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Clinical spectrum of patients with Intracranial Hemorrhage at rural teaching hospital

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ABSTRACT

Background: Intracranial Hemorrhage; despite being a public health concern of such significant proportions; its incidence, risk factors and outcomes have not been studied systematically in India. *Methods:* In this hospital based cross-sectional study, 75 adult cases of non-traumatic intracranial hemorrhage were enrolled for clinical profiling using various relevant parameters over the period of 2 years. The subjects were followed up after 30 days from the date of admission for outcome assessment. *Results:* Hypertension (41, 54.7%) was the most commonly observed risk factor. The commonest presenting symptoms were hemiplegia (66.7%), loss of

consciousness (58.7%) and headache (53.3%). The commonest site of bleed was Basal Ganglia (50.66%) followed by cortex (33.33%); the mortality rate being higher in cortical bleed (64%) than in basal ganglia bleed (28.9%). The mortality rate of patients went up with the scores of MRS; while lower the Barthel's score on admission, higher was the reported mortality. *Conclusion:* GCS, MRS and Barthel's score are good prognostic markers in stroke patients and could be used to evaluate long term outcomes.

Keywords: Intracranial hemorrhage, clinical profile, prognostic markers, outcome

1. INTRODUCTION

Intracranial Hemorrhage (ICH) is spontaneous extravasations of blood into brain parenchyma. The overall incidence of ICH is as high as 12 to 15 cases per 100,000 populations per year, with it contributing up to 10-15% of first ever stroke cases (Gebel et al., 2000). ICH accounts for 10 to 30% of total stroke related admissions; the thing of special concern being, mortality percentage going as high as 50% after average 30 days of hospitalization (Fogelholm et al., 2005). Functional outcome in survivors is also poor with fewer than 20% being independent at 6 months (Broderick et al., 2007).

Around 85% ICH have been reported to be occurring spontaneously (primary) due to rupture of small penetrating arteries and arterioles damaged by chronic arterial hypertension (2/3rd cases) or amyloid angiopathy (1/3rd cases) (Thrift et al., 1998). Secondary ICH has been attributed to multiple modifiable/non-modifiable causes; like male gender, older age, African or Asian ethnicity and hypertension, warfar in anticoagulation therapy, high dose aspirin therapy, cocaine abuse and heavy alcohol intake etc (Qureshi et al., 2001; Ariesen et al., 2003) .

Intracranial Hemorrhage; despite being a public health concern of such significant proportions; its incidence, risk factors and outcomes have not been studied systematically in India. This study aims to plug the gap with the objective of detailed profiling of non-traumatic intracranial hemorrhage cases at a referral hospital in central India.

2. METHODOLOGY

In this cross sectional study, total 75 patients of non-traumatic intracranial hemorrhage were recruited for the study during September 2016 to august 2018. Ethical clearance was obtained from the Institutional Ethics Committee before the study [enrollment number DMIMS (DU)/IEC/2016-17/615], and written informed consent was obtained from the participating patients. Patients with history of trauma and with anti-coagulant therapy were excluded from the study .Basic socio-demographic details, presenting symptoms and history with respect to risk factors such as hypertension, diabetes mellitus, smoking, alcohol consumption and previous history of cerebrovascular episode were noted. Vital signs & Waist/Hip ratio was assessed. Glasgow Coma Scale (GCS) score, Modified Ranking Scale (MRS) score and Barthel's score were also noted on admission. CT scan of brain was done and information about location, extent & volume of hemorrhage were recorded. The need for ventilator was also put on record. Amongst blood investigations, Lipid profile was done. The subjects were followed up after 30 days from the date of admission either at the OPD or telephonically. For comparative purposes, similar data on risk factors of 276 cerebral infarct cases were also recorded during the study period.

The data were analyzed using SPSS (version 15); by applying chi-square test & ANOVA wherever applicable. Approval from Institutional Ethics Committee was obtained before start of the study.

