Original Research Article

"A STUDY TO ASSESS THE RELIABILITY OF INTRACEREBRAL HAEMORRHAGESCORE (ICH SCORE) FOR PREDICTING THE MORTALITY RATE IN ACUTE INTRACEREBRAL HEMORRHAGE PATIENTS"

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ABSTRACT:

Background: Stroke is characterised as the sudden onset of a vascular cause of focal neurological deficit leading to a loss of blood flow to an area of the brain [1]. A stroke can be categorised into a hemorrhagic and ischemic stroke [2].10 percent of all strokes are intracerebral haemorrhage (ICH) [3]. Approximately 45 percent of ICH patients die in the first 30 days

OBJECTIVES: To predict clinical outcome and mortality in patients with acute Intracerebral hemorrhage based on ICH score.

MATERIAL & METHODS:

Study Design: Prospective hospital based observational study.

Study area: Department of General Medicine,Sapthagiri Institute of medical sciences and research centre, Bengaluru

.**Study Period:** October. 2021 – September. 2022

Study population: Patients aged more than18 years with acute Intracerebral hemorrhage, admitted to the wards of the department of General Medicine,Sapthagiri Institute of medical sciences and research centre, Bengaluru.

Study tools and Data collection procedure: Total of 114 patients satisfying inclusion and exclusion criteria were included in the study. They were enrolled in the study only after

obtaining written consent from the patient, in case where patient is not in state to give consent, consent was obtained from the patient's relatives.Patients demographic details, History, Comorbid condition like Type 2 DM and Systemic Hypertension, History of smoking and alcohol consumption. Patient examination including, Blood pressure, GCS score, central nervous system examination was recorded in the proforma sheets.

Results: Mean ICH score was 2.50 ±1.305.10(8.8%) patients had ICH score of 0, 13(11.4%) patients had ICH score of 1, 30(26.3%) patients had ICH score of 2, 40(35.1%) patients had ICH score of 3, 15(13.2%) patients had ICH score of 4, 4 (3.5%) patients had ICH score of 5 and 2(1.8%) patients had a score of 6.

CONCLUSION: This study concludes that ICH score is simple, easy to use and can be easily trained to others. It predicts 30 days' mortality reliably. Individual parameters of ICH by themselves also predicts 30 days' mortality. ICH score can be used as a tool prognosticate a patient with ICH.

Key words: Acute intracerebral hemorrhage, ICH score, and Mortality.

INTRODUCTION:

Stroke is characterised as the sudden onset of a vascular cause of focal neurological deficit leading to a loss of blood flow to an area of the brain [1]. A stroke can be categorised into a hemorrhagic and ischemic stroke [2].

10 percent of all strokes are intracerebral haemorrhage (ICH) [3]. Approximately 45 percent of ICH patients die in the first 30 days [4]. However, better survival is achieved by those who survive the initial phase. The incidence of ICH among Asian and black people is higher [5]. ICH care is supportive, with no proof to justify some form of intervention. Improved results have not been correlated with medical treatments, such as blood pressure, temperature or glycemic regulation, or attempts at recombinant factor VII hemostasis. There is also no substantial gain from surgical treatment, except in patients with posterior fossa haemorrhages > 3 cm who are neurologically affected [6].

Compared to cerebral infarction and subarachnoid hemorrhage, ICH has been associated with greater mortality and morbidity [7]. Families of patients with ICH may opt to restrict or withhold treatment if they face the real prospect of an unfavorable outcome. Consequently, in patients with ICH, removal of treatment is the most common cause of immediate death [4].In patients with acute ischemic stroke, the National Institute of Health stroke scale (NIHSS score) is widely used [9].

There is no clinical grading scale for ICH that is regularly used as part of either clinical treatment or clinical study, despite the presence of many comprehensive prognostic models for outcomes after ICH. ICH Score was developed in 2001 by Hemphill and colleagues, the ICH Score was the first system that was used stratify patients with intracerebral hemorrhage [7].

