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Assessment of Intracerebral Haemorrhage prognosis with Intracerebral Haemorrhage Score

[1]Dr Pooja Dholakiya, Resident, Department of General Medicine, Bharati Vidyapeeth(Deemed to be University) Medical College,Pune.

[2]Dr V.P. Singh, Professor, Department of General Medicine, Bharati Vidyapeeth(Deemed to be University) Medical College, Pune.

[3]Dr S. P. Gorthi, Head and Professor, Department of Neurology, Bharati Vidyapeeth(Deemed to be University) Medical College, Pune.

Corresponding Author: Dr Pooja Dholakiya, Resident, Department of General Medicine, Bharati Vidyapeeth (Deemed to be University) Medical College, Pune.

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Abstract

Background: In the entire world, intracerebral haemorrhage (ICH) is one of the main causes of mortality and disability. It is crucial to have a scale model that can reliably predict the prognosis of ICH for prompt management. The ICH score is one of the most widely applied scale models that have been created so far. In order to predict outcomes and mortality in ICH patients, it is necessary to evaluate the validity and reliability of the ICH score. Main goal of this study is to ascertain if the ICH Score accurately stratifies patients with acute ICH in relation to their functional prognosis after 30 days.

Method: It was a prospective observational study. Total 71 patients with diagnosed ICH on neuroimaging were analyzed. ICH and modified ICH scores were calculated. Blood pressure, blood sugar level, temperature were monitored. All patients were followed up on day 7 and day 30.

Results: Out of 71 patients, total 22 patients had with ICH score of equal or greater than 3. All those patients had poor outcome measured by modified rankin scale. Rest of the patients with less than 3 ICH score had good prognosis. Also, higher systolic blood pressure and hyperglycemia were associated with poor prognosis.

Conclusion: ICH score is useful in predicting the 30-day mortality. Modified ICH score was equally valuable in accurately measuring the prognosis. ICH score should be calculated in all patients for assessing the prognosis of patients. High Blood pressure and blood glucose level

should be vigorously monitored and adequately treated for better outcome.

Keywords: Intracerebral haemorrhage, ICH score, Hypertension

Introduction

Spontaneous intracerebral haemorrhage is described as a spontaneous blood artery rupture resulting in a bleeding within the brain parenchyma. Non-traumatic intracerebral haemorrhage (ICH), which accounts for 7.5–30% of all strokes, is the second most frequent type of stroke. [1,2] There are two categories of spontaneous ICH: primary and secondary. About 78 to 88% of non-traumatic ICH is classified as primary, which results from systemic hypertension or cerebral amyloid angiopathy. Secondary causes of ICH are tumours, hemorrhagic transformation of cerebral infarcts, aneurysms, vascular malformations, and coagulopathy. [3]

Worldwide, spontaneous intracerebral haemorrhage (ICH) causes a large amount of illness and mortality. The 30-day mortality rate for ICH is the worst of any stroke subtype, at 40–50%. Compared to the west, India has a greater incidence of ICH. Population-based research revealed that with the right medical care, the majority of individuals with minor ICH might survive. Thus, receiving prompt medical treatment has a powerful and immediate impact on the morbidity and mortality of ICH. Numerous scores, including the ICH score, the modified ICH score, the mICH, the ICH-grading scale score, the FUNC score, the new ICH score, the Essen score, and the simplified ICH score, have been created so far for the assessment of ICH and to predict the functional result of ICH.

In the Western world, the ICH score is widely acknowledged as a useful indicator of the prognosis of ICH. However, very few Indian research studies have evaluated its effectiveness among Indian population. Despite being widely used, the ICH Score's accuracy in classifying patients according to long-term functional outcome has not been thoroughly tested.

Main goal of this study is to ascertain if the ICH Score accurately stratifies patients with acute ICH in relation to their functional prognosis after 30 days as measured by the modified Rankin scale.

Method

It was a prospective observational study done in a tertiary care centre in western Maharashtra. All the patients admitted in hospital with diagnosed ICH on CT brain scan with age above 18 years were included in the study. All patients with known case of bleeding disorder, history of recent head trauma, documented A-V malformation, aneurysm or cerebral neoplasm as the underlying cause of ICH Premorbid organ failure or disability, hemorrhagic transformation of cerebral infarct were excluded from the study.