3. RESULTS

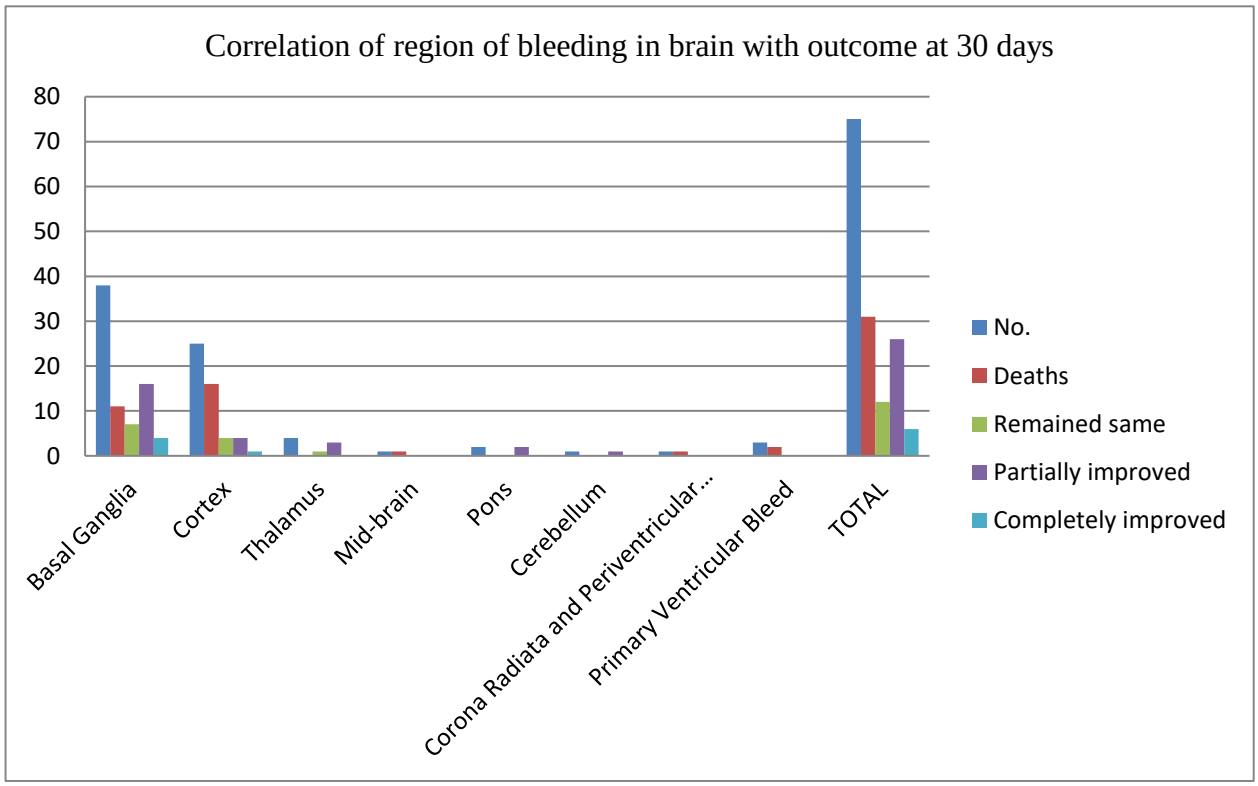
Out of total 75 patients with intracranial hemorrhage enrolled, most (53.3%) were in their 5th& 6th decade of life. Majority (44, 58.7%) were males and 31 (41.3%) were females. The most common presenting symptoms were hemiplegia (66.7%), loss of consciousness (58.7%), headache (53.3%), vertigo (44%), speech defect (42.67%), vomiting (38.7%), seizures (18.7%) and respiratory difficulty (17.3%). No patients with monoplegia or quadriplegia were reported in our study.

The risk factor profiling of participants showed that hypertension (41, 54.7%) was the most commonly observed risk factor; followed by history of alcohol intake (22.7%), history of smoking (21.3%), diabetes mellitus (13.3%) and history of previous stroke (9.1%). The mean systolic BP was 171.89 $\pm$ 31.08 while the mean diastolic BP was 98.74 $\pm$ 17.0; both significantly higher than normal. Waist/Hip ratio was also observed to be higher than normal (0.89 $\pm$ 0.07). The Lipid Profile results showed normal mean values for all the studied parameters (Total Cholesterol- 161.01 $\pm$ 30.89, Triglycerides- 144.28 $\pm$ 36.67, LDL Cholesterol- 97.25 $\pm$ 32.24, VLDL Cholesterol- 28.19 $\pm$ 7.39, HDL Cholesterol- 36.24 $\pm$ 9.69).