The ICH score was created in order provide a basic clinical ICH ranking. There are several criteria included in the score which can be easily measured at the time of admission. Apart from clinical criteria, non-contrast CT for all patients was required for the determination of score. The five ICH score parameters include: GCS score, volume of ICH, age >= 80 years,

intraventricular hemorrhage (IVH) presence, position of ICH. For each of these five characteristics, the ICH score was calculated as the number of particular point values [7].

The score for ICH ranged from 0 to 6. The prognosis for hemorrhagic stroke varies according to depending on the hemorrhage's location and duration. The poorer prognosis and higher mortality rate has been associated with lower Glasgow Coma Scale ratings. A greater volume of blood is associated with a worse prognosis at presentation. A poorer functional performance and an increased mortality rate are correlated with the growth in hematoma volume [7].

OBJECTIVES: To predict clinical outcome and mortality in patients with acute Intracerebral hemorrhage based on ICH score.

MATERIAL & METHODS:

Study Design: Prospective hospital based observational study.

Study area: Department of General Medicine, Sapthagiri Institute of medical sciences and research centre, Bengaluru.

Study Period: October. 2021 – September. 2022.

Study population: Patients aged more than18 years with acute Intracerebral hemorrhage, admitted to the wards of the department of General Medicine,Sapthagiri Institute of medical sciences and research centre, Bengaluru.

Sample size: study consisted a total of 114subjects.

Sampling method: Simple Random sampling method.

Inclusion criteria: Patients aged more than18 years with acute Intracerebral haemorrhage, admitted to the wards of the department of General Medicine,Sapthagiri Institute of medical sciences and research centre, Bengaluru.

Exclusion criteria:

• Patients aged < 18 years.

• Patients who underwent surgical evacuation of hematoma.

• Patients with traumatic intracerebral bleed.

• Patients with Subarchanoid hemorrhage, Subdural hemorrhage, Extradural haemorrhage.

• Patients or attenders not giving consent for participating in the study.

Ethical consideration: Institutional Ethical committee permission was taken prior to the commencement of the study.

Study tools and Data collection procedure: Total of 114 patients satisfying inclusion and exclusion criteria were included in the study. They were enrolled in the study only after obtaining written consent from the patient, in case where patient is not in state to give consent, consent was obtained from the patient’s relatives.

Patients demographic details, History, Comorbid condition like Type 2 DM and Systemic Hypertension, History of smoking and alcohol consumption. Patient examination including, Blood pressure, GCS score, central nervous system examination was recorded in the proforma sheets.

At the time of admission, the patient is subjected to non-contrast brain CT. In order to record the location of bleeding and the incidence of intraventricular extension, brain CT scanning has been studied. Using the ABC/2 technique, bleed volume was calculated. In the bedside ABC/2 process, the CT slice with the largest area of haemorrhage was recognized [10,11].

The largest hemorrhage diameter (A) has been measured on this slice. The largest diameter of 90 degrees to A was measured next on the same slice (B). The estimated number of 10 mm slices on which the ICH was seen was eventually measured (C). To measure C, a comparison was used from each CT slice with haemorrhage to the CT slice with the greatest haemorrhage on that scan. The slice for measuring C was considered to be 1 haemorrhage slice if the haemorrhage region for a given slice was greater than 75 percent of the area shown on the slice where the haemorrhage was greatest. If the area was approximately 25 percent to 75 percent of the area, the slice was called half a haemorrhage slice; and if the area was less than 25 percent of the largest haemorrhage, the slice was not considered a haemorrhage slice. These CT haemorrhage slice values were then applied to describe the value for C.

Both measurements for A and B were made by using the centimetre scale on the CT scan to the nearest 0.5 cm. The product was then multiplied by A, B and C and divided by 2, resulting in cubic centimetres of haemorrhage volume (ml).Modified Boston criteria is used for diagnosis of Cerebral amyloid angiopathy

Following investigations are done:

• Complete hemogram

• Renal Function test

• Serum electrolytes

• HIV, HBsAg

• PT INR

• Electrocardiograph

• Chest x ray

• 2D Echocardiography (If required)

• Computed tomography Brain Plain

• MRI Brain (If required)

From the above parameters ICH score was calculated. Mortality at the end of 30days noted. Mortality was compared with ICH score.