Detailed history, physical examination, neurological examination was done of every patient. All the patients underwent for NCCT/ MRI of brain. ICH Score and modified ICH score was calculated on admission based on age of patient, location of bleed, GCS of the patient, Intraventricular extension and ICH volume (Calculated by ABC/2 method). The patients were treated as per the standard guidelines for the management of spontaneous ICH issued by American Heart Association and American Stroke Association 2015. All the patients were treated in the neurocritical care unit till they got stabilized. Blood pressure, blood glucose level and temperature were monitored. All patients were followed up on day 30 day of enrollment in the study and outcome was assessed using modified Rankin Scale.

Study definitions:

Hyperglycemia- random blood sugar level >140 mg/dl

Hypertension – blood pressure >= 140/90 mm hg

Hyperthermia – temperature > 99.5 F

ICH Score

	Finding	Points
GCS	3-4	2
	5-12	1
	13-15	0
AGE	>=80	1
	<80	0
LOCATION OF ICH	INFRATENTORIAL	1
	SUPRATENTORIAL	0
ICH VOLUME	>=30 ML	1
	<30 ML	0
Intraventricular bleed	YES	1
	NO	0
ICH SCORE		0-6 Points

Modified ICH Score: Instead of GCS, NIHSS was included given the following point : 0-10: 0 points, 11-20: 1 point, and 21-40: 2 points. The remaining items were the same as those in the original ICH Score.

Results

The study was conducted over the time period of 18 months in a tertiary care centre. We have studied total 71 patients with spontaneous non traumatic ICH who have fulfilled the inclusion criteria. Data was collected as per the clinical profoma. Data was analysed and results are concluded here.

Out of 71 patients, majority of cases (47.89%) were observed in the age group of 56-75 years, followed by 40.85% patients with age group of 35 to 55 years. Mean age was 56.51± 12.24 years. Out of a total 71 patients of ICH, 48 patients (67.6%) were male and 23 patients (32.4%) were female.

Among 71 patients, 36 were known to have co-morbidities and other 35 patients had no co-morbidities. Hypertension was observed most commonly with 69% of total patients. Hyperglycemia and dyslipidemia were observed in 43.7% and 33.8% respectively. Assessment of prognostic factors like hypertension, hyperglycemia, dysphasia and hyperthermia was done and outcome was measured on day 7 and day 30 of follow up. In the study, a statistically significant difference was observed between hyperglycemia, higher SBP and poor outcome within 30 days. Results were statistically significant at p value < 0.05 shown in table below.

Table 1: Correlation of Modified Rankin scale with Hyperglycemia

Mann Whitney U Test				
	Hyperglycemia	N	Median (IQR)	p-value
Modified Rankin Scale	Yes	31	1(4-6)	0.01
	No	40	2(1-3)	
	Total	71		

Most common location of ICH observed was basal ganglia (38.2%) followed by lobar (25.4%), thalamus (21.12%), cerebellum (7%), pons (4.2%), corona radiata (2.8%) and midbrain (1.4%).

In our study, out of total 71 patients with ICH only 7 patients (9.8%) underwent neurosurgical intervention. Rest of the 64 patients were managed with medical treatment only. 1 patient who underwent surgical procedure died within 30 days. Total 13 patients died during hospitalization.

Table 2: Distribution of cases according to ICH score

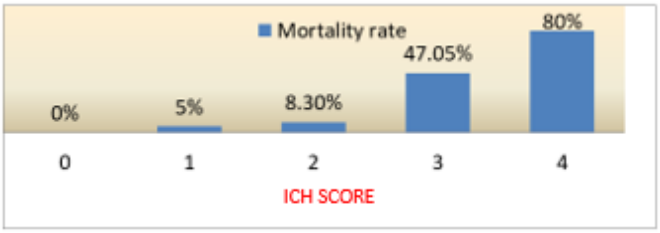
ICH SCORE	Number of patients	Percentage (%)
0	17	23.94
1	20	28.16
2	12	16.9
3	17	23.94
4	5	7.04

The above table shows the distribution of patients according to ICH score, which was calculated at the time

admission. 20 patients (28.16%) had ICH score of 1 while 17 patients (23.94%) had ICH score of 0 and 3 each followed by 12 patients(16.9%) with score of 2 and only 5 patients (7.04%) with score of 4. In the study no patients were found to have ICH score 5 and 6.

