Risk factors associated with in-hospital mortality following intracerebral hemorrhage

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ABSTRACT

Background: Intracerebral hemorrhage (ICH) is the most severe subtype of stroke. Non-traumatic ICH occurs due to bleeding from a vascular source directly into the brain substance Its mortality **r**ate is high, and most survivors experience significant disability.

Aims & objectives: To assess primary patient risk factors associated with mortality following ICH.

Materials & Methods: We performed a prospective study carried out in the department of medicine in a tertiary care hospital, central India. All patients admitted with a non traumatic ICH were included. Detailed clinical history general and systemic examination was done. All relevant investigation was done and ICH was confirmed by CT/MRI brain.

Results: A total of 200 patients diagnosed with intracerebral hemorrhage, 133 (66.5%) were male and 67 (33.5%) were female. 54% of subjects were between 60 to 80 years of age. The overall mortality rate among ICH patients admitted to the hospital was 46.7%. Hypertension, smoking, alcohol habit, diabetes and dyslipidemia were the common factors were associated in mortality in ICH. Factor significantly associated with in-hospital mortality were Glasgow Coma Scale (GCS) score (≤ 8), and midline shift.

Conclusion: Higher rate of mortality were observed during the first two weeks of hospitalization following ICH. Neuro imaging features along with GCS score can help the clinicians in developing their prognosis.

INTRODUCTION:

Intracerebral hemorrhage (ICH) is the subtype of stroke, usually caused by rupture of small penetrating arteries secondary to hypertensive changes or other vascular abnormalities [1-2]. Stroke is the third leading cause of death in developed countries, after heart disease and

cancer, and it is also a leading cause of disability in adults [3]. ICH remains the most devastating form of stroke. Within 1 month of injury, 40% of patients with ICH die, and by 1 year, this number increases to 54% [4]. Young stroke patients have a greater socioeconomic burden and an excess of mortality across all age groups of patients [5]. Many risk factors associated with the ICH such as hypertension, diabetes mellitus, apolipoprotein allele E2 or E4, obesity, frequent use of alcohol and cigarette smoking, through hypertension is the most prevalent risk factor in ICH patients [6-7]. The outcome of ICH is variable, depending on hematoma volume, location, extension to ventricles, and other factors.6 However, compared to ischemic stroke, ICH leads to higher mortality and more severe disability [8]. Use of anticoagulation reversal agents, early access to critical care, and development of dedicated inpatient stroke units have all contributed to lower rates of in-hospital mortality following spontaneous ICH [9-10]. Patients who were survived a first-time ICH, leading to a growing population of ICH survivors. The long-term causes of death in the ICH survivor population are unclear. Survivors of ICH are at risk for subsequent ischemic stroke, as those with atrial fibrillation (AF) are often not restarted on anticoagulation therapy.12 Survivors also remain at risk for recurrent hemorrhage, a complication that is estimated to occur in about 2%–7% of patients [11-12].

Aims & objectives: The aim of the current study was to determine the mortality rate and to evaluate the influence of various factors on the mortality of patients with intracerebral hemorrhage (ICH).

MATERIAL AND METHODS:

This was a prospective study conducted in the Department of Medicine, G.R. Medical College & Group of Hospitals, Gwalior, central India, over a period of 3 years (2016-2018)**.** All patients whom diagnosed as intracerebral hemorrhage confirmed by CT scan/MRI admitted in the our hospital during the study period were enrolled in the study

Inclusion Criteria:

- Age ranged from 18 to 75 years
- Cases of ICH diagnosed by CT scan/MRI.
- Who are willing to participate in the study

Exclusion Criteria:

- Aged <18 or >75 years
- ICH secondary to head trauma, brain tumour, subarachnoid hemorrhage.
- Patients who are not willing to give consent

Detailed clinical history was taken with special reference to risk factors and comorbid condition. The collected data were patient age, gender, socio-economic status, duration of hospitalization, etiopathogenesis, risk factors clinical manifestations, laboratory data and imaging at admission. Detailed general and systemic examination especially neurological examination was done.