Statistical analysis:

Using SPSS 20.0 programme, statistical data analysis was performed. In data analysis, the Chi Square test and the unpaired T test were used and the p value < 0.05 was considered to be

significant.To find a relation between two qualitative variables, Chi square was used and the Unpaired T test was used to find a difference between two mean groups where the group was different from each other.

OBSERVATIONS & RESULTS:

Table No.1: showing Age distribution of patients

Agein Years	Number ofpatients	Percentage
<40	3	2.6
40-59	56	49.1
60-79	46	40.4
≥80	9	7.9
Total	114	100.0

Most patients were within age group of 40 to 59 years, (49.1%) and where as 2.6 % of patient were less than 40 years.Mean age in this study was 61.18±12.901 years.

Table No.2: Gender distribution of patients

Sex	Numberofpatients	Percent
Male	65	57.0
Female	49	43.0
Total	114	100.0

Among 114 patients, 65 (57%) were male and rest were female.

Table No.3: Distribution of patient based on ICH score

ICH score	Numberofpatients	Percent
0	10	8.8
1	13	11.4
2	30	26.3
3	40	35.1
4	15	13.2
5	4	3.5
6	2	1.8
Total	114	100.0

Mean ICH score was 2.50 ±1.305.10(8.8%) patients had ICH score of 0, 13(11.4%) patients had ICH score of 1, 30(26.3%) patients had ICH score of 2, 40(35.1%) patients had ICH score of 3, 15(13.2%) patients had ICH score of 4, 4 (3.5%) patients had ICH score of 5 and 2(1.8%) patients had a score of 6.

Table No.4: Distribution of patient based on Size of hemorrhage

Sizeofhemorrhage	Numberofpatients	Percent
<30ml	49	43.0
≥30ml	65	57.0
Total	114	100.0

In this study, number of patient with Size of hemorrhage of ≥30ml were 65(57%).

Table No.5: Distribution of patient based on location of bleed

Locationofbleed	Numberofpatients	Percent
Thalamic	19	16.7
Basalganglia	60	52.6
Lobar	11	9.6
Cerebellum	17	14.9
Pons	7	6.1
Total	114	100.0

In this study, number of patient with Thalamic bleed were 19(16.7%), with Basal ganglia bleed were 60(52.6%), with Lobar bleed were 11(9.6%), with cerebellum bleed were 17(14.9%) and those with Pontine bleed were 7(6.1%).

Table No.6: Distribution of patient based on cause of ICH

	Numberofpatients	Percent
Hypertension	108	94.7
AV Malformation	2	1.8
Coagulopathy	2	1.8
ProbableCerebralAmyloidosis	2	1.8
Total	114	100.0

In this study, in 108 patients Hypertension was cause of ICH, in 2 patients AV Malformation was cause of ICH, in 2 patients Coagulopathy was cause of ICH and in 2 patients Probable Cerebral Amyloidosis was the cause of ICH.

Table No.7: Outcome at the end of 30 days of follow up

Outcome	Numberofpatients	Percent
Survivor	52	45.6
Death	62	54.4
Total	114	100.0

In this study number of patient who survived were 52(45.6%) and those who died were 62(54.4%).

Table No.8: Outcome in comparison with ICH score

			Survivor	Death	Total
ICH score	0	NumberofPatient	10	0	10
		%	19.2%	0.0%	8.8%
	1	NumberofPatient	13	0	13
		%	25.0%	0.0%	11.4%
	2	NumberofPatient	22	8	30
		%	42.3%	12.9%	26.3%
	3	NumberofPatient	6	34	40
		%	11.5%	54.8%	35.1%
	4	NumberofPatient	1	14	15
		%	1.9%	22.6%	13.2%
	5	NumberofPatient	0	4	4
		%	0.0%	6.5%	3.5%
	6	NumberofPatient	0	2	2
		%	0.0%	3.2%	1.8%
Total		NumberofPatient	52	62	114
		%	100.0%	100.0%	100.0%

Chi-square – 66.03, p value – <0.001

In this study all patients with score of 5 and 6 died. With score of 2, 8 out of 30 patients died.With score of 3, 34 patients out of 40 died. With score of 4, 14 patients out of 15 died. All patients with score 0 and 1 survived.Outcome in comparison with ICH score was statistically significant with p value of <0.001.

