ORIGINAL RESEARCH PAPER

Medicine

ROLE AND VALIDITY OF ICH SCORING IN PRIMARY INTRACEREBRAL HAEMORRHAGE PATIENTS FOR PREDICTION OF MORTALITY AND FUNCTIONAL OUTCOMES IN 30 DAYS TO 1 YEAR FOLLOW UP

KEY WORDS: ICH score, ICH , CVA, MRS score

Sarata Chandra Singh Associate Professor, Department of Medicine, SCB Medical College

Sashmi Prabha Sethi Junior Resident, Department of Medicine, SCB Medical College

Mamta Singh Assistant Professor ,Department of Radiodiagnosis, SCB Medical College.

Ravi Ranjan Kindo* Junior Resident, Department of Medicine, SCB Medical College *Corresponding Author

ABSTRACT

Primary ICH is a spontaneous brain haemorrhage mainly due to hypertension and atherosclerosis having higher mortality and morbidity. The aim of the study was to find out the role and validity of ICH scoring in primary ICH patients for prediction of mortality and funtional outcomes in 30 days to 1 year follow up. A prospective observational cohort study was conducted in 100 Primary Intracerebral hemorrhage patients who were physically examined and routinely investigated along with CT scan or MRI to locate the area of stroke and ICH volume and were followed up daily during the hospital stay and regularly thereafter until 30 days and 1 year in whom Functional outcomes were determined by modified Rankin's scale. The mortality and the major disability dependency was higher in high ICH score with p<0.001, p<0.001 and p<0.001 for mortality and p<0.001, p<0.03, p<0.003 for major disability dependency in hospitalized patient , 30-day and 1 year follow up respectively. The ICH Score is a valid clinical grading scale and good predictor of mortality and functional outcomes.

INTRODUCTION:

Primary Intracerebral Hemorrhage(ICH) is the often devastating "spontaneous" brain hemorrhage which is predominantly a result of chronic hypertension and degenerative changes in cerebral arteries. It has higher risk of morbidity and mortality than cerebral infarction or subarachnoid hemorrhage .

AIMS AND OBJECTIVES: To assess the clinical status of ICH patient through GCS and MRS grading and predict the outcome on the basis of ICH score.To study the role of ICH score for prediction of mortality and functional outcomes in ICH patient in 30 days to 1 year follow up.

METHODS: A prospective observational cohort study was conducted in 100 Primary Intracerebral hemorrhage patients who were admitted to the Department of medicine, SCB medical college, Cuttack from October 2016 to October 2018. A detailed physical examination including neurological examination was done in all patients. Apart from routine investigations, CT scan or MRI was done in all patients to locate the stroke and ICH volume was measured. GCS was calculated in all patients to assess the clinical status at the time of admission. Then ICH Score was calculated basing on GCS, ICH volume, presence of intraventricular hemorrhage (IVH), age and infra/supra tentorial location. All the patients were followed up daily during the hospital stay and regularly thereafter until 30 days and 1 year. Functional outcomes of all patients were determined by modified Rankin's scale at the time of admission, after 30days follow-up, 1year follow-up.

RESULTS:

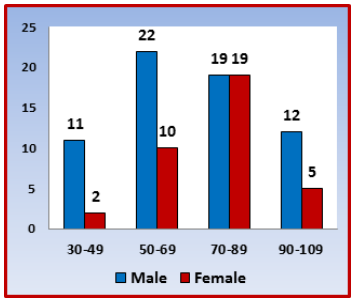

Fig-1 : Distribution of cases according to Age and Sex

Maximum patients were from the age group of 70-89 year with the average age of 68.38 years ± 16.177. On examination Maximum patients had altered sensorium, followed by hemiparesis or hemiplegia. Supratentorial location of ICH was more common than Infratentorial location. Among Supratentorial location of ICH most lesion were localized in the basal ganglia and internal capsule region.

