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Intracerebral hemorrhage in young from a tertiary neurology center in North India

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ABSTRACT

Objective: There is paucity of information on the etiology and predictors of outcome of intracerebral hemorrhage (ICH) in young which may have regional and ethnic differences. In this study, we report the etiology and predictors of outcome of ICH in young patients from North India.

Methods: 404 patients with ICH in young (16–50 years) were retrospectively reviewed who were admitted in neurology service of a tertiary care teaching hospital in North India. The data were retrieved from the computerized hospital information service. The information about the demography, risk factors, clinical status, laboratory findings, CT/MRI features and angiography (CT, MRI or digital substraction) were noted. The etiology of ICH was ascertained based on clinical, laboratory and radiological findings. Outcome at 1 month was assessed using Glasgow Outcome Scale (GOS).

Results: The mean age of the patients was 41.6 years and 23.8% were females. Hypertension (57.2%), hypocholesterolemia (33.7%), alcohol (15.8%) and anticoagulant (3.5%) were the important risk factors. The etiology of ICH was hypertension in 320 (79.2%), vascular malformation in 17 (4.2%), coagulopathy in 16 (4%), cerebral venous sinus thrombosis (CVST) in 9 (2.2%), thrombocytopenia in 3 (0.7%), vasculitis in 2 (0.5%) and cryptogenic in 37 (9.2%) patients. The patients with cryptogenic ICH were younger, had better Glasgow coma scale (GCS) on admission and good outcome compared those with known etiology. The most common location of ICH was basal ganglion and thalamus (71.3%). 102 (25%) patients died, 161 (39.9%) had poor and 141 (34.9%) had good outcome. Hypertensive ICH patients had frequent death or disability ($P < 0.001$). On multivariate analysis, low GCS score ($P < 0.001$), large ICH ($P = 0.01$) and high leukocyte count on admission ($P = 0.03$) were significantly related to the 1 month mortality.

Conclusion: Hypertension is the commonest cause of ICH in young Indian adults and its outcome is related to volume of ICH, GCS score and admission leukocyte count.

1. Introduction

Intracerebral hemorrhage (ICH) constitutes about 10–15% of all strokes. The frequency of ICH among young onset stroke varies from 0.7% to 40% among different series [1,2]. The causes of nontraumatic ICH are generally classified into primary and secondary. Primary ICH is the result of spontaneous rupture of the damaged intracranial small vessels secondary to hypertension or amyloid angiopathy. Secondary ICH is associated with underlying vascular malformations, coagulopathy, vasculitis or tumors. The majority of nontraumatic ICH are primary but secondary causes are important etiology of ICH in younger patients. The incidence of ICH is higher in Asian countries compared to the West [3]. This may be due to difference in the prevalence of stroke risk factors as well as dietary, sociocultural and genetic variation. Hypertension is an independent risk factor of ICH. In India, the prevalence of hypertension below the age of 50 years is 20% [4]. Incidence of ICH varies in different parts of India. In the Kolkata study, 32% of stroke patients had ICH [5]. This ratio was higher as compared to western countries. On the other hand, one series of stroke in young adults from New Delhi, only 14.5% of young stroke had ICH [6]. In a recent study from the northeast India, tribals had more frequently primary ICH compared nontribals (31% versus 18%) [7]. In a population based study from south India, ICH constituted 11.6% of the all strokes which is similar to western countries [8]. It seems that incidence of ICH is higher in eastern India compared to north and south. Compared to ischemic stroke, ICH has worse outcome. One month mortality rate has been reported from 35% to 52% [9,10]. Half of the deaths occur in the first week of the event. Only 20% of the patients with ICH are independent at 6 months [11]. There are reports of ischemic stroke in young but very few studies have been done on ICH in young patients. A pubMed search using keywords 'intracerebral hemorrhage", "young" and "young onset intracerebral hemorrhage" revealed only 11 articles; 9 of these were in English language [2,12–19]. Most of these studies are based on small sample size, mainly focused on the etiology of ICH and only one study reported the outcome (Table 1). The etiology of ICH in young patients may differ in different

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Table 1
Tabulation of different studies on young ICH.

Author	Patients number	Age (yrs)	Causes	Risk factors	Mortality & outcome	Morality predictors
Toffol GJ et al. [12], 1987	72	15–45	Cause determined 55; AVM (21), Hypertension (11), Ruptured saccular aneurysms (7), Sympathomimetic drug abuse (5), Tumour (3)& Others (8)	Not mentioned	Mortality 12.5%.	–
Bevan et al. [2], 1990	113, Nontraumatic ICH 46 (41%)	15 – 45	Aneurysm 21, AVM 9, Hypertension 7, Tumour 5, Coagulopathy 2, Moya-Moya 1, Eclampsia 1.	Alcohol 13, Hypertension 7, Illicit drug 2, Coagulopathy 2.	Mortality 26.1%	–
Fuh et al. [13], 1994	170	15 – 45	Hypertension (64), Vascular malformation (39), Blood dyscrasia (13), Toxins (6), Moyamoya (2), Eclampsia (2), Tumour (1), Systemic lupus erythematosus (1), Cryptogenic 42.	Not mentioned	Mortality ICH 35.1%	–
Awada et al. [14], 1998	107	0.5- 45	AVM (25) Hypertension (21) Blood dyscrasias (17) Berry aneurysms (9) Other causes (7) & cryptogenic (28)	Not mentioned	Mortality 27%. Complete independent 26%.	–
Ruiz_Sandoval et al. [15], 1999	200	15–40	AVM (67) Cavernous angioma (32), Hypertension (22), Drugs (7), Toxins (7), CVST (10), Others (14), Cryptogenic (29), & Undetermined (12).	Tobacco 40, Hypocholesterolemia 70, Hypertension 26 & Alcohol 20.	Mortality 8% in ICH, 90% CVST had good outcome, 68% with hypertensive ICH had worst prognosis	–
Feldmann et al. [16], 2005	217	18 – 49	Not studied.	Hypertension, smoking, and regular heavy alcohol	Not studied	–
Lai et al. [17] 2005	296	15 – 45	Hypertension (138), Vascular anomaly (50), Coagulopathy (16), Tumour (18), Drugs (26), Undetermined (30), Cryptogenic (13) & Others (5).	Hypertension 146, diabetes 25, smoking 114, alcohol 109, drugs 6, hypocholesterolemia 32, family history 20.	Mortality 24%	Site of ICH, surgery, ventricular extension, hydrocephalus, & GCS score
Ruiz-Sandoval et al. [18], 2006	35 patients 15–40 years & 105 >40 yrs.	2 groups of 15–40 yrs and >40 yrs	All were hypertensive	Obesity 18, Alcohol10, Smoking 5, diabetes 3, Previous ICH 3.	Mortality 23% in <40 yrs group	–
Kumar et al. [19], 2011	109, 61 (56%) ischemic stroke, 25 (22.9%) ICH & 23 (21.1%) embolic stroke	15 – 45	Not mentioned	Smoking 76, Alcohol 53, Diabetes 59, Hypertension 79 & Family history 42.	Mortality 7.4%, disability 55% & good outcome 37.6%.	–