Table No.9: Outcome in comparison with location of bleed

			Survivor	Death	Total
Location ofbleed	Thalamus	NumberofPatient	17	2	19
		%Patient	32.7%	3.2%	16.7%
	Basalg anglia	NumberofPatient	20	40	60
		%Patient	38.5%	64.5%	52.6%
	Lobar	NumberofPatient	9	2	11
		%Patient	17.3%	3.2%	9.6%
	Cerebellu m	NumberofPatient	6	11	17
		%Patient	11.5%	17.7%	14.9%
	Pons	NumberofPatient	0	7	7
		%Patient	0.0%	11.3%	6.1%
Total		NumberofPatient	52	62	114
		%Patient	100.0%	100.0%	100.0%

Chi-square – 30.79, p value – <0.001

In this study 2 out of 19 patients with thalamic bleed died, 40 out of 60 patients with basal ganglia bleed died, 2 out of 11 patients with lobar bleed died, 11 out 17 patients cerebellar

bleed died and all 7 patients with pontine bleed died.Outcome in comparison with location of bleed was statistically significant with p value of<0.001.

Table No.10: Outcome in comparison with size of hemorrhage

			Survivor	Death	Total
Size ofhemorrhage	<30ml	Number ofPatient	30	19	49
		%Patient	57.7%	30.6%	43.0%
	≥30ml	Number ofPatient	22	43	65
		%Patient	42.3%	69.4%	57.0%
Total		Number ofPatient	52	62	114
		%Patient	100.0%	100.0%	100.0%

In this study 43 out of 65 patients with size of bleed ≥30ml died.Outcome in comparison with size of hemorrhage was statistically significant with p value of 0.03.

DISCUSSION:

Sample size in this study was 114 which is almost similar to sample size taken in Piyush Ojha et al [12] study with sample size of 120.Gender distribution of patient in this study, males were 65 and females were 49 and this is similar to gender distribution seen in Muhammad Aslam et al [13] and Sombat et al [14] study. 30-day mortality rate in this study was 54.3%. Mortality rate at the end of 30 days in other studies ranged from 35 to 52%. So mortality rate was slightly higher in our study as compared with other studies.

Mean age of the patients in this study was 61.18±12.901 years which is about 5 to 7 years less as compared with other studies like Piyush Ojha et al[12], Anil Kumar et al[15], Muhammad Aslam et al[13] and Sombat et al[14].

In this study all patients with ICH score of 5 and 6 died. Those with ICH score of 2, 8 out of 30 patients died. Those with ICH score of 3, 34 patients out of 40 died. Those with ICH score of 4, 14 patients out of 15 died. All patients ICH score of 0 and 1 survived. These results are similar to those observed in studies of Piyush Ojha et al[12] and Sombat et al[14].

In this study mortality outcome in comparison with ICH score was statistically significant with p value of <0. 001.This statistical significance was seen in Piyush Ojha et al[12], Anil Kumar et al[15], Muhammad Aslam et al[13] and Sombat et al[14] studies.

In this study number of patient with age of ≥80years who died were 9(7.9%).Mortality outcome based on age ≥80year was statistically significant with p value of 0.03. This statistical significance was not observed in Piyush Ojha et al[12], Anil Kumar et al[15], Muhammad Aslam et al[13] and Sombat et al[14] studies. However original study carried out by Hemphill et al[7] showed mortality outcome based on age ≥80year as statistically significant.

In this study 43 out of 65 patients with size of bleed ≥30ml died. Outcome in comparison with size of hemorrhage was statistically significant with p value of 0.03.This statistical significance was seen in Piyush Ojha et al[12], Anil Kumar et al[15] and Hemphill et al[7] studies.

