

# Original Research Article

## To Study Compare Glasgow Coma Scale with National Institute of Health Stroke Scale as A Marker of Short-Term Prognosis in Cerebrovascular Accident Patients in A Tertiary Care Centre, Rewa

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### ABSTRACT

#### BACKGROUND

Stroke is the 2<sup>nd</sup> largest cause of mortality world over. In the intensive care unit (ICU), severity scales are crucial adjuncts of treatment for anticipating patient outcomes, comparing quality-of-care, and stratification for clinical studies. They're an important aspect of making better healthcare judgments and identifying people with unusual outcomes. This study was conducted to assess and compare GLASGOW COMA SCALE and NIHSS score as predictors of mortality in CVA patients admitted in MICU of Tertiary Care Centre, Rewa.

#### METHODOLOGY

This was a cross sectional, analytical study conducted in the Department of Medicine, Sanjay Gandhi Memorial Hospital (SGMH), associated with Shyam Shah Medical College (SSMC), Rewa, M.P. between January 2020 to June 2021. The GLASGOW COMA SCALE and NIHSS score were calculated for each patient on day of admission and patients were followed-up for a max period of 7 days. The area under ROC curve was used to measure the ability of these scoring systems to forecast the prognosis, in order to find the best dividing value.

#### RESULTS

The mean GCS in Death group was  $5.56 \pm 4.412$ , mean NIHSS score in Death Group was  $32.45 \pm 6.486$  and the mean of GCS in Survival group was  $11.41 \pm 4.413$ , mean NIHSS score in Survival Group was  $14.09 \pm 8.099$ . The GCS score had an AUC of 0.886 which is slightly less than the NIHSS score which had the AUC of 0.913.

#### CONCLUSIONS

GLASGOW COMA SCALE and NIHSS scores have good ability to predict the short-term prognosis of CVA patients, and the combination of these two can provide an even better measure of mortality.

**Key Words:** CVA, GCS, NIHSS, Mortality, ICU

### 1. INTRODUCTION:

The abrupt onset of a neurologic impairment brought on by a focused vascular aetiology is known as a stroke, sometimes known as a cerebrovascular accident. Because of this, the clinical definition of stroke is employed, and laboratory tests such brain imaging are performed to solidify the diagnosis.<sup>1</sup> Approximately 2400 years ago, HIPPOCRATES (460–370 BC), the founder of medicine, recognised stroke for the first time. At first, it was referred to as apoplexy in Greek, which means being struck down by violence. Johann Jacob Wepfer (1620-1695) revealed that significant bleeding into the brain tissue or clogged arteries may cause blood flow to the brain to be interrupted in apoplexy-related deaths.<sup>2</sup> It is also the second most common cause of disability world over.<sup>1</sup>

Severity scales are essential therapy adjuncts in the intensive care unit (ICU) for predicting patient outcomes, comparing healthcare quality, and stratifying clinical research. They are crucial to detecting individuals with unexpected outcomes and improving healthcare decisions. Although the prediction models face a number of challenges, effective use of these models The GCS grading system has been approved for use in neurological patients for benchmarking and predicting mortality.<sup>3</sup> The National Institutes of Health Stroke Scale (NIHSS), or NIH Stroke Scale, is a measure used by healthcare professionals to impartially assess the harm caused by a stroke. The 11 components that make up the NIHSS are graded on a scale from 0 to 4 for various abilities. For

each item, a score of 0 indicates normal function in that specific ability, whereas a higher number denotes some degree of impairment.<sup>4</sup>

In order to identify which of the 2 scoring systems is better at predicting short-term mortality, the following study compares the short-term (7-day) outcome of patients hospitalized with a stroke diagnosis with values from each of the 2 scoring systems. A thorough analysis of the literature reveals that there aren't many studies that compare the above two scores in the Indian medical system, which highlights the significance of this study.

## 2. METHODS

The present cross-sectional analytical study carried out in Medical ICU of Department of Medicine, SGMH, Rewa. 150 consecutive cases of Cerebrovascular accident primarily diagnosed by clinical examination and further evaluated by available Brain imaging modality viz. Computerized Tomography Scan (CT SCAN) & MRI were taken for study during a period from January 2020 to June 2021. Detailed history was taken and thorough examination (general & systemic) of patient, GCS score & NIHSS Scoring were done. Hence clinical diagnosis was made. Informed consent was obtained from each patient.

