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A Study of Clinical Profile, Ct Scan and Risk Profile in Patients of Intracerebral Hemorrhage of Geriatric Versus Non Geriatric Groups

KEYWORDS: geriatric, intracerebral hemorrhage, hypertension, hyperglycemia, smoking.

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ABSTRACT *Background : Age is a strong risk factor for Intra Cerebral Hemorrhage (ICH). Several studies have shown high incidence of ICH in the elderly. Understanding the role of age in pattern of bleed and outcome can guide the management.*

Materials and Methods : 200 patients of ICH confirmed by CT Scan were studied between March 2012 to January 2014. They were sorted out into Group 1 consisting of 100 patients ≥ 60 years of age and Group 2 of 100 patients < 60 years of age. Patients with old stroke, fresh ICH due to other causes like head trauma, known bleeding tendency or coagulation disorder were excluded. Detailed history was taken using a structured questionnaire. General and systemic examination, CT scan head and required blood investigations were done. Chi-square test was used for statistical analysis.

Results : Male : female ratio was 1.5:1 in group 1 and 3.5:1 in group 2. The most common presentation in group 1 was altered sensorium followed by motor deficit whereas in group 2 it was speech disturbance followed by altered sensorium (P < 0.03). Glasgow Coma Scale in group 1 was less than 3 in 39% whereas in group 2 it was less than 3 in 9% only. Risk factors in decreasing order in group 1 were hypertension, hyperlipidemia, hyperglycemia, smoking and alcohol whereas in group 2 they were smoking, hyperlipidemia, hyperglycemia, hypertension and alcohol. Putamen was the most common site of bleed followed by thalamus in group 1 whereas in group 2 lobar bleed was common followed by thalamus. Intraventricular extension was more common in group 1 as compared to group 2 (P=0.03). Group 1 had more tendency for a large volume bleed than group 2. Mortality was more in group 1 (67%) as compared to group 2 (52%) (P < 0.05). Modified Rankin scale was > 2 in majority of group 1 patients as compared to group 2 patients.

Conclusions : ICH occurring in the geriatic population has several differences from that seen in the non geriatic population and these differences have a definite impact on the neurological outcome.

Introduction :

Stroke is classically characterized as a neurological deficit attributed to an acute focal injury of the central nervous system (CNS) by a vascular cause, including cerebral infarction, intracerebral hemorrhage (ICH), and subarachnoid hemorrhage (SAH), and is a major cause of disability and death worldwide. The current World Health Organization definition of stroke (introduced in 1970 and still used) is "rapidly developing clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin."[1] During the last decade, spontaneous ICH accounted for 10% of strokes in high income countries and 20% of strokes in low and middle income countries, where the one month case fatalities were 25%–35% and 30%–48%, respectively. The incidence of ICH is higher in Asians, and the major risk factors for spontaneous ICH without an identified cause (so called primary ICH) are male gender, systemic arterial hypertension, excessive alcohol consumption, increasing age, smoking, and diabetes mellitus.[2] Increasing age is an important non modifiable risk factor associated with intracerebral haemorrhage. In a systemic review and meta analysis of the population-based studies published between 1980 and 2008 by Asch C J et al[3] which included 8145 pts of intracerebral haemorrhage in the age group 45-80 years, incidence ratios increased from 0.10 (95% CI 0.06-0.14) for people aged less than 45 years to 9.6 (6.6-13.9) for people older than 85 years. In the South East Asian setting the figure was slightly different. A cross sectional study conducted in China, Malaysia and India over 14906 patients of intracerebral haemorrhage in 2009 showed that the incidence was 4.5% in patients < 60 yrs and 9.5% in patients > 60 yrs of age.[4] Hence this study was conducted with an aim to analyse the clinical, CT scan and risk profile in patients of intracerebral haemorrhage of geriatric and non geriatric groups .

