## **Research Article**

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# Risk factors and outcome of stroke in young in a tertiary care hospital

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### **ABSTRACT**

**Background:** Stroke is one of the important causes of morbidity, mortality, and disability worldwide. This disease/ disability happening in the younger age group add to the social burden. Young stroke can have devastating consequences with respect to quality of life, the ability to work, plan or shoulder the responsibility of a family, and participate in social life. Although the number of young stroke is lesser than stroke among the elderly, the total number of years that young stroke patients live with the consequences of stroke exceeds that of older stroke survivors due to far longer survival. The issue of stroke in young in India has long been of interest to neurologists in the country. This study was done to know the factors leading to stroke in young and outcome of these cases in a tertiary care hospital.

**Methods:** A hospital based, cross sectional study consisting of all stroke cases admitted in SDM College of Medical Sciences and Hospital, Dharwad, Karnataka for a period of one year.

**Results:** Out of 236 stroke cases, 52 (22%) were <45 years of age. 80.8% of them were in the age group of 30-45 years. Overweight and obesity (63.4%) was the most common risk factor followed by Hypertension (50%) and cigarette& tobacco use (40.3%). Patients with family history of stroke had higher chances of having stroke at younger age (13.5%) compared to older age group (p value=0.0299). Mortality rate was found to be 11.5%.

**Conclusions:** There was predominance of traditional risk factors in young strokes. This highlights the needs for aggressive management of these risk factors.

Keywords: Stroke in young, Risk factors, Outcome, Modified Rankin scale, Disability

#### INTRODUCTION

Stroke is an important cause of disability among adults and is one of the leading causes of death worldwide. It is a major health problem in India. Stroke burden has been rising in India as compared to the developed countries where it has reached plateau or decreased. Stroke incidence rises steeply with age. Therefore, stroke in younger people is less common; however, stroke in a young person can be devastating in terms of productive years lost and impact on a young person's life. While a specific definition of "young stroke" is lacking, the vast majority of authors consider "young stroke" to pertain to individuals less than 45 years of age.<sup>2</sup>

In India, 10–15% of strokes occur in people below the age of 40 years.<sup>3</sup> It is believed that the average age of patients with stroke in developing countries is 15 years younger than that in developed countries. In India, nearly one-fifth of patients with first ever strokes admitted to hospitals are aged <40 years.<sup>4</sup>

While a greater proportion of strokes are due to subarachnoid hemorrhage and intracranial hemorrhage in young adults (40–55%) compared to the general stroke population (15–20%), cerebral infarction is still most common.<sup>2</sup> Diabetes mellitus, hypertension, heart disease, current smoking, and long-term heavy alcohol consumption are major risk factors for stroke in young adults as in elder population.<sup>5</sup> It is important to identify

the causative factors in young stroke patients in order to prevent recurrences. Despite its substantial societal impact, there remains a paucity of literature regarding the etiological subtyping and risk factors for stroke in young Indian patients. Hence, this study was an attempt to know the risk factors and outcome of these cases in a tertiary care hospital.

### **METHODS**

This study was conducted in Sri Dharmasthala Manjunatheshwara College of Medical Sciences and Hospital (SDMCMSH), a tertiary care centre in Dharwad, Karnataka. It was a cross sectional study, conducted for a period of one year from November 2013 to October 2014. The study was approved by the institutional ethical committee. All cases of acute stroke fulfilling the WHO definition of stroke admitted to SDMCMSH, Dharwad, diagnosed & confirmed by radiological investigations were included in the study. Old cases of stroke admitted for co-morbidities and those with neurological deficit caused by non-vascular causes were excluded. Cases with age ≤45 years were considered as stroke in young cases.

Informed consent was taken from the cases that were willing to participate in the study. A semi-structured and pre-tested Questionnaire was used to assess the socio-demographic profile. History regarding smoking, alcohol consumption, diabetes, hypertension, dyslipidemia and CVA was elicited.

Hypertension was defined as a BP recording of >140/90 mm Hg on two or more readings on two or more occasions after initial screening. Patients who are already on antihypertensive medications were also taken as hypertensive. Diabetic patients were diagnosed as per the WHO recommendations for the diagnostic criteria for diabetes (Fasting plasma glucose ≥126 mg/dl or 2 hour plasma glucose >200 mg/dl). Patients on antidiabetic medications were also considered as diabetics. Patients were included as suffering from heart diseases if they had ischemic heart disease, congestive heart failure, rheumatic heart disease, and atrial fibrillation. Dyslipidemia was taken as serum cholesterol >200mg/dl, LDL cholesterol >130mg/dl and HDL cholesterol <35mg/dl in females and <40mg/dl in males.

