Krishna & Siddique, Md. (2009). The Glasgow Coma Scale following Acute Stroke and In-hospital Outcome: An Observational Study. Journal of Medicine. 10 (Supplement 1). 11. 10.3329/jom.v10i3.2009.

Jain S, Iverson LM. Glasgow Coma Scale. [Updated 2022 Jun 21]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan

Ramachandran K, Radha D, Gaur A, Kaliappan A, Sakthivadivel V. Is the National Institute of Health Stroke Scale a valid prognosticator of the aftermath in patients with ischemic stroke? J Family Med Prim Care. 2022 Nov;11(11):7185-7190.

Ahmed R, Zuberi BF, Afsar S. Stroke scale score and early prediction of outcome after stroke. J Coll Physicians Surg Pak. 2004 May;14(5):267-9. PMID: 15225452.

Mansour OY, Magaded MM, Elghany EHSA. Acute ischemic stroke prognostication, comparison between Glasgow Coma Score, NIHS Scale and Full Outline of UnResponsiveness Score in intensive care unit. Alexandria Journal of Medicine.2015; 51, 247–253

Dusenbury W, Tsivgolis G, Chang J, Goyal N, Swatzell V. Validation of the National Institutes of Health Stroke Scale in Intracerebral Hemorrhage. Stroke: Vascular and Interventional Neurology. 2023;3:e000834

Malviya DK, Thakur SK, Indurkar M, Singh UP, Tilkar M. To Study Compare Glasgow Coma Scale with National Institute of Health Stroke Scale as A Marker of ShortTerm Prognosis in Cerebrovascular Accident Patients in A Tertiary Care Centre, Rewa. Journal of Cardiovascular Disease Research.2023;5(14).

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