Aims and Objectives :

To compare ICH patients > 60 years of age with ICH patients < 60 years of age under the following parameters :

1. Clinical features of intracerebral hemorrhage
2. CT Scan head findings
3. Risk factors in both the groups
4. Mortality in both the groups
5. Neurological status at the time of discharge

Material and Methods :

The study was conducted at Dr. B.R. Ambedkar memorial hospital, Raipur (C.G.). A total of 200 patients of intracerebral hemorrhage (primary), confirmed by CT Scan, were randomly included in the study between March 2012 to January 2014. The patients were sorted out into 2 groups (each 100) :

1. Group 1 consisted of patients ≥ 60 years of age
2. Group 2 consisted of patients < 60 years of age

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We excluded patients with old stroke, fresh intracerebral hemorrhage due to other causes (evident or presumed) like head trauma, brain tumor etc. Patients with a known severe bleeding tendency or coagulation disorder as well as those with severe disabling diseases were also excluded because their living habits (eg, alcohol consumption) are restricted and severe bleeding or coagulation disorders are relatively infrequent causes of ICH. Patients and their family members were interviewed. Detailed history of the patients with focus on the possible risk factors was documented using a structured questionnaire. Detailed systemic and general examination of the patients was done. All the required blood investigations were done. CT scan head was done in the department of radiology. Significance of difference observed between two variables in the two groups was tested using Chi-square test. The P value < 0.05 was considered significant otherwise insignificant.

Results :

There were 200 patients of intracerebral haemorrhage. All patients who were ≥ 60 years of age were assigned to group 1 and all patients < 60 years of age were assigned to group 2. In group 1, of 100 patients 60% were males and 40% were females. The maximum number of patients were in the age group 60 – 69 (n=50) followed by the age groups 70 – 79 (n=38), 80 – 90 (n=12). Sex distribution was 60 – 69 (62% males; 38% females), 70 – 79 (55.3% males; 44.7% females), 80 – 90 (66.7% males; 33.3% females).

Analysis of age and sex distribution of patients in both the groups :

Age group (in yrs)	Total patients	Male patients		Female patients		P value	
		Number	%	Number	%		
80-90	12	8	66.7	4	33.3	0.056	Group I (n=100)
70-79	38	21	55.3	17	44.7		
60-69	50	31	62	19	38		
TOTAL	100	60		40			
50-59	64	50	78.1	14	21.9	0.01	Group II (n=100)
40-49	26	21	80.8	5	19.2		
30-39	10	7	70.0	3	30.0		
TOTAL	100	78		22			

In group 2, of 100 patients 78% were males and 22% females. The maximum number of patients were in the age group 50 – 59 (n=64) followed by the age groups 40 – 49 (n=26), 30 – 39 (n=10). Sex distribution was 50 – 59 (78.1% males; 21.9% females), 40 – 49 (80.8% males; 19.2% females), 30 – 39 (70% males; 30% females).

The most common presentation in group 1 was altered sensorium (75%) followed by motor deficit (67%) whereas in group 2 it was speech disturbance (57%) followed by altered sensorium (40%) (P < 0.03). Glasgow Coma Scale in group 1 was less than 3 in 39%, 4-11 in 30%, more than 11 in 31% cases whereas in group 2 it was less than 3 in 9%, 4-11 in 47% and more than 11 in 44% cases (P < 0.01).

Analysis of various modifiable risk factors in both the groups :

Risk Factors	Group I (n=100)	Group II (n=100)	P value
Hypertension	65	40	0.04
Hyperglycemia	54	43	0.01
Hyperlipidemia	56	44	0.056
Smoking	44	65	0.03
Alcohol	37	40	0.3
Cardiac disease	56	44	0.2

In group 1, the pattern of risk factors noted was hypertension (65%), hyperlipidemia (56%), cardiac disease (56%), hyperglycemia (54%), smoking (44%), alcohol (37%) whereas in group 2 the pattern was smoking (65%), hyperlipidemia (44%), cardiac disease (44%), hyperglycemia (43%), hypertension (40%), alcohol (40%). The P value for the risk factors hypertension, hyperglycemia, hyperlipidemia, smoking was < 0.05 (significant) whereas for alcohol and cardiac disease it was > 0.05 (insignificant). In group 1, out of 54 patients of hyperglycemia 20 patients had prediabetes and 34 patients were with diabetes.