When the risk factors were compared between the hemorrhage (n= 75) & the infarct (n= 276) group, only Blood pressure (BP) & Waist/Hip ratio were found to be statistically significantly different in the two groups. The mean systolic BP was 171.89 ± 31.08 in the hemorrhage group while it was 142.71 ± 19.05 in the infarct group. The mean diastolic BP was 98.74 ± 17.0 in the hemorrhage group, while it was observed to be normal at 78.43 ± 8.4 in the infarct group. The other factors were different between the two groups to variable extent, all differences being statistically insignificant shown in Table 1.

Table 1 Comparisons of risk factors in the hemorrhage & infarct groups.

Parameter	Hemorrhage (n = 75)	Infarct (n= 276)	P value
Age (in years) (mean± SD)	581.8 ± 13.45	60.82 ± 12.22	0.1
Sex	44 males (58.67%), 31 females (41.33%)	192 males (70.28%), 84 females (29.72%)	0.1
Hypertension	41 (54.67%)	144 (52.17%)	0.67
Smoking	16 (21.33%)	72 (26.08%)	0.4
Alcohol intake	17 (22.67%)	63 (22.82%)	1.00
Diabetes	10 (13.33%)	23 (8.33%)	0.62
History of Previous Stroke	07 (9.09%)	12 (4.34%)	0.15
Systolic BP (mean)	171.89 ± 31.08	142.71 ± 19.05	P < 0.001
Diastolic BP (mean)	98.74 ± 17.0	78.43 ± 8.4	P < 0.001
Waist/Hip Ratio (mean)	0.89 ± 0.07	0.91 ± 0.55	0.01



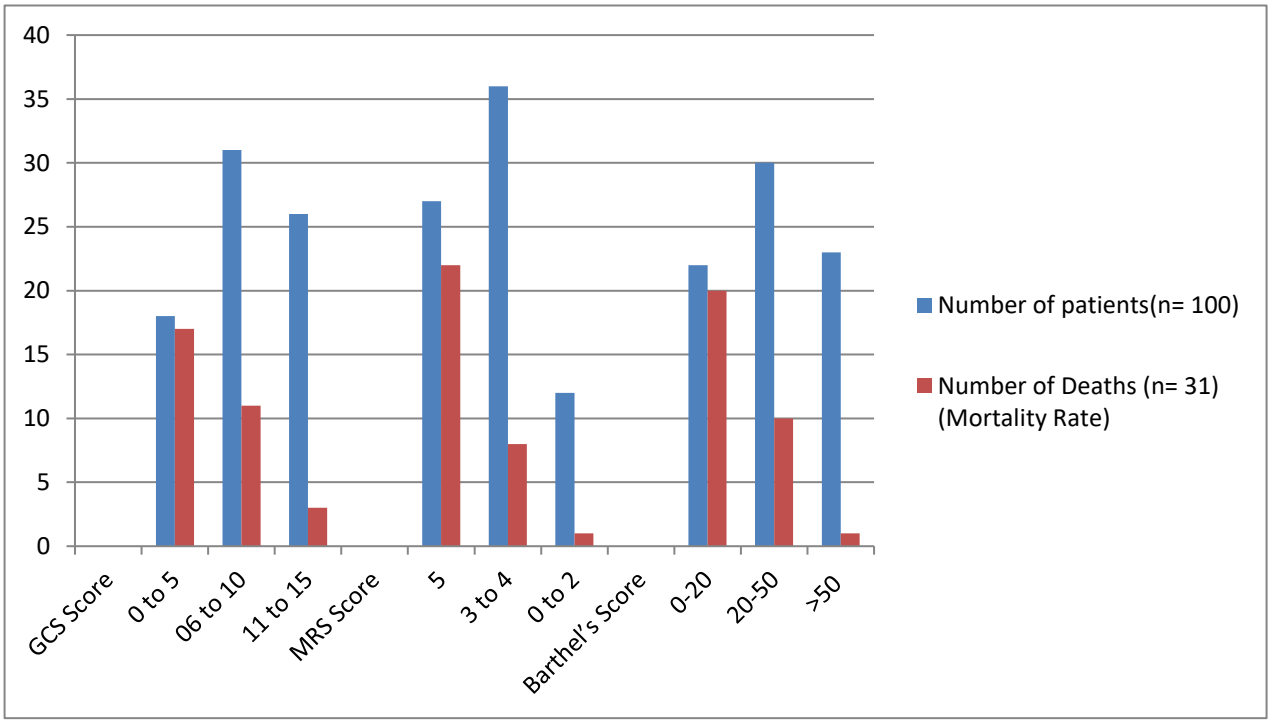
Graph 1 Correlation of region of bleeding in brain with outcome at 30 days

