RESEARCH ARTICLE

CIMT (CAROTID INTIMA MEDIA THICKNESS): AS PREDICTOR OF EARLY MORTALITY IN ACUTE ISCHEMIC STROKE

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ARTICLE INFO	ABSTRACT
	Objectives: The present study was carried out with an aim to detect correlation of CIMT with mortality in acute ischemic stroke. **Methods:** After ethical considerations, this prospective observational study was conducted on 200 patients of acute ischenic stroke. The diagnosis of ischemic stroke was based on the clinical profile and confirmed by CT / MRI as defined by ASA/AHA. **Results:** Among the 200 patients studied age of patients with acute ischemic stroke ranged from 45-78 years with a mean age of 61.18±7.59 years. Majority of patients were in 51-70 years of age (n=43; 86%). CIMT values of left side ranged from 0.05cm to 0.10cm with a mean value of 0.074±0.012. At right side, CIMT values ranged from 0.06cm to 0.12cm with a mean value of 0.077±0.017. Average CIMT value ranged from 0.055cm to 0.11cm with a mean value of 0.075±0.013. After one month, a total of 44 (22%) patients showed improvement, 52(26%) showed survival without change in status. A total of 56 (28%) were lost to follow up and a total of 48 (24%) expired. **Conclusion-** Carotid intima media thickness in acute ischemic stroke patients did not provide any useful information with respect to outcome (short term mortality).

INTRODUCTION

Cerebrovascular diseases are ranked as the second leading cause of death after ischemic heart disease. In the year 2001 it was estimated that cerebrovascular diseases (stroke) accounted for 5.5 million deaths world wide, equivalent to 9.6% of all deaths. Two-thirds of these deaths occurred in people living in developing countries and 40% of the subjects were aged less than 70 years. Additionally, cerebrovascular disease is the leading cause of disability in adults and each year millions of stroke survivors has to adapt to a life with restrictions in activities of daily living as a consequence of cerebrovascular disease. The situation is no less severe in India. A recent community survey in the eastern Indian city of Kolkata showed the prevalence rate of stroke to be 545 per 100,000 population. The average annual incidence rate of stroke in the same study was 145 per 100,000 persons per year. These rates, age standardised to world standard population, are similar to or higher than many Western nations. These rates are also much higher than those reported previously from the other parts of India.

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Stroke burden in India has been rising from last few decades, in contrast to developed countries, where stroke prevalence has decreased or plateaued. Based on the pathological background, the stroke may be either of ischemic or hemorrhagic type. Thrombotic cerebral infarction results from the atherosclerotic obstruction of large cervical and cerebral arteries, with ischemia in all or part of the territory of the occluded artery. This can be due to occlusion at the site of the main atherosclerotic lesion or to embolism from this site to more distal cerebral arteries. Several other causes of cerebral infarction exist and are of great practical importance for patient management. As they are relatively rare they can be ignored for most epidemiological purposes. Although mortality rates of ischemic stroke have been reported to be lower (25.9%) as compared to hemorrhagic stroke (49.2%), yet more than one-sixth (17.5%) of ischemic stroke patients have been reported not to survive beyond three months of stroke episode. In India, stroke accounts for nearly 1.2% of total deaths in country. This high mortality is concerning and has attracted the interest of many workers. It has been shown that stroke severity, age, sex, cardiovascular risk factors, smoking habit, atrial fibrillation, hypertension, atherosclerosis, hyperlipidemia, previous myocardial infarction, previous stroke and older age have been reported to be risk factors associated with mortality in stroke patients. Carotid intima media thickness (CIMT or IMT) has

emerged as a useful screening tool for detection of the presence of atherosclerosis, cardiovascular risk and associated mortality. Evidence has also emerged regarding the role of carotid intima media thickness in the prediction of major cardiovascular events or death after a first-ever ischemic stroke, however, there are reports that suggest that carotid intima media thickness has nothing to do with the functional outcome after acute ischaemic stroke.

MATERIALS AND METHODS

The present study was prospective observational study done in total 200 patients of acute ischemic stroke. The diagnosis of ischemic stroke was based on the clinical profile and confirmed by CT / MRI as defined by ASA/AHA. Patients with stroke older than 3 days and hemorrhagic stroke were excluded.The selected patients underwent other investigations as and when required. CIMT was measured on day 1 by using B-mode (brightness mode) ultrasound. In the present study intima media thickness was measured just before bifurcation of common carotid artery. Patients were followed for 30 days after stroke. Statistical analysis was done by SPSS software version 18 by using Pearson's Chi-square test and student t-test. P-value of less than 0.05 was considered significant.

RESULTS

Table 1 shows the distribution of cases according to age. Age of patients ranged from 45 to 78 years. Majority of patients were in between 51-70 years (n=43; 86%). There were only 12 (6%) patients aged ≤50 years, 44 (22.0%) patients were 66-70 years and 16 (8.0%) patients were aged >70 years. Mean age of patients was 61.18±7.59 years. Table 2 shows CIMT values of left side ranged from 0.05cmcm to 0.10 with a mean value of 0.074±0.012. At right side, CIMT values ranged from 0.06cmcm to 0.12 with a mean value of 0.077±0.017 cm. Average CIMT value ranged from 0.055cm to 0.11 cm with a mean value of 0.075±0.013. After one month, a total of 44 (22%) patients showed improvement, 52 (26%) showed survival without change in status. A total of 56 (28%) were lost to follow up and a total of 48 (24%) expired.