Of 34 diabetes patients, duration of diabetes was less than 5 years in 5 patients, 5-10 years in 10 patients and more than 10 years in 19 patients. 26 of them were on regular treatment and 8 were not on any treatment. In group 2, out of 43 patients of hyperglycemia 31 patients had prediabetes and 12 patients had diabetes. Of 12 diabetes patients, duration of diabetes was less than 5 years in 5 patients, 5-10 years in 4 patients and more than 10 years in 3 patients. 8 of them were on regular treatment and 4 were not on any treatment. In group 1, 44 patients were smokers (cigarette/bidi) of which 19 smoked less than 10 cigarettes/bidis a day and 25 smoked more than 10 cigarettes/bidis a day. Duration of smoking was less than 10 years in 12 patients and more than 10 years in 32 patients. Whereas in group 2, 65 patients were smokers (cigarette/bidi) of which 14 smoked less than 10 cigarettes/bidis a day and 51 smoked more than 10 cigarettes/bidis a day. Duration of smoking was less than 10 years in 10 patients and more than 10 years in 55 patients.

In group 1, 37 patients were alcoholic of which 4 drank less than 40 gm a day, 8 drank 40-120 gm a day and 25 drank more than 120 gm a day. Duration of alcohol intake was less than 10 years in 7 patients and more than 10 years in 30 patients. Whereas in group 2, 40 patients were alcoholic of which 3 drank less than 40 gm a day, 6 drank 40-120 gm a day and 31 drank more than 120 gm a day. Duration of alcohol intake was less than 10 years in 5 patients and more than 10 years in 35 patients. In group 1, dyslipidemia was present in 56 patients whereas in group 2, 44 patients had dyslipidemia. In group 1, CT scan head documented bleeding in the putamen in 43, thalamus in 26, pontine in 18 and lobar in 13 patients. Thus putamen was the most common site followed by thalamus. Lobar bleed was least common. Whereas in group 2, CT scan head documented bleeding in the lobe in 44, thalamus in 26, pontine in 08 and putamen in 22 patients. Thus lobe was the most common site followed by thalamus. Pontine bleed was least common. Intraventricular extension was more common in group 1 (55%) as compared to group 2 (30%) (P=0.03).

Distribution of patients according to the area of bleed as diagnosed by CT scan head :

Area of bleed	Group I (n=100)	Group II (n=100)	P value
Putamen	43	22	0.003
Thalamus	26	26	0
Pontine	18	08	0.02
Lobar	13	44	0.001

In group 1, volume of bleed was less than 30 c.c. in 34 and more than 30 c.c. in 66 patients whereas in group 2

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it was less than 30 c.c. in 55 and more than 30 c.c. in 45 patients. Thus group 1 had tendency for a large volume bleed as compared to group 2. Mortality was comparatively more in group 1 (67%) as compared to group 2 (52%) (P < 0.05). Out of patients who survived ICH in group 1(33) and group 2 (48), only 8 (24.2%) were normal in group 1 as compared to 33 (68.7%) in group 2 (P < 0.02) at the time of discharge. Modified Rankin scale was > 2 in majority of group 1 patients as compared to group 2 patients.

Discussion :

Increasing age is an important non modifiable risk factor associated with intracerebral haemorrhage. In a study done by Narayanaswamy Venketasubramanian et al[4] in the Indo Malaysian region the prevalence rate rose with age (P < 0.001 for trend). In our study, in group 1, the maximum number of patients were in the age group 60 – 69 (n=50) followed by the age groups 70 – 79 (n=38), 80 – 90 (n=12) (P value 0.056) whereas in group 2, the maximum number of patients were in the age group 50 – 59 (n=64) followed by the age groups 40 – 49 (n=26), 30 – 39 (n=10) (P value 0.01). A significant association with age was noted in group 2. Group 1 despite being an elderly group, age was less significantly associated with ICH.

A number of factors may be responsible :

1. Small number of patients in our study as compared to other studies.
2. Factors such as a lack of transport facilities and dependency on somebody to accompany an elderly person to the health care facility impede them from accessing the available health services. The 60th National Sample Survey (January–June 2004) collected data on the old age dependency ratio. It was found to be higher in rural areas (125) than in urban areas (103).[5]
3. Chattisgarh state is largely a rural state. Health-care delivery services are still inaccessible in rural areas and therefore life expectancy has not improved.

