

**Original article****PREVALENCE OF POSITIVE TROPONIN AND ECHOCARDIOGRAM IN PATIENTS WITH ACUTE ISCHEMIC STROKE FINDINGS AND THEIR ASSOCIATION WITH MORTALITY**

Khalid Mohiuddin, Aidel Fayaz, P A Shah, Hamed Bashir

**Abstract****Introduction:**

Adverse cardiac events after stroke are associated with increased mortality. Current American Heart Association/American Stroke Association guidelines recommend evaluating cardiac biomarkers (preferably cardiac troponin [cTn]) in all patients presenting with acute ischemic stroke

**Objectives:**

Aim of current study was to analyze the prevalence of positive troponin levels and abnormal echocardiograph findings in patients admitted with acute ischemic stroke, and to analyse association of troponin levels with mortality rates in these patients.

**Results:**

Mortality rates were higher in patients with elevated troponin levels (23.3 % vs 8.4% in patients with trop > 14ng/l and trop <14nh/l respectively) with significant p value of 0.007. Non-fatal MI was higher in patients with elevated troponin levels (44.2 % vs 3.6% in patients with trop > 14ng/l and trop <14nh/l respectively). MACE rate was found in 13.9% patients with normal troponin levels and 39.5% patients with elevated troponin levels. During post discharge follow up, 11 6.6% patients who died from any cause had normal troponin levels as compared to 30.2% patients who had elevated troponin levels. The difference was found to be statistically significant (p < 0.05).

**Conclusion:**

Elevation of cTnT occurs in patients with acute ischemic stroke and can be regarded as a predictor of poor functional outcome and increased mortality

**JK-Practitioner2021;26(1): 5-9****INTRODUCTION**

Cardiovascular and cerebrovascular disease are two major causes of death and disability in the United States.<sup>1,2</sup> Since adverse cardiac events are associated with increased mortality after stroke, current American Heart Association/American Stroke Association guidelines recommend evaluating cardiac biomarkers (preferably cardiac troponin [cTn]) in all patients presenting with acute ischemic stroke.<sup>3-5</sup> Although cTn is highly specific for myocardial injury, it does not reveal the underlying mechanism of injury.<sup>6</sup> The majority of patients with acute ischemic stroke have neither typical symptoms nor electrocardiographic evidence of acute coronary ischemia, but between 5% and 34% of these patients have cTn levels above the diagnostic threshold, suggesting ongoing myocardial injury, when conventional assays are used; when high-sensitivity assays are used, this rate can be as high as 60%.<sup>7,8</sup> Scheitz JF et al (2012)<sup>9</sup> found that 14% of patients admitted with AIS had significant cTnT elevation.

Apart from raised troponin levels, significant number of patients with ischemic stroke have abnormal echocardiographic findings. Cardio embolic AIS per-se accounts for 20% of all AIS. Hypertroponinemia in AIS, as evidence of underlying demand ischemia, has been linked to cardiac dyskinesias detectable on echocardiography. Darki A et al (2013)<sup>10</sup> found that 17.5% patients with AIS had a positive troponin level. 67%

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**Keywords:**

Acute ischemic stroke, troponin levels, Hs-cTnTof

patients with a positive troponin level had a new wall motion abnormality on echocardiogram that was suggestive of unstable atherosclerotic disease. Svatikova A et al (2011)<sup>11</sup> compared echocardiographic findings in ischemic stroke patients with and without OSA. Ischemic stroke subjects, regardless of their OSA status, had LV diastolic dysfunction. Dasti MA, et al (2016)<sup>12</sup> found that 70% of patients admitted with cva had abnormal echo finding. (Global Hypokinesia -28.5%, LVH -25.7% and diasystolic dysfunction in 17.14%, were predominate).

Irrespective of the underlying mechanism, elevated cTn values are associated with worse clinical outcomes and a higher risk of mortality in patients with acute ischemic stroke.<sup>8-11</sup> PuvardaveV et al (2016)<sup>13</sup> concluded that raised cardiac Troponin I in acute ischemic stroke without clinical or ECG changes of MI predicts adverse cardiac outcome in the form of non-fatal MI. Su YC et al (2016)<sup>14</sup>, atTzu chi University Hualien Taiwan, conducted a retrospective study, enrolling 871 patients with Acute Ischemic Stroke. They concluded that elevation of TnI during stroke is a strong independent predictor of both poor out come and in-hospital mortality.