DISSCUSSION

Acute ischemic stroke carries with it a huge burden of short-term mortality and disability throughout the world (WHO, 2002; Das *et al.*, 2007; Carter *et al.*, 2007; Xian *et al.*, 2011; Fonarow*et al.*, 2012; Chaudhuri*et al.*, 2013). This huge burden of mortality has attracted the focus of healthcare community throughout the world to assess, evaluate and give weightage to different predictor variables that can predict a poor outcome and hence provide the basis for improvement. Thousands of studies throughout the world have been carried out on this issue and are still undergoing at different centres (Ellul *et al.*, 2004; Hatano, 1976; Lanktree *et al.*, 2009; Prati *et al.*, 2008; Vaartjes *et al.*, 2013). As a result, despite incline in incidence of ischemic stroke, the mortality rate has been on the decline (Vaartjes *et al.*, 2013). Considering the dynamics of factors affecting the mortality, it is important that newer relevant factors should be identified and reevaluated in view of changing environmental, infrastructural and clinical manifestation of acute ischemic stroke. In present study, we attempted to detect correlation of CIMT with acute(short term) mortality in patients with acute ischemic stroke.CIMT is a new variable, relevance of which as a predictor of acute ischemic stroke itself and as a predictor of its outcome especially in Indian conditions (Sahoo *et al.*, 2009; Das *et al.*, 2015). With this background, the present study was carried out to evaluate the predictive value a new emerging parameter (CIMT), so that the predictive modelling for early mortality in elderly patients with acute ischemic stroke could be predicted precisely. For this purpose a total of 200 elderly patients with acute ischemic stroke were enrolled in the study. The age of patients ranged from 45 to78 years. With CIMT, although we reviewed two studies showing association of acute ischemic stroke with CIMT (Mukherjee *et al.*, 2006; Sahoo *et al.*, 2009), but neither of two studies showed an association of CIMT with short term mortality in cases of acute ischemic stroke. In present study, we found that average CIMT measurements of patients who expired was nearly similar compared to that of patients who survived, thus indicating, no relation between CIMT and short term mortality in patients with acute ischemic stroke.

Table 1. Distribution of cases according to age

SN	Age Group	No. of cases	Percentage
1.	≤50 Yrs	12	6.0
2.	51-55 Yrs	36	18.0
3.	56-60 Yrs	44	22.0
4.	61-65 Yrs	48	24.0
5.	66-70 Yrs	44	22.0
6.	>70 Yrs	16	8.0
Mean Age±SD (Range in yrs)		61.18±7.59 (45-78)	

Table 2. CIMT Values

	N	Minimum(cm)	Maximum(cm)	Mean(cm)	Std. Deviation
Left	50	0.05	0.10	0.074	0.012
Right	50	0.06	0.12	0.077	0.017
Average	50	0.055	0.11	0.076	0.013

Table 3. Status after one month

SN	Status	No. of cases	Percentage
1.	Improvement	44	22.0
2.	Survival with no change	52	26.0
3.	Death	48	24.0
4.	Loss to follow up	56	28.0

After one month, a total of 44 (22%) patients showed improvement, 52 (26%) showed survival without change in status. A total of 56 (28%) were lost to follow up and a total of 48 (24%) expired. Thus the correlation of different variables with outcome could be done in only 144 patients as the outcome of patients was not known in 56 patients who were lost to follow up. Effective mortality rate was thus 33.3%. This mortality rate is in agreement with the reported short-term mortality rate of 25.9% as reported by Andersen *et al.* (2009). A slightly lower mortality rate of 22.7% was reported by Bhalla *et al.* (2002). De Jong *et al.* (2003) in their study reported a mortality rate of 36% but over a 1-year long follow up. Basri and Ali (2003) in contrast reported a much lower case fatality rate of 11.7% but within an average follow up period of 7.5 days. In a much larger study, Collins *et al.* (2003) who reported a series of 34,866 patients of ischemic stroke reported the 30-day mortality to be merely 7.4%. In another evaluation of a big series of 13,440 ischemic stroke patients, Heuschmann *et al.* (2004) reported the in-hospital mortality rate of 4.9%. Sawalha (2009) reported an in-hospital mortality rate of 17%. Smith *et al.* (2010) in another big series of 274,988 ischemic stroke patients reported an in-hospital mortality rate of 5.5%. A 30-day mortality rate of 13% was reported by Nedeltchev*et al.* (2010). Similar to our study, Ayazoglu *et al.* (2011) reported a mortality rate of 34.54% in their series of fifty five patients of stroke. The limitation of present study was a huge loss to follow up. This huge loss to follow up limited the already small sample size and failed to establish a statistically significant association with categorical variables.

Conclusion

The findings in present study showed that carotid intima media in acute ischemic stroke patients did not provide any useful information with respect to acute mortality (short term). Further study to clarify role of each factor is recommended on a larger sample size.

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