The male : female ratio in group 1 was 1.5:1 and in group 2 was 3.5:1. Similar findings have been observed in other indian studies also. Findings from the World Economic Forum indicate that India is one of the worst countries in the world in terms of gender inequality. Gender inequalities, in turn, are directly related to poor health outcomes for women.[6] Numerous studies have found that the rates of admission to hospitals vary dramatically with gender, with men visiting hospitals more frequently than women.[7] Differential access to healthcare occurs because women typically are entitled to a lower share of household resources and thus utilise healthcare resources to a lesser degree than men.[8]

Group 1 patients had greater degree of neurological deficit as compared to the group 2 patients which may be because of the effect of increasing age. The effect of aging on the brain's microvasculature is well-recognized, and includes decreased vascular density, micro embolic brain injury, vessel basement membrane thickening, endothelial dysfunction, and increased blood brain barrier permeability. In addition, cerebral white matter lesions known as leukoaraiosis - characterized by spongiosis, gliosis, demyelination, and capillary degeneration - are seen in the elderly population with vascular risk factors and/or vascular dementia, and are thought to be related to cerebrovascular disease in this population.[9]

The maximum number of admissions took place in the winter months - about 50% in group 1 and about 37% in group 2 (P = 0.07) suggesting a seasonal variation with a characteristic winter peak of incidence of intracerebral hemorrhage. It has been documented that exposure to cold causes peripheral constriction and an increase in blood pressure. Other parameters influenced by changes in temperature, such as clotting factors, may play a role. An acute cold–induced rise in blood pressure is probably a much more significant precipitating factor of bleeding than are slight seasonal variations in blood pressure.[10]

In our study patients were considered to have definite hypertension if their blood pressure readings had repeatedly exceeded 160 mm Hg systolic or 95 mm Hg diastolic before the illness or if they used antihypertensive medication. Systemic hypertension was the major risk factor in group 1 patients (65%) as compared to group 2 patients (40%) (P = 0.04). Most spontaneous hemorrhages are attributed to chronic arterial hypertension. A prior history of chronic hypertension is a well-known risk factor for ICH, and its occurrence among ICH patients varies from 45% to 70%.[11]

Hyperglycemia on admission was found in 54 patients in group 1 (20 prediabetes, 34 diabetes) and 43 patients in group 2 (31 prediabetes, 12 diabetes) (P < 0.01). The role of diabetes mellitus in the pathogenesis of intracerebral hemorrhage (ICH) is controversial. Some studies (12,13,14) demonstrated a significant association between diabetes and intracerebral hemorrhage, and diabetes was shown as an important risk factor for ICH.

Other studies (15,16,17,18) failed to show an association between diabetes mellitus and intracerebral hemorrhage. Omid Hesami et al[19] in their study found no significant relationship between diabetes mellitus and intracerebral hemorrhage but they stressed upon the fact that high plasma glucose at the admission time was an independent predictor of death after intracerebral hemorrhage. Eun-Chol Song et al[20] in their experimental rat ICH model study found that hyperglycemia aggravated brain edema, culminating in neural cell death around the hematoma. Out of 67 patients who died in group 1 and 46 patients in group 2 , 35 and 27 respectively had hyperglycemia on admission (P = 0.50).

Most, but not all studies, find an association between lower cholesterol levels and increased risk of hemorrhagic stroke. In MRFIT the risk of death from intracranial hemorrhage was increased 3-fold in men with total cholesterol concentrations of <4.14 mmol/L (160 mg/dL) compared with higher levels.[21] . In our study dyslipidemia was found in 56% of group 1 patients and 44% of group 2 patients (P = 0.056). Pattern in group 1 versus group 2 was – hypercholesterolemia (80.35% vs 79.5%), hypertriglyceridemia (71.42% vs 77.2%), high LDL (62.5% vs 79.5%), low HDL (35.7% vs 63.6%). Thus our findings were not concordant. In a retrospective study[22] which included 92 patients with primary ICH hypertrigliceridemia was not proved as a risk factor, while hyper-LDL cholesterolemia, hypo-HDL cholesterolemia, and hyper-Hol were associated with primary ICH, which could justify further statin treatment in secondary prevention of this disease.