When the outcomes (after 30 days) of all the 75 patients of hemorrhage were studied; 31 (41.33%) had died, condition remained same in 12 (16%), partially improved in 26 (34.67%) and completely improved in 6 (8%) patients. The findings on CT scan (brain) showed Basal Ganglia (50.66%) to be most commonly affected region followed by Cortex (33.33%). After these two regions, Thalamus (5.33%), Brainstem (4%), Primary ventricular bleed (4%), Cerebellum (1.33%) and Corona Radiata with periventricular bleed

(1.33%) were affected in lesser number of patients. When the region of hemorrhage was correlated with the outcome, mortality rate was observed to be more in cortical bleed (64%) than in basal ganglia bleed (28.94%). Since the number of patients in other regions were very few, the mortality rate in those areas could not be compared shown in Graph 1.

As for the volume of blood loss, in the patients with volume of bleed less than 40 ml (47, 62.67%), there were only 8 deaths (mortality rate- 17.02%). But with 23 deaths in patients with volume of bleed more than 40 ml (28, 37.33%), the mortality rate shot up to as high as 82.14%., the difference being statistically significant ($p < 0.001$).

In the present study; there were 18 patients with GCS score less than 5, with 17 dying in 30 days (mortality rate- 94.44%). Patients with GCS score 6-10 (n= 31) & 11-15 (n= 26) fared better with 11 deaths (mortality rate- 35.48%) & 3 deaths (mortality rate- 11.53%) respectively. With respect to MRS scale, the mortality rate of patients with score 0-2 (n= 12) was 8.33% (1 death), with score 3-4 (n= 36) was 22.22% (8 deaths) and with score 5 (n= 27) was as high as 81.48% (22 deaths). As for Barthel's score; the mortality rate of subjects with Barthel's score on admission more than 50 (n= 23) was 4.34% (1 death), Barthel's score 20-50 (n= 30) was 33.33% (10 deaths) and very high mortality rate (90.90%, 20 deaths) in those with scores between 0-20.All the above correlations drawn with GCS, MRS and Barthel's score were found to be statistically significant, Shown in graph 2.



Graph 2 Correlation of GCS, MRS and Barthel's score with mortality in ICH patients

Out of 75 participants of ICH, 17 (22.67%) required and 58 (77.33%) did not require ventilator support. Patient who required ventilator support also had low mean GCS score on admission (mean GCS score- 5.64) and higher mortality (82.35%); while patients who did not require ventilator support had higher mean GCS score on admission (mean GCS score- 10.29) and lower mortality (29.31%). The results were significant.

4. DISCUSSION

The present study entailed profiling of 75 patients of non-traumatic Intra-Cranial Hemorrhage (ICH) admitted at the study centre during the study period of two years. All the patients were followed up after 30 days for outcome assessment. With it, 276 patients of cerebral infarct were also studied for comparative analysis of risk factors, not followed up though.

In our study, the mean age of patients with hemorrhage was 58.18 $\pm$ 13.45 years, which is lesser than that reported previously in other ethnicities was 64.9 years (Fogelholm et al., 2005) and 73.6 years (Saco et al., 2009). We observed male preponderance (males-58.66% vs. females-41.33%), which is in line with available literature (Fogelholm et al., 2005 ; Sacco et al., 2009 ; Zia et al., 2009).

Amongst the risk factors studied, hypertension was observed to be most common (similar for intracranial hemorrhage- 54.67% & infarct- 52.17%). Similar to our findings, (Fauziah et al., 2002) in a Malysian study observed hypertension as the commonest risk

factor in both intracerebral hemorrhage (69.2%) & infarct (65.2%). In one Iranian study of 122 patients of primary ICH by (Togha et al., 2004), history of hypertension was the reported to be the most important risk factor in 60-80 years of age. Our observation of higher than normal Systolic (171.89 ± 31.08 mmHg) & Diastolic BP (98.74 ± 17 mmHg) on admission in ICH patients is also in sync with the above finding. But this did not hold true for cerebral infarct patients; the values being significantly lower (Syst. BP- 142.71 ± 19.05 mmHg, Diastolic BP- 78.43 ± 8.40 mmHg). So, in our study, high mean systolic & diastolic BP on admission correlated more strongly with intracranial hemorrhage than in cerebral infract group.