The mean ICH volume is 22.562 CC ± 12.513. The in-hospital, 30 days, 1 year mortality of ICH patients was 52%, 55% and 58% respectively. The median ICH score for total 100 ICH patients, survivors, non-survivors is 3, 1, and 4 respectively. In hospital mortality, 30-days mortality, 1 year mortality is high with high ICH score and mortality is low with low ICH score with p<0.001, p<0.001 and p<0.001 respectively.

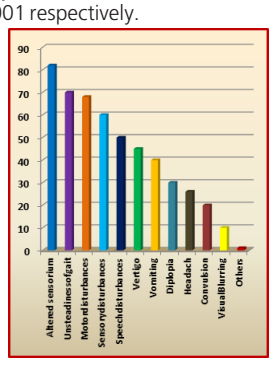

Fig-2:Clinical manifestation

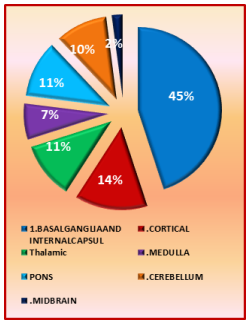

Fig-3: Site of ICH

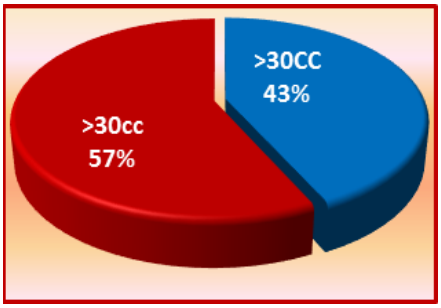

Fig-4 : ICH VOLUME

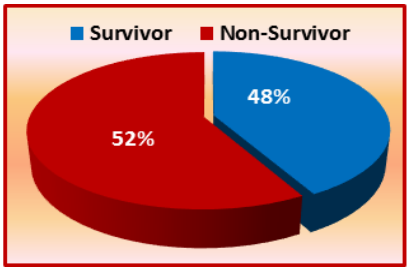

Fig-5: In hospital mortality

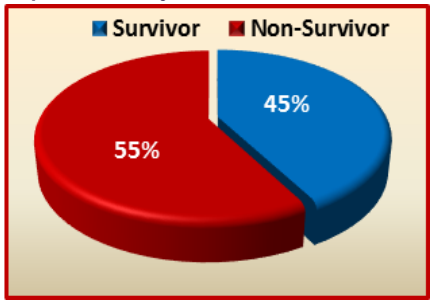

Fig-6: 30-days mortality

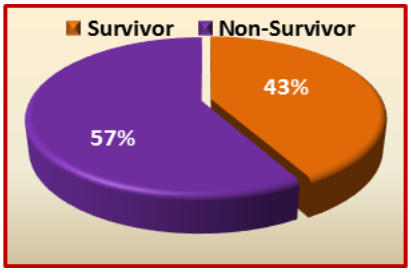

Fig-7: 1 year mortality

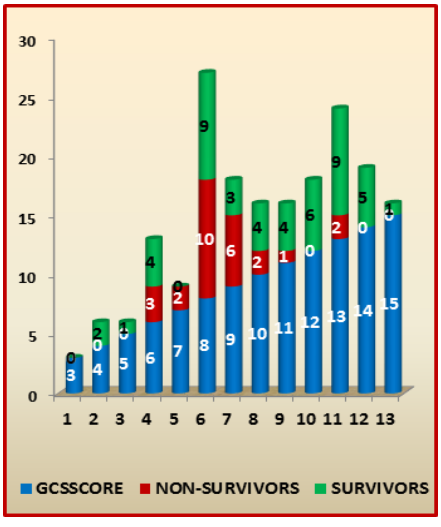

Fig-8:Comparision of GCS score with survivors and non survivors

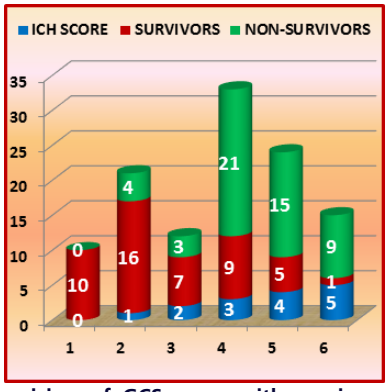

Fig-9:Comparision of GCS score with survivors and non survivors

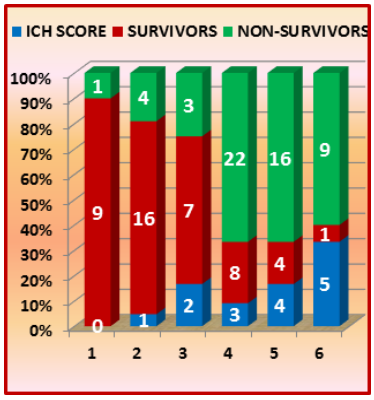

Fig-10:Comparision of ICH score with survivors and non survivors

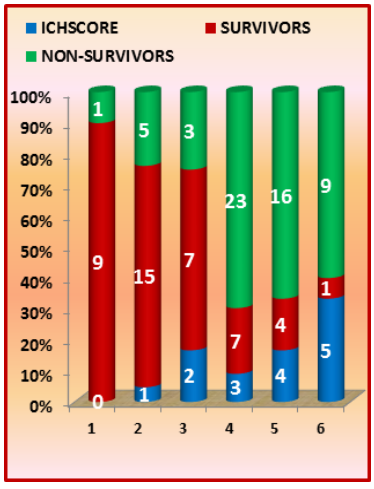

Fig-11:Comparision of ICH score with survivors and non survivors

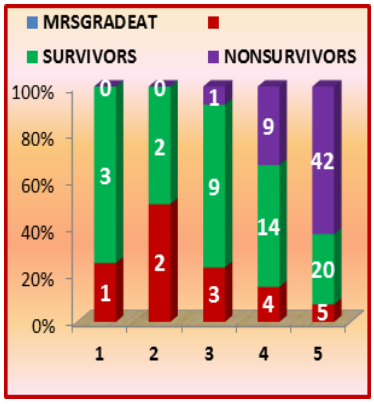

Fig 12: MRS grading of survivors vs non survivors