Cases diagnosed and treated earlier as stroke were taken as previous history of stroke. A family history of stroke was entertained if the first degree relatives of the patients suffered from stroke. Smoking, tobacco chewing and alcohol intake were based on the clinical history of past and present consumption of these substances. BMI was classified according to WHO classification.

In case patient was not in a position to respond, his immediate family member was interviewed. Height and weight of the cases were measured using the standard techniques. Outcome of the cases at the time of discharge and after 28 days of admission was assessed using the

Modified Rankin scale.<sup>7</sup> In case the patient is discharged before 28 days; the outcome was assessed through personal telephonic enquiry.

Data was analysed using SPSS version 21. Chi-square test was used to determine whether the differences observed were statistically significant. P-value < 0.05 was considered significant.

#### **RESULTS**

Table 1: Socio-demographic profile of stroke in young cases.

Variable	n=52
Sex	
Male	28 (53.8%)
Female	24 (46.2%)
Religion	
Hindu	44 (84.6%)
Muslim	6 (11.5%)
Christian	1 (1.9%)
Others	1 (1.9%)
Marital status	
Un married	7 (13.5%)
Married	45 (86.5%)
Locality	
Rural	21 (40.1%)
Urban	31 (59.6%)
Educational status	
Illiterate	-
Primary	14 (26.9%)
Secondary	28 (53.9%)
Graduate	10 (19.2%)
Post graduate	-
Occupation	
Unemployed *	26 (50%)
Employed	26 (50%)

\*House wives and students are clubbed under unemployed category

Table 2: Risk factors associated with stroke in young cases.

Risk factors	n=52
Overweight & obesity	33 (63.4%)
Hypertension	26 (50%)
Cigarette smoking & tobacco chewing	21 (40.38%)
Alcohol consumption	19 (36.5%)
Diabetes mellitus	10 (19.2%)
Family history	7 (13.5%)
Dyslipidemia	5 (9.6%)
Cardiac diseases	5 (9.6%)

A total of 236 acute stroke cases were admitted during the study period. Mean age of the cases was found to be  $57.99\pm15.02$  years. Out of this 52 (22%) cases were  $\leq$ 45 years of age. Mean age of the stroke in young cases was found to be  $36.37\pm8.03$  years. Total number of males

having stroke in young was 28 (53.8%) and females were 24 (46.2%).

Table 3: Non-modifiable risk factors associated with stroke in young cases & stroke in >45 years of age.

Risk factor	≤ 45 years of age (n=52)	> 45 years of age (n=184)	p value
Sex			
Male	28 (53.8%)	125 (67.9%)	
Female	24 (46.2%)	59 (32.1%)	0.0603
Family His	story		
Yes	7 (13.5%)	9 (4.9%)	
No	45 (86.5%)	175 (95.1%)	0.0299

Socio-demographic profile of stroke in young cases is as given in Table 1. There was a little male preponderance (53.8%) and most of the cases were Hindus (84.6%) and of urban locality (59.6%).

Stroke was more common in the age group of 31-45 years (80.8%). The age-wise distribution of stroke in young cases is as given in Figure 1. Most of the stroke in young were of ischemic stroke 39 (75%), followed by haemorrhagic stroke 11 (21.2%) and Sub arachnoid Hemorrhage (SAH) 2 (3.8%).

Risk factors associated with stroke in young cases are given in Table 2. Overweight & obesity (63.4%) was the most common risk factor followed by hypertension (50%) and cigarette & tobacco use (40.3%).

Table 4: Modifiable risk factors associated with stroke in young cases & stroke in >45 years of age.

Risk factor	Yes		No		- n volvo
	≤45 years	>45 years	≤45 years	>45 years	p-value
Hypertension	26 (50%)	137 (74.4%)	26 (50%)	47 (25.6%)	0.00075
Diabetes mellitus	10 (19.2%)	62 (33.6%)	42 (80.8%)	122 (66.4%)	0.0454
Dyslipidemia	5 (9.6%)	82 (44.5%)	47 (90.4%)	102 (55.5%)	< 0.0001
Cardiac diseases	5 (9.6%)	22 (11.9%)	47 (90.4%)	162 (88.1%)	0.639
Cigarette smoking	13 (25%)	29 (15.7%)	39 (75%)	155 (84.3%)	0.1240
Tobacco chewing	9 (17.3%)	52 (28.3%)	43 (82.7%)	132 (71.7%)	0.111
Alcohol consumption	19 (36.5%)	49 (26.6%)	33 (63.5%)	135 (73.4%)	0.1636
Overweight & obesity	33 (63.4%)	65 (35.3%)	19 (36.6%)	119 (64.7%)	0.0002

Table 5: Outcome of stroke cases after 28 days.