Cigarette smoking increases the risk of ischemic stroke and SAH, but the data on ICH are inconclusive.[21] In a report[23] it was found that there was a definite relationship between smoking and both ischemic and hemorrhagic stroke, particularly at young ages. In our study 44 patients in group 1 and 65 patients in group 2 were smokers . P value was < 0.05 which was statistically significant suggesting that

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smoking is a risk factor for ICH especially in the young patients. Smoking just 1 cigarette increases heart rate, mean BP, and cardiac index and decreases arterial distensibility.[24] Majority of the patients in group 1 and group 2 smoked > 10 cigarettes/bidis per day (56.8% vs 78.4% ; $P < 0.02$) and duration of smoking was > 10 years (72.7% vs 84.6% ; $P < 0.04$) clearly establishing that the number smoked per day and duration of smoking was also important.

37% patients in group 1 and 40% patients in group 2 were alcoholic of which majority consumed alcohol > 120 gm per day (67.5% vs 77.5% ; $P < 0.03$) and duration was > 10 yrs (81% vs 87.5% ; $P = 0.06$). In a study by Seppo Juvela et al[11] 156 consecutive patients with intracerebral hemorrhage aged 16 to 60 years (96 men and 60 women) were compared with those of 332 hospitalized control patients (192 men and 140 women). It was found that recent light drinking (1 to 40 g of ethanol within 24 hours or 1 to 150 g within 1 week) did not seem to increase the risk of ICH, but moderate (41 to 120 g within 24 hours or 151 to 300 g within 1 week) and heavy (>120 g within 24 hours or >300 g within 1 week) drinking increased the risk in a dose-dependent manner. Recall bias cannot be avoided, and people usually report their drinking of alcohol as the number of drinks per day or week without mentioning either periodicity or peaks of their alcohol consumption. Daily drinking of alcohol results in a dose-dependent gradual elevation of blood pressure within a few days to weeks. In heavy drinkers, a high variability of alcohol consumption (episodic drinking) seems to increase blood pressure values more than a low variability of alcohol intake.[11] In our study 12 patients in group 1 (32.4%) and 10 patients in group 2 (25%) ($P < 0.05$) had a definite history of recent alcool drink before the onset of illness.

In group 1, on CT scan head imaging putamen was the most common site of bleed followed by thalamus. Lobar bleed was least common. Whereas in group 2, lobe was the most common site followed by thalamus. Pontine bleed was least common. Intraventricular extension was more common in group 1 (55%) as compared to group 2 (30%). P value for the distribution of bleed was 0.003 (highly significant) suggesting a significant difference in the area of bleed in the two groups . In group 1, a tendency for a large volume bleed was seen as compared to group 2. Mortality was comparatively more in group 1 (67%) as compared to group 2 (52%) (P value less than 0.05). Out of patients who survived ICH in group 1(33) and group 2 (48), only 8 (24.2%) were normal in group 1 as compared to 33 (68.7%) in group 2 ($P < 0.02$) at the time of discharge. Modified Rankin scale was > 2 in majority of group 1 patients as compared to group 2 patients. Examination of these findings indicates that older age is associated with increased mortality, worse functional outcome, and decreased long-term survival. Weakened physiologic reserve, worse healing, worse long-term functional outcome, and more debilitation with less insult seen in old age contribute to morbidity and mortality.

Limitations of the study :

Resources were very limited. Size of the population studied was small. Cardiac disease has been mentioned in this study as a prevailing comorbid condition rather than a risk factor. Most were clinically and electrocardiographically hypertensive heart disease or alcohol related cardiomyopathy cases. Few were ischaemic heart disease cases. None was valvular heart disease. As most of ICH patients were old, moribund and bedridden it was difficult to mobilize them for echocardiography as bedside echocardiography is still not feasible in our hospital. For the same reason we have not commented upon obesity/overweight.

Conclusion :

We conclude that increasing age is a strong risk factor for ICH and in our opinion is also a direct cause for considerable morbidity and mortality after ICH. ICH occurring in the geriatic population has several differences from that seen in the non geriatic population and these differences have a definite impact on the neurological outcome in the context of increasing age. We saw a definite age related interplay of different chronic conditions like hypertension, hypercholesterolemia. Therefore we emphasize upon the need to adopt a different clinical approach and planning of treatment strategy and care when dealing with ICH in geriatic population.

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