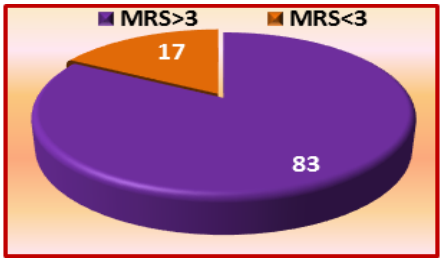

Fig 13 : MRS grading

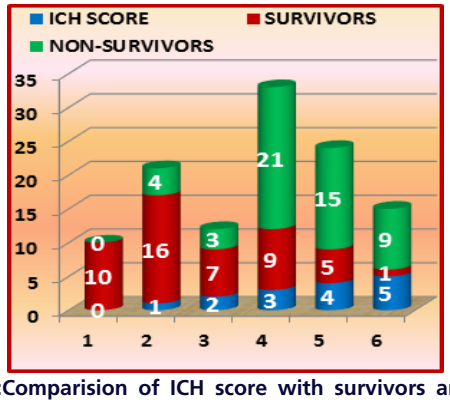

Fig-14:Comparision of ICH score with survivors and non survivors

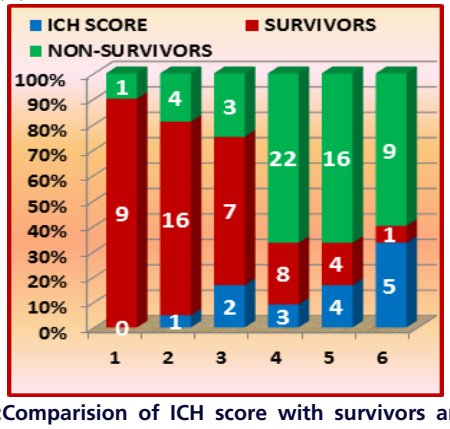

Fig-15:Comparision of ICH score with survivors and non survivors

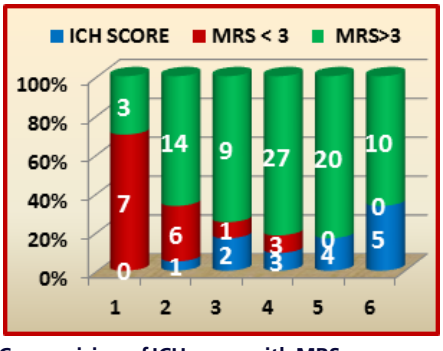

Fig-16:Comparision of ICH score with MRS

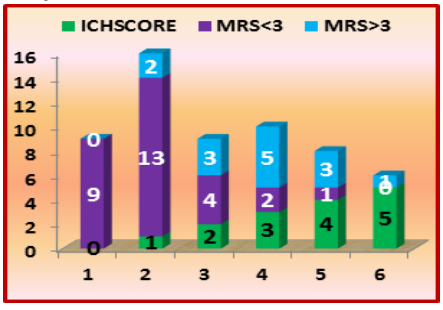

Fig-17:Comparision of ICH score with MRS

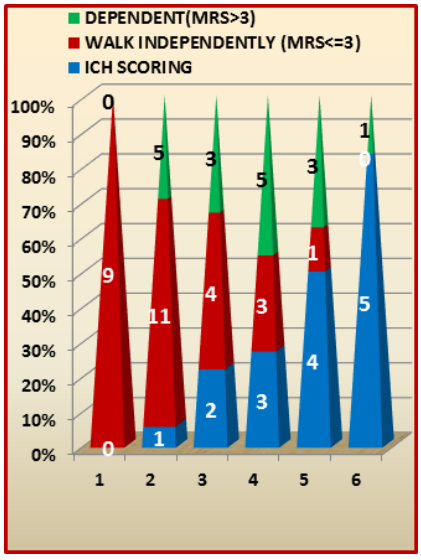

Fig- 18: Comparision of ICH score with MRS

Major disability/ functionally dependency is more with high ICH score and no or minor disability/ functionally independency is low with low ICH score at the time of hospitalization, 30 days follow-up, and 1 year follow-up with p<0.001, p<0.03, p<0.003 respectively.

DISCUSSION:

Age and sex distribution of 100 primary ICH patients showed 64 (64%)being Male and female being 36 (36%) with a Male to female ratio of 1.77:1 which was similar to other studies like **Ma. Cristina et al[2] (1.86:1) and R.B. Libman et al[3] (1.44:1).** The maximum number of cases was seen in the age group of 70-89 years that is 38 (38%) which is in accordance to studies by **Kora S.A, Doddamani. G.B. et al[1],Ma. Cristina L et al[2]and R.B. Libman et al[3].** followed by 50-69 years that is 32 (32%). The average age was 68.38 years with Standard deviation 16.177., youngest and oldest of whom were 30 and 98 years respectively. There were 13 cases of young stroke in 30-49 age group, all were hypertensive.

Clinical presentation in the ICH patients showed that most patient presented with altered sensorium (82%), followed by unsteadiness of gait (70%), motor disturbances (68%), sensory disturbances (60%), speech disturbances (50%), vertigo (45%), vomiting (40%), diplopia (30%), headache (26%), and convulsion (20%). Similar findings were also found in studies conducted by **Kora S.A., Doddamani. G.B. et al[1]** and**Patrick et al[4]** . The most common manifestation was altered sensorium 100% in hemorrhagic strokes studied by **Kora S.A, Doddamani. G.B. et al[1]** while in our study, 82% were found with altered sensorium at the time of presentation which may be due to incidence of cerebellar, brainstem stroke. Sensory disturbances were found in 60% of cases as compared to 5.3% in previous studies, which may be explained due to maximum cases of supratentorial involvement. Visual blurring was found in 10% of cases. The incidence of visual disturbances was low as comparable to**Patrick et al[4]**. This disparity may be explained in terms of less number of occipital strokes in our study.