Other noticeably observable risk factors studied were history of alcohol consumption (22.67% in hemorrhage and 22.82% in infarct group), history of smoking (21.33% in hemorrhage and 26.08% in infarct group), history of DM (13.33% in hemorrhage group and 8.33% in infarct group) and history of previous stroke (9.09% in hemorrhage and 4.34% in infarct group). All these risk factors were significant individually in both intracranial hemorrhage and cerebral infarct groups; but the difference between the two groups was not significant, suggesting commonality of mentioned risk factors for both the events. (Ariesen et al., 2003) had observed similar significant risk in intracranial hemorrhage with alcohol consumption, smoking & diabetes (Ariesen et al., 2003). (Smajlovic et al., 2008), in a similar study of 352 patients with intracranial hemorrhage, concluded by reporting cigarette smoking (28%) and diabetes mellitus (14%) to be significant risk factors.

In our study, the mean waist/hip ratio (WHR) in intracranial hemorrhage group was significantly associated with both the groups; albeit more strongly with the infarct group than hemorrhage group. In a prospective study of Swedish women, it was found that compared with women in the lowest quintile of WHR (<0.80), those in the highest quintile (>0.85) had twofold higher risk of stroke (Adami et al., 2006). In another similar study conducted by (Gang Hu et al., 2007), men with WHR > 0.90 were reported to be at higher risk of stroke, ischemic more than hemorrhagic. So our finding sits fine with the available literature.

The most common presenting symptoms were hemiplegia (66.7%), loss of consciousness (58.7%), headache (53.3%), vertigo (44%), speech defect (42.67%), vomiting (38.7%), seizures (18.7%) and respiratory difficulty (17.3%); each of the risk factor being individually statistically significant. Similarly, in a Malaysian study by (Sia et al., 2007), common presenting features were hemiplegia (61.8%), loss of consciousness (58.5%), headache (56.3%) and speech disturbances (45.3%). Other previous similar studies had also reported similar presenting features (Qureshi et al., 2001; Zia et al., 2009; Smajlovic et al., 2008).

In our study, the commonest site of bleed was Basal Ganglia (50.66%) followed by cortex (33.33%); the mortality rate was higher in cortical bleed (64%) than in basal ganglia bleed (28.9%). (Sia et al., 2007) also reported basal ganglia to be the commonest site of bleed (45.1%), followed by cortex (32.9%). The significant positive correlation of volume of bleed with mortality observed by us was in line with the findings of (Helg-Larsen et al., 1984) who reported the crucial limit to be 50 ml, with a mortality rate of 90% above & 10% below it. (Sia et al., 2007) put the significant crucial limit at 30 ml, as against our 40 ml cut-off.

We observed the GCS score to have significant negative association with the mortality, which is corroborative of the findings of previous similar studies (Qureshi et al., 2001; Sacco et al., 2009 ; Sia et al., 2007 ; Helweg-Larsen et al.,1984). We used two scores for functional assessment of patients, MRS and Barthel's score. The mortality rate of patients significantly went up with the scores of MRS; while lower the Barthel's score on admission, higher was the reported mortality. This is also in line with the available evidence that both MRS and Barthel's score were good prognostic markers in stroke patients (both hemorrhagic & ischemic) and could be used to evaluate long term outcomes (Krista et al., 2007; Roopesh et al., 2019).

5. CONCLUSION

Intracerebral hemorrhage diagnosis and treatment have evolved over the past decade, in the setting of increasing knowledge about risk factors, pathophysiology, and management. Glasgow Coma Scale, Modified Ranking Scale and Barthel's score are good prognostic markers in stroke patients and could be used to evaluate long term outcomes. Its diagnosis and treatment have evolved very fast recently, in the setting of increasing knowledge about risk factors, and pathophysiology. So, we corroborate the recommendation regarding their prognostic usage in ICH patients.

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Conflicts of Interest:
The authors declare no conflict of interest.

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