### Inclusion Criteria

- All patients more than 15 years of age presenting with 1<sup>st</sup> episode of stroke in MICU, SGMH, Rewa.

### Exclusion Criteria

- Patients < 15 years of age
- Patients with prior stroke,
- Patients with Stroke having comorbidities like
  - CKD
  - CLD
  - CAD patients
  - Brain Tumors
  - Post traumatic intra cranial hemorrhage

All patients were selected without any bias of sex. Detailed history was recorded with respect to presenting symptoms, type of exposure and a complete general and systemic examination was carried out.

Patient's proforma was maintained which included the clinicodemographic particulars, investigations of the patients & final calculated GCS & NIHSS scores on the day of admission. The patients were followed up for a period of maximum 7 days. The outcome of the patients at the end of one week was determined as survivors (which includes the deeply comatose patients and patients on ventilatory support or inotropic support at the end of 1 week) and expired (which includes both in hospital and post discharge mortality). The study was approved by Ethical Committee of the institute and informed consent was obtained from every case.

## STATISTICAL METHODS

Data was collected and managed on an excel work sheet and the mean values were calculated and denoted as mean  $\pm$  Standard Deviation. Appropriate Statistical tests were used to determine significance of values. NIHSS & GCS for each patient was correlated with the outcome within the first week and ROC curves for each were obtained using SPSS software. P values of < 0.05 were considered significant.

## 3. RESULTS

**Table 1 - Mean score comparison of CVA patients in survival group and death group**

Outcome	GCS	NIHSS
Death Group (Mean)	5.56 $\pm$ 4.412	32.45 $\pm$ 6.486
Survival Group (Mean)	11.41 $\pm$ 4.413	14.09 $\pm$ 8.099

p<0.001

Above table shows comparison of mean values of GCS score & NIHSS score between death group and survival group of CVA patients in the study. The mean GCS in Death group was 5.56  $\pm$  4.412, mean NIHSS score in Death Group was 32.45 $\pm$ 6.486 and the mean of GCS in Survival group was 11.41  $\pm$  4.413, mean NIHSS score in Survival Group was 14.09 $\pm$ 8.099.

**Table 2: Comparison result of the area under the ROC curve for GCS & NIHSS**

Variable	AUC	SE	95% CI

GCS	0.886	0.0259	0.825 to 0.932
NIHSS	0.914	0.0241	0.858 to 0.953

The GCS has an AUC of 0.886 which is slightly less than the NIHSS score which has the AUC of 0.914

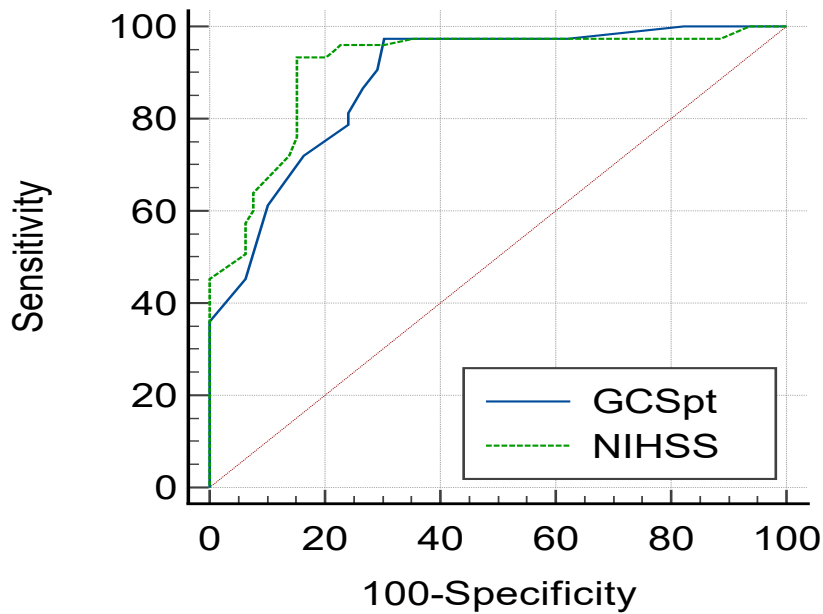


Figure 1: Area under Curve for GCS AND NIHSS

Table 3 - risk of death of the GCS score for subgroups of hospitalized CVA patients

GCS	Death	Survived	Odds of death
3 - 8 (n = 80)	61	19	76.3
9 - 13 (n = 42)	12	30	28.6
14 - 15 (n = 32)	2	30	6.3
Total	75	79	

$\chi^2 = 54.197$   $P < 0.0001$

The above table shows the comparison between the rise in GCS score and risk of death which shows an increasing trend from 76.3 % in 3 to 8 group followed by 28.6 % in 9 to 13 group and the least (6.3%) in the 14 to 15 group. The p-value of the table is  $< 0.0001$ , which means that there is a highly significant association between the variables.