Neurological findings of the ICH patients showed: altered sensorium 82% ;hemiparesis or hemiplegia 78% ; Speech disturbances 50% ; cranial nerve involvement 20% and quadriparesis 20% ; cerebellar signs positive and nystagmus, with each 10%.These findings were more compared to studies done by **Nilay N. Suthar, et al[5].**

Distribution of location of ICH showed : Supratentorial 70% and Infratentorial 30%. In Supratentorial location, , ICH was localized in basal ganglia and internal capsule region 45%, cortical 14%, thalamic 11% which can be compared to the studies Done by

Nilay N. Suthar, et al[5]. In Infratentorial location, ICH was localized in pons 11%, cerebellum 10%, medulla 7%, midbrain 2% which was similar to studies by **Prakash and Bhavani et al.**

Out of 100 patients, 43 (43%) patients had hematoma size of >30cc and 57 (57%) patients had ICH volume <30cc. The mean ICH volume is 22.562 cc with S.D. 12.513.Out of 100 ICH patients, 48 (48%) number of ICH patients survived during hospital stay and 52 (52%) number of patients died which means a higher mortality rate than compared to mortality of 32.7 % in the studies like **Rohit Bhatia, Hariom Singh et al[7],** which is due to various factors like poor literacy about health care, low socioeconomic status, low GCS, Large hematoma size.

The mortality of ICH patients in 30 days after ICH was 55 (55%). Approximately, 35-50% of patients die with in the 1st month after ICH in studies by **Nilsson OG et al[5] and Poungvarin N et al[6].** In our study, mortality is significant more and could be explained, due to low socioeconomic status of studied population, poor literacy of peoples about health care, associated risk factors like smoking, alcohol, obesity, hypertension and also due to large hematoma size.

The mortality of ICH patient in 1 year after hemorrhage was 58 (58%). The annual mortality rate in various studies were 50 % in **MM Mehndiratta, et al 110.,** 62 % in **Fiona C Taylor, et al[8],** 55% in **Farzad Rahman et al[13]**.

The result of total, survivors and non-survivors of ICH patients during hospitalization.The median ICH score for total 100 ICH patients is 3.00,range is 5.00, maximum ICH score is 5.00, minimum ICH score is 0.00. The median GCS is 8.00, range is 12.00, maximum GCS is 15.00, minimum GCS is 3.00. The median MRS score is 5.00, range is 4.00, maximum MRS score is 5.00, minimum MRS score is 1.00. The median ICH score for nonsurvivors is 4.00, with range 4.00, minimum ICH score is 1.00 and maximum ICH score is 5.00. The median GCS score for non-survivors is 5.00, with range 10.00, minimum GCS score is 3.00 and maximum is 13.00. The median MRS grade for the non-survivors is 5.00, with range 2.00, minimum MRS grade is 3.00 and maximum is 5.00. The median ICH score for the survivors is 1.00, with range 4.00, minimum ICH score is 0.00 and maximum ICH score is 4.00. The median GCS score for survivors is 11.00, with range 11.00, minimum GCS score is 4.00 and maximum is 15.00. The median MRS grade for the survivors is 4.00, with range 4.00, minimum MRS grade is 1.00 and maximum is 5.00.In comparison of GCS with mortality; Out of 13 patients with GCS 3,all 13 patients (100%) died. Out of 15 patients with GCS 4, 13 patients(87%) died. Out of 1 patient with GCS 5, no one died**.**Out of 7 patients with GCS 6, 3(43%) patients died**.** Out of 2 patients with GCS 7, all patients (100%) died, because all patients had brainstem hemorrhages. Out of 19 patients with GCS 8, 10 (53%) patients died**.** Out of 9 patients with GCS 9,6 (67%) patients died**.** Out of 6 patients with GCS 10, all 2 (33%) patients died**.** Out of 5 patients with GCS 11, 1 patient (20%) died. Out of 6 patients with GCS 12, no patient died. Out of 11 patients with GCS 13, 2 (18%) patients died. Out of 6 patients with GCS 14, 15 noone died. So, in this study, with low GCS, mortality is high and with high GCS, mortality is low.