In this study 33 out of 65 males died and 29 out of 49 females died.Outcome in comparison with Gender was not statistically significant with p value of 0.241. This statistical significance was not seen Piyush Ojha et al[12], Anil Kumar et al[15], Muhammad Aslam et al[13] and Sombat et al[14] studies.

CONCLUSION:

This study concludes that ICH score is simple, easy to use and can be easily trained to others. It predicts 30 days' mortality reliably. Individual parameters of ICH by themselves also predicts 30 days' mortality. ICH score can be used as a tool prognosticate a patient with ICH. Most common site of ICH was Basal ganglia while most common cause was Hypertension. The mortality rate in this study was 54.3%. Mortality rate in this study was slightly higher as compared with other study. ICH score may be used as tool to make treatment guideline and clinical research in patients with ICH.

REFERENCES:

1. Markus H et al. Stroke: causes and clinical features. Medicine (Baltimore). 2008 Nov 1; 36(11):586–91.

2. Broderick J P, Brott T, Tomsick T, Miller R, Huster G et al. Intracerebral hemorrhage more than twice as common as subarachnoid hemorrhage. J Neurosurg. 1993; 78: 188– 11.

3. Rymer M M et al. Hemorrhagic Stroke: Intracerebral Hemorrhage. Mo Med. 2011; 108(1):50–4.

4. Aguilar M I, Brott T G et al. Update in Intracerebral Hemorrhage. The Neurohospitalist.

2011 Jul; 1(3):148–59.

5. Mehta RH, Cox M, Smith EE, Xian Y, Bhatt DL, Fonarow GC, et al. Race/Ethnic Differences in the Risk of Hemorrhagic Complications Among Patients With Ischemic Stroke Receiving Thrombolytic Therapy. Stroke. 2014 Aug; 45(8):2263–9.

6. Fischer MA, M Das J et al. Cerebellar Hematoma. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020

7. Hemphill J. Claude, Bonovich David C., Besmertis Lavrentios, Manley Geoffrey T., Johnston S. Claiborne et al. The ICH Score. Stroke. 2001 Apr 1; 32(4):891–7.

8. Ralph L, Kasner Scott E, Broderick Joseph P, Caplan Louis R, Connors J.J. (Buddy), Culebras Antonio et al. An Updated Definition of Stroke for the 21st Century. Stroke. 2013 Jul 1; 44(7):2064–89.

9. Chalos Vicky, Van der ende Nadinda A.M, Lingsma Hester F, Mulder Maxim J.H.L, Venema Esmee, Dijkland Simone A et al. National Institutes of Health Stroke Scale. Stroke. 2020 Jan 1; 51(1):282–90.

10. Huttner HB, Steiner T, Hartmann M, et al. Comparison of ABC/2 estimation technique to computer-assisted planimetric analysis in warfarin-related intracerebral parenchymal hemorrhage. Stroke 2006; 37(2): 404-8.

11. Kothari RU, Brott T, Broderick JP, et al. The ABCs of measuring intracerebral hemorrhage volumes. Stroke 1996; 27(8): 1304-5.

12. Ojha P, Sardana V, Maheshwari D, Bhushan B, Kamble S, et al. Clinical Profile of Patients with Acute Intracerebral Hemorrhage and ICH Score as an Outcome Predictor on Discharge, 30 Days and 60 Days Follow-up. J Assoc Physicians India. 2019 Aug 1; 67:14–8.

13. Aslam Rind M, sheikh M, lakhair MA, Nazir M, Sheikh S, et al. Validity of intracerebral haemorrhge score in predicting prognosis of hemorrhagic stroke. Pak J Neurol Sci PJNS. 2016 Jan 1; 11(1):7–12.

14. Muengtaweepongsa, Sombat & Seamhan, Bancha, et al. (2013). Predicting mortality rate with ICH score in Thai intracerebral hemorrhage patients. Neurology Asia. 18. 131-135.

15. Anil Kumar, Madhuri Meena, Y.K. Sanadhya, et al. To assess the reliability of ICH score for predicting the mortality rate in acute intracerebral hemorrhage patients, in a rural based hospital, Jhalawar. IAIM, 2018; 5(7): 1-7.