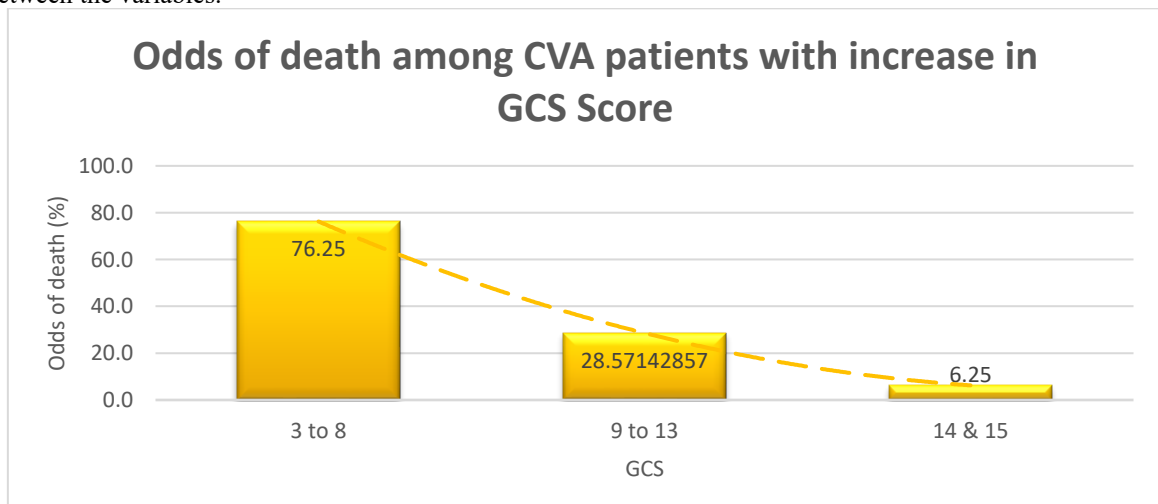


Figure 2: Odds of death among CVA patients

Table 4 - risk of death of the NIHSS score for subgroups of hospitalized CVA patients

NIHSS Scores in each subgroup	Survival	Dead	Odd ratio
0 to 7 (n=11)	9	02	.18
8 to 14 (n=39)	38	-	0
15 to 21 (n=21)	18	03	0.14
22 to 28 (n=16)	03	13	.81
29 to 35 (n=36)	11	25	0.69
36 to 42 (n=32)	-	32	1
<b>Total</b>	<b>79</b>	<b>75</b>	

$X^2 = 96.8247023$  P < 0.0001

The above table shows the comparison between NIHSS scores and the outcome variables in the study namely survival and death. The table shows a rise in the likelihood of death with an increase in the NIHSS scores, with the maximum risk of death if the score was between 36 – 42 (100%), followed by 22 – 28 (81%), 29 – 35 (69%) & least being 8 – 14 (0%).