Pearson Chi-Square= 44.049, df=12, the relation is statistically significant with p value <0.001. The incidence of low GCS is considerably higher in hemorrhagic stroke (69%), this may be due to acute rise in intracranial pressure. The results are similar to the studies done by **Rohit Bhatia ,et al[7].**In comparison of ICH score of patients at the time of admission with mortality during hospitalization; Out of 10 patients with ICH Score 0, no one died. Out of 20 patients with ICH score 1, 4(20%) patients died.Out of 10 patients with ICH score2, 3 (30%) patients died**.** Out of 30 patients with ICH score 3, 21(70%) patients died**.**Out of 20 patients with ICH score 4, 15 patients (75%) died. Out of 10 patients with ICH score 5, 9 (90%) patients died**.** So, in this study, mortality is high with high ICH score and mortality is low with low ICH score. Pearson Chi-Square= 34.896, df=5, p value=0.00000158 that is <0.001. The relation is statistically significant. So ICH Score can be used as a prognostic marker in ICH stroke at the time of admission. Maximum patients were presented with high ICH Score (60%) due to acute increase in intracranial pressure and low GCS. This result is similar to the studies done by**Rohit Bhatia, et al[7].**Comparing ICH score of patients at the time of admission with mortality in 30 days; Out of 10 patients with ICH Score 0, 1 (10%) patient died. Out of 20 patients with ICH score 1, 4(20%) patients died.Out of 10 patients with ICH score2, 3(30%) patients died**.** Out of 30 patients with ICH score 3,22(73%) patients died**.** Out of 20 patients with ICH score 4, 16 patients(80%) died. Out of 10 patients with ICH score 5, 9(90%) patients died**.** So,in this study, the mortality in 30 days after ICH, is high with high ICH score and mortality is low with low ICH score. Pearson Chi-Square= 34.68, df=5,p value= 0.00000174 that is p < 0.001. So ICH score can be used as a prognostic marker in ICH stroke in 30 days also.This result is similar to the studies done by **Anil Kumar, et al[16]** and **Clarke JL et al[11].**

Comparing ICH score of patients at the time of admission with mortality in 1 year: Out of 10 patients with ICH Score 0, 1(10%) patient died. Out of 20 patients with ICH score 1, 5(25%) patients died.Out of 10 patients with ICH score2, 3 (30%) patients died**.** Out of 30 patients with ICH score 3, 23(77%) patients died**.** Out of 20 patients with ICH score 4, 16 patients(80%) died. Out of 10 patients with ICH score 5, 9(90%) patients died**.** So,in this study, the mortality in 1 year is high with high ICH score and mortality is low with low ICH score. Pearson Chi-Square= 33.837, df=5, p value=0.00000257 that is p< 0.001. The relation is statistically significant. So, ICH score can be used as a prognostic marker in intracerebral hemorrhagic stroke in 1 year also. This result is similar to the studies done by**J Claude Hemphill, et al[15].**In comparison of MRS grade of patients at the time of admission with mortality during hospitalization; Out of 3 patients with MRS grade 1, no one died. Out of 2 patients with MRS grade 2, no one died. Out of 10 patients with MRS grade 3, 1 (10%) patient died**.**Out of 23 patients with MRS grade 4, 9 (31%) patients died**.** Out of 62patients with MRS grade 5, 42 patients(68%) died. So, in this study, the mortality during hospitalization is high with high MRS grade and mortality is low with low MRS grade. Pearson Chi-Square= 20.166, df=4, p value= <0.001. The relation is statistically significant. This result is similar to the studies done by **Reza Deljavan et al[14].**Total number of functionally dependent patients (MRS grade 4,5)was 83 (83%) and total number of functionally independent patients was 17(17%). At the time of admission, maximum number of patients were functionally dependent, that means with high MRS grade 4,5 , may be due to high intracranial pressure in hemorrhage. Comparing ICH score of patients at the time of admission with Functional outcomes of ICH patients; Out of 10 patients with ICH Score 0,7(70%) patients were functionally independent (MRS<=3). Out of 20 patients with ICH score 1, 6(30%) patients were functionally independent. Out of 10 patients with ICH score2, 1 (10%) patient was functionally independent**.** Out of 30 patients with ICH score 3, 3(10%) patients functionally dependent**.**Out of 20 patients with ICH score 4, all 20 patients (100%) were functionally dependent (MRS>3). Out of 10 patients with ICH score 5, 10(100%) patients functionally dependent**.** So, in this study, major disability/ functionally dependency is more with high ICH score and no or minor disability/ functionally independency is low with low ICH score. The increase in ICH score was associated with poor clinical outcome in the study. Pearson Chi- Square=29.837, df=5, p value= 0.00000158 that is p value <0.001. Therelation is statistically significant. So, ICH score can be valid score of hemorrhagic patients to predict the functional outcomes at the time of hospitalization. This result is similar to the studies done by **Nilay N. Suthar, et al[5].**Comparing ICH score of patients at the time of admission with Functional outcomes of 45 survived ICH patients at 30days follow-up; Out of 9 patients with ICH Score 0, 9(100%) patients were functionally independent (MRS≤3). Out of 16 patients with ICH score 1, 11(69%) patients were functionally independent.Out of 7 patients with ICH score2, 4(57%) patient was functionally independent**.** Out of 8 patients with ICH score 3, 3(37.5%) patients functionally independent**.** Out of 4 patients with ICH score 4, 3 patients (75%) was functionally dependent (MRS>3). Out of 1 patient with ICH score 5, 1(100%) patient was functionally dependent**.** So,in this