Outcome	≤45 yrs (n=52)	>45 yrs (n=184)	p value
No disability (mRS 0 to 1)	33 (63.5%)	91 (49.5%)	
Disability (mRS 2 to 5)	13 (25%)	47 (25.5%)	0.0883
Death	6 (11.5%)	46 (25%)	

mRS- modified Rankin Scale

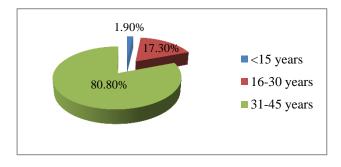


Figure 1: Age-wise distribution of stroke in young cases.

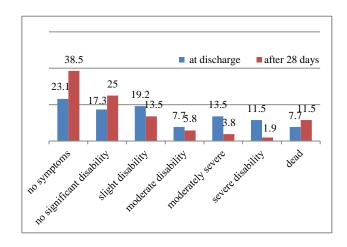


Figure 2: Outcome of stroke in young cases at discharge and at 28 days.

When non-modifiable risk factors like sex and family history was compared with stroke in > 45 years of age, given in Table 3, family history was statistically significant for stroke in young (p value=0.0299). Table 4 gives the comparison of modifiable risk factors between stroke in young and stroke in > 45 years of age. Overweight & obesity was significantly associated with

stroke in young (p value=0.0002) where as Hypertension, diabetes mellitus and dyslipidemia were significantly associated with stroke in > 45 years of age.

Outcome of stroke cases was assessed at discharge and after 28 days of admission (Figure 2). 25% of stroke in young cases had disabilities at 28 days (slight disability 13.5%, moderate disability 5.8%, moderately severe disability 3.8% and severe disability 1.9%) and mortality was found to be 11.5%. When the same was compared with outcome of stroke in >45 years of age group of patients who had 25.5% disabilities and mortality of 25%, no significant association was found (Table 5). However, as far as mortality is concerned it was much less among stroke in young than stroke in > 45 years age group.

### **DISCUSSION**

In the study, data was collected and analysed from 236 acute stroke cases admitted in SDMCMSH, Dharwad, out of whom 22% were  $\leq$  45 years of age. This proportion was higher than reported by Kapoor D et al. (8.55%), Dash et al.(16.7%) and Nagaraja et al.(18%), <sup>8.6,9</sup> but lesser than JIPMER stroke registry (36.2%) and Abraham et al.(25%). <sup>10,11</sup>

Majority of the stroke in young cases were in the age group of 31-45 years (80.8%) compared to a study done in coastal South India where 71.5% of stroke in young cases were of 31-45 years age group.<sup>12</sup>

Similar studies were done in Pakistan and North India. In Pakistan study 45.07% cases had cerebral infarction, 47.89% had intracerebral hemorrhage and 7.04% had SAH<sup>13</sup> and in North India study 59.3% cases had cerebral infarction, 28.1% had intracerebral hemorrhage and 12.5% had SAH.<sup>8</sup> However, in our study 75% cases had cerebral infarction, 21.2% & 3.8% cases had intracerebral hemorrhage and SAH respectively.

In our study overweight & obesity (63.4%) was the most common risk factor followed by hypertension (50%) and cigarette & tobacco use (40.3%). But in many other studies hypertension was the most common risk factor. In a study by Praveen et al. 80% cases had hypertension. <sup>14</sup> In another similar study done by Kumar et al. 72.5% cases had hypertension followed by smoking (69.7%) and diabetes (54.1%) <sup>12</sup> and in a study done in Lucknow, 56% had hypertension, 54% had heart diseases and 38% were using cigarette & tobacco. <sup>15</sup>

In a study for stroke in young done by Dash *et al.* in Delhi it was found that at the time of hospital discharge, 392 (89%) patients had mRS scores in the range of 0-2, and 37 (8.4%) patients hand mRS scores of 3 or 4. Death was reported in 11 (2.5%) patients.<sup>16</sup>

Nedeltchev et al studied the outcome of stroke in young cases using modified Rankin scale (mRS). In their study, 68% achieved a mRS score of 0 to 1, 26% had a mRS

score of 2 to 5, and 3% were dead by 3 months. Our study had almost similar outcome at the end of 28 days with 63.5% achieving mRS score of 0-1, 25% had mRS score of 2-5 and 11.5% were dead.<sup>17</sup>

### **CONCLUSION**

This study demonstrated the substantial role of modifiable risk factors like overweight & obesity, hypertension, cigarette smoking / tobacco consumption and alcohol consumption in stroke in young. Primary and secondary prevention strategies targeting the traditional modifiable risk factors among young Indian population would benefit them and the same is emphasized. It was also found that mortality of stroke in young cases was much less than stroke in older age group. Health care facilities need to be strengthened to provide immediate and essential care for stroke cases.

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