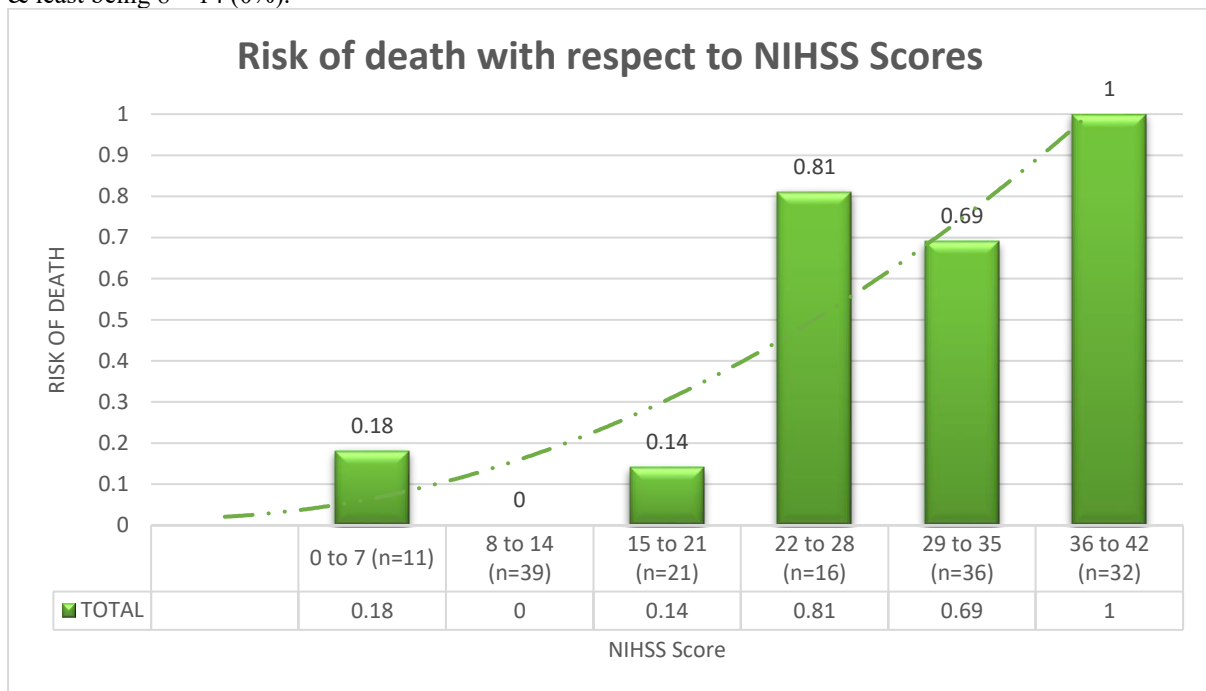


Figure 2: Risk of death of the NIHSS score

4. DISCUSSION

In the present study, the mean values of GCS score & NIHSS score between death group and survival group of CVA patients in the study. The mean GCS in Death group was  $5.56 \pm 4.412$ , mean NIHSS score in Death Group was  $32.45 \pm 6.486$  and the mean of GCS in Survival group was  $11.41 \pm 4.413$ , mean NIHSS score in Survival Group was  $14.09 \pm 8.099$ . This result correlates closely with the results of Mansour OY et al<sup>5</sup>.

In the present study, receiver operating characteristic curve was drawn for GCS & NIHSS score. The GCS score had an AUC of 0.886 which is slightly less than the NIHSS score which had the AUC of 0.914. According to Youden's index, the dividing value for the GCS was 13 and the NIHSS score was 22. These findings are consistent with those of Mansour OY et al<sup>5</sup> & Adams HP et al<sup>6</sup>.

The present study showed an increasing trend of risk of death with respect to Glasgow Coma Scale values, from 76.3 % in 3 to 8 group followed by 28.6 % in 9 to 13 group and the least (6.3%) in the 14 to 15 group. These findings matched with the findings of Reith FC et al<sup>7</sup> & Ghelichkhani P et al<sup>8</sup> who concluded that there is a steady increase in mortality with decrease in GCS values.

The present study shows a rise in the likelihood of death with an increase in the NIHSS scores, with the maximum risk of death if the score was between 36 – 42 (100%), followed by 29 – 35 (69%) & least being 8 – 14 (0%). These results correlated with the study done by Dawodu CO et al<sup>9</sup> which also concluded that there is

increase in morbidity and mortality with an increase in NIHSS scores. In the presents study, the groups of 0 – 7 and 22 – 28 had unusually high mortality which might be due to either late presentation or occurrence of other complications such as recurrence of stroke, hemorrhagic transformation of Ischemic stroke, Acute Kidney Injury, Metabolic Acidosis or dyselectrolytemia after admission.

## 5. CONCLUSION

Based on the comparison of GCS and NIHSS scores, it can be concluded that both are good at predicting the short-term outcome in terms of mortality in stroke patients and should be routinely applied in all stroke patients admitted to the hospital to decide the prognosis and plan the line of management of the stroke patients for proper utilization of hospital and patient resources, as well as timely intervention for better outcomes.

## 6. REFERENCES

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