All the selected patients were subjected to routine blood investigations like CBC, RBS, RFT, LFT, lipid profile. Mortality of all admitted patients was assist during course of hospitalization.

Statistical Analysis: All the data analysis was performed using SPSS version 20 software. Numerical data were expressed as mean ± standard deviation. P value < 0.05 was considered significant

RESULTS

In present study, out of 200 patients, 53 (26.5%) had expired

Figure 1: Mortality incidence after ICH

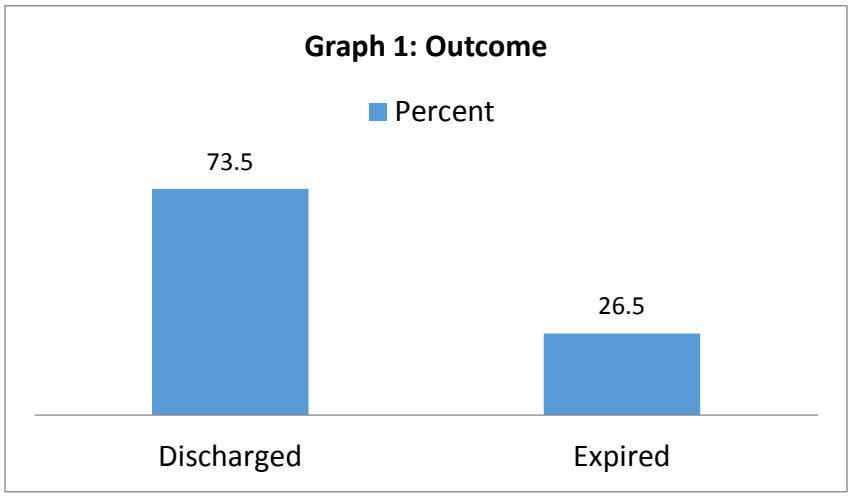

Table 1: Comparing the socio-demographic variables with ICH outcome

Socio-demographic variables		**ICH outcomes**		**Total**	**P value**
		Discharged	Expired		
Age of patient (in years)	18-40	14	6	20	**0.877**
	41-60	48	15	63	
	61-80	76	26	108	
	>80	9	6	15	
Total		147	53	200	
Gender	Male	95	38	133	**0.350**
	Female	52	15	67	
GCS score	<8	68	47	115	**<0.001**
	9-12	46	1	47	

	13-15	86	5	91	

Table 2: Comparing mortality with the risk factors

Risk factors	**No of patients**	**Mortality**	**P value**
Smoking	57	19	**0.003**
HTN	38	38	
Diabetes	23	6	
Alcohol	43	10	
H/o CAD	25	8	
Hypercholesteromia	20	6	

Mortality was highest among the patients who had hypertension (100%) followed by smokers (33.33%) and patients who had alcohol addiction (23.25%) (p=0.003).

Table 3: Comparing mortality with TLC

		Frequency	**Mortality rate**	**P value**
Total Leukocyte Count	<4000	9	6 (33.33%)	**<0.001**
	4000-11000	145	22 (15.17%)	
	>11000	46	25 (54.34%)	
B. Urea	Normal (<45mg/dl)	154	24 (15.58%)	**<0.001**
	Raised (>45mg/dl)	46	29 (63.04%)	
Serum Creatinine	Normal (<1.4mg/dl)	172	35 (20.34%)	**<0.001**
	Raised (>1.4mg/dl)	28	18 (64.28%)	
RBS	Normal (<200 mg/dl)	186	46 (24.73)	**0.039**
	Raised (>200 mg/dl)	14	7 (50%)	

Patients with higher TLC (>11000) had highest mortality (54.34%)(p<0.001). Patients with raised blood urea had significantly higher mortality (63.04%) compared to patients with normal blood urea (p<0.001) similarly patients with raised serum creatinine level had significantly higher mortality prevalence (64.28%) compared to patients with Normal creatinine levels.