study at 30days follow-up, major disability/ functionally dependency is more with high ICH score and no or minor disability/ functionally independency is low with low ICH score. Pearson Chi-Square= 11.916, df=5,p value= 0.03595. The relation is statistically significant. So, ICH score can be a valid score of hemorrhagic patients to predict the functional outcomes in 30-days follow-up. The present study can be compared to studies done by **Nilay N. et al**[5]. Hemorrhagic patient despite high MRS grade at the time of admission improves greater with follow-up at 30 days. This may be attributed to vasogenic edema in cases of hemorrhage. Similar studies done by **Roland Dominic et al**[10]**.**Comparing ICH score of patients at the time of admission with Functional outcomes of 43 survived ICH patients at 1year follow-up; Out of 9 patients with ICH Score 0, 9(100%) patients were functionally independent (MRS<=3). Out of 15 patients with ICH score 1, 13(88%) patients were functionally independent. Out of 7 patients with ICH score2, 4 (57%) patient was functionally independent**.** Out of 7 patients with ICH score 3, 2(39%) patients functionally independent**.** Out of 4 patients with ICH score 4, 3 patients (75%) was functionally dependent (MRS>3). Out of 1 patient with ICH score 5, 1(100%) patient is functionally dependent. So, in this study at 1year follow-up, major disability/ functionally dependency is more with high ICH score and no or minor disability/ functionally independency is low with low ICH score. Pearson Chi-Square= 17.377, df=5, p value= 0.0038. The relation is statistically significant. So, ICH score can be a valid score of hemorrhagic patients to predict the functional outcomes in 1year follow-up also. The results can be similar to the studies done by **J Claude Hemphill, et al**[15] in 243 patients and **Gustavo Cartaxo Patriota, et al**[12]**.** In our study, %walk independently in 1 year functional outcome of 43 survivors was higher than Hemphill study due to study was conducted in small no. of population. Further work on larger cohort are needed to validate the findings.

CONCLUSION:

Primary intra cerebral Hemorrhage is a neurological problem having varied clinical symptoms and signs like altered sensorium, unsteadiness of gait, motor and sensory disturbances, which is more common in older age group and more common in supratentorial location than infratentorial location.

The ICH Score at the time of admission of ICH patients is a valid clinical grading scale and good predictor of mortality and functional outcomes in 30 days and 1 year follow-up.

However, the limitation of the study is the smaller study population. Further larger studies are required to validate the functional outcomes of the ICH patients in 1 year follow-up.

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