Mortality rate with different ICH scores was assessed. It was observed that with the increasing ICH score, mortality rate also increases.

Figure 1: Mortality rate of patients with different ICH score



The correlation between GCS and NIHSS which were calculated at the time of admission, with modified rankin scale. In the study, there was statistically significant correlation was observed with GCS, NIHSS and modified rankin scale which showed that low GCS and high NIHSS were associated with poor outcome. Statistically significant correlation was observed between ICH score and modified ICH score with modified rankin scale.

Table 3: Correlation of modified ranking scale, modified ICH score and ICH score

Correlations					
			Modified ranking scale	Modified ICH score	ICH score
Spearman's rho	Modified rankin scale	Correlation Coefficient	1.000	.623**	.739**
		Sig. (2-tailed)		0.000	0.000
		N	71	64	71
	MODIFIED ICH score	Correlation Coefficient	.623**	1.000	.954**
		Sig. (2-tailed)	0.000		0.000
		N	64	64	64
	ICH score	Correlation Coefficient	.739**	.954**	1.000
		Sig. (2-tailed)	0.000	0.000	
		N	71	64	71
**. Correlation is significant at the 0.01 level (2-tailed).					

Discussion

India has a different pattern and demographics for ICH. In contrast to western populations, where the typical age range is 70–79 years, incidence is more prevalent in younger age groups here. Hypertensive ICH strikes Indians 15 to 20 years earlier than it does in western countries. In our study 71 patients with an average age of 56.51 years were included. The age range of 56 to 75 years has the most patients among them. Patients over 75 years old made up just 8.4% of the population.

In our study, we also examined the relationship between SBP, DBP, body temperature, and random blood sugar with outcome at day 30. Hypertension is the most significant modifiable risk factor. At the time of presentation, 69% of the patients overall had hypertension. Higher values of SBP were associated with increased mortality, according to stepwise multivariate analysis. Similar findings were seen in another study by Fogelholm R et al. [4] Additionally, our study found that elevated blood sugar levels resulted in worse results. Our results were consistent with findings of Tapia-Perez JH et al, which showed that initially elevated glucose levels and elevated glucose levels within 24 hours of the onset of ICH were related to worse outcomes and may have been caused by altered blood glucose metabolism due to inflammatory cell activation. [5]

Our study demonstrated a favourable association between the GCS and NIHSS score and the prognosis of ICH patients. Modified rankin scale (mRS), the most widely used outcome measure in stroke trials, was utilized to measure the outcome. Poor results were seen after 30 days for patients with low GCS at the time of admission. In our study, the ICH and modified ICH scores were computed at the time of admission, and the outcome was assessed using the modified rankin scale. Patients with high ICH and modified ICH scores had poor outcomes. 13 patients passed away in the hospital overall over the course of the process. All of them had an ICH score of greater than three, whereas 8 patients had modified ICH scores of greater than three, 1 patient had a score of two, and it was impossible to compute for 4 intubated patients. All 22 patients with ICH score and modified ICH score of greater than or equal to 3 had a bad prognosis with mRS of 5/6. A number of ICH prognostic models have already been developed and evaluated. These models have discovered a variety of features that are related to outcome based on measurements of mortality and functional outcome. As described in studies by Turhim S et al. and Lisk DR et al., [6,7] hematoma volume and level of consciousness at the time of hospital admission have typically been the most accurate predictors of prognosis. In a study, Cheung RT et al. [8] investigated if altering the initial ICH Score would result in better projections of morbidity and death. According to our study, both the original and modified ICH scores accurately predict mortality.

The standardization of clinical research protocols and treatment methods in ICH may be enhanced by the adoption of a scale like the ICH Score.

Conclusion

In conclusion, a separate cohort of ICH patients confirms the usefulness of original ICH Score in predicting 30-day mortality. Modified ICH score, however, is equally valuable in assessing ICH. Anyhow, calculating the ICH score is simpler than modified ICH score. Additionally, according to our findings, GCS and NIHSS may each function independently as a predictor of a favourable or deadly outcome in ICH patients. Age,

male gender, prior stroke history, high systolic blood pressure, and hyperglycemia have all been proven to be poor prognostic indicators that are associated with worse outcomes. Blood pressure and blood glucose level should be monitored and corrected. To conclude, in order to evaluate the outcome of ICH early and for its better management, ICH score should be used in daily practice by clinicians.

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