Table 4: Comparing SITE OF LESION with mortality

Site of lesion	Frequency	Percent	Mortality	p value
Thalamic or basal ganglia	149	74.5	41(25.51%)	0.558
Lobar	40	20	10 (25%)	
Brainstem	6	3	2 (33.3%)	

Cerebellum	5	2.5	0 (0)	
Total	200	100%		

Majority of the patients had lesion at thalamic or basal ganglia (74.5%) and out of that 25.51% had mortality similarly out of 20% patients who had lesion at lobar, 25% had mortality and out of 3% patients who had brainstem lesion, 33.33% had mortality. Comparison was insignificant (p=0.558)

Table 5: Comparing IVH extension / midline shift with mortality

IVH extension / midline shift	Frequency	Percent	Mortality	P value
Yes	58	29	44 (75.86%)	**0.002**
No	142	71	14 (9.85%)	

Mortality was higher among the patients who had IVH extension / midline shift, out of 29% patients of IVH extension / midline shift, 75.86% had mortality (p=0.002).

DISCUSSION

The leading causes of death in ICH survivors were infection, recurrent intracranial hemorrhage, respiratory failure, cardiac disease, and ischemic stroke. Death in patients with AF was significantly more likely to be due to ischemic stroke or cardiac disease, and less likely to be caused by recurrent intracranial hemorrhage [13]

The incidence of ICH increases with advanced age, in agreement to that in present study the incidence of mortality was higher in old age group ICH patients, similar finding also reported by Jolink et al [14], Sang Joon et al [15] and Nilesh kumar et al [16].

Current study determined the mortality rate of intracerebral haemorrhage patients were more in male than female, but not significant statistically (p>0.05), our results are comparable with study conducted by Sia SF et al [17] and Broderick J et al [18].

In our study Glasgow coma scale (GCS) was significantly associated with the mortality rate of ICH (p<0.05), concordance observation shown by M Togha et al [19] and Daniel et al [20].

Present study found mortality was highest among the patients who had hypertension (100%) followed by smokers and patients who had alcohol addiction , many factors like: hypertension, smoking, alcohol, diabetes, Hypercholesteromia and h/o CAD were significantly associated with mortality (p=0.003), similar results obtained by Narayan et al [21], Zia E et al [22] and Martini SR et al [23].

In our study patients with raised TLC level (>11000), high blood urea, raised serum creatinine and raised blood sugar level (>200mg/dl) had significantly higher mortality rate (p<0.05), consistent finding reported by Chen et al [24] and V. Kasirajan et al [25].

Current study reported that mortality rate was highest in lesion at Brainstem, but site of the ICH not significantly associated with the mortality rate, accordance to the Flaherty ML et al [26] and Nilsson OG et al [27].

Mortality was significantly higher among the patients who had ICH extension or midline shift, ($p<0.05$), in agreement to our study some other investigators reported the same results: Lindsey R.et al [28] and Arboix A,et al [29].

In present study, overall mortality rate of ICH was 26.5%, similar finding also reported by Zhang B,et al [30] and Morgan TC et al [31].

Known poor prognostic factors of ICH include large hematoma volume, hematoma expansion, intraventricular hemorrhage, infra-tentorial location, old age, contrast extravasation on CT scan (spot sign) and the use of anticoagulation. ICH Score, a simple clinical grading scale, may help stratify the risk; patients with high ICH score have a high mortality rate

CONCLUSIONS

We have concluded that higher mortality rate found in older age males. Hypertension and smoking was the predominant factors associated with the mortality in ICH. GCS score at the time of admission, volume of hematoma and midline shift could serve as independent prognostic factors for poor outcome and may help clinicians to assess prognoses more accurately.

Conflicts of interest: none

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