Aim of current study was to analyze the prevalence of positive troponin levels and abnormal echocardiograph findings in patients admitted with acute ischemic stroke, and to analyse association of troponin levels with mortality rates in these patients.

Aims and objectives:

1. To analyze the prevalence of positive troponin and abnormal echocardiograph findings in patients with acute ischemic stroke, and
2. To analyze the association of elevated troponin levels with mortality in acute ischemic stroke.

### Material and methods

The present prospective cohort study was conducted in the Postgraduate Department of Medicine, Government Medical College Srinagar. All consecutive patients > 20years of age admitted with acute ischemic stroke were enrolled in the study. Apart from detailed clinical history, relevant clinical examination was done in every patient. Routine hematological investigations like CBC, LFT, Electrolytes, VBG, was done. Imaging in the form of plain CT brain (16 slice Somatom Emotion) and/or MRI (3-Tesla Magnatom Siemen's) brain was performed in every patient. QuantitativeTrop T levels were done in all patients using Chemiluminescent Micro-particle Immunoassay (CMIA) test. Echocardiography was done on all patients using Zonare Medical System (Saint Jude)

echocardiography machine. Relevant investigations were also done for determination of etiology of stroke whenever necessary.

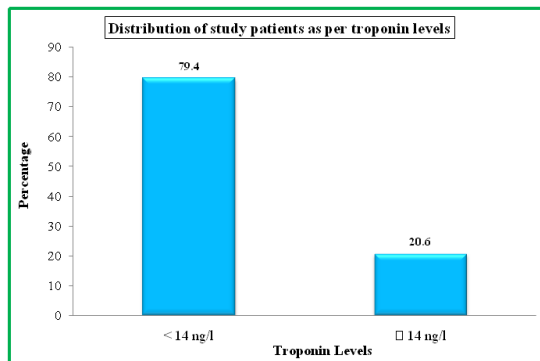
Statistical methods:

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean±SD and categorical variables were summarized as frequencies and percentages. Graphically the data was presented by bar and pie diagrams. Chi-square test was employed for comparing 30-Day mortality with respect to age, gender, troponin levels and echocardiographic findings A P-value of less than 0.05 was considered statistically significant. All P-values were two tailed.

### Results

A total of 209 patients were enrolled in current study. The mean age of study cohort was 52.3 years. Male dominated the study comprising of 67.5% of patients. Various clinical features were seen in our study patients. Majority of the patients had weakness 191 (91.4%) followed by altered sensorium and aphasia in 182 (87.1%), sensory disturbance in 168 (80.4%) patients, cranial nerve lesions in 167 (79.9%) patients. Seizures were seen in 152 (82.7%) patients and involuntary movements in 144 (68.9%) patients.

Patients were distributed as per troponin levels, <14ng/l troponin level was observed in 166 (79.4%) patients while as >14ng/l troponin level was found in 43 (20.6%) patients (Fig 1).



**Fig 1: Distribution of study patients as per troponin elevation.**

On echocardiography majority of patients, in our study, had global hypokinesia of left ventricle (30.6%). Other echocardiographic abnormalities noted were: left ventricular hypertrophy (24.4%), diastolic dysfunction (18.2%), mitral regurgitation(4.3%), cardiomyopathy (3.3%),

intracardiac thrombus(1.4%). 7.2% patients had multiple abnormal findings on echocardiography [table 1].

**Table 1: Echocardiographic findings in study patients**

Echocardiographic findings	No. of Patients	Percentage
Global hypokinesia	64	30.6
Left ventricular hypertrophy	51	24.4
Mitral regurgitation	9	4.3
Diastolic dysfunction	38	18.2
Systolic dysfunction	22	10.5
Intracardiac thrombus	3	1.4
Cardiomyopathy	7	3.3
Multiple abnormalities	15	7.2
Total	209	100

When 30-day mortality was compared as per troponin levels, mortality rates was higher in patients with elevated troponin levels (23.3 % vs 8.4% in patients with trop > 14ng/l and trop <14nh/l respectively) with significant p value of 0.007(Table 2). Non-fatal MI was higher in patients with elevated troponin levels (44.2 % vs 3.6% in patients with trop > 14ng/l and trop <14nh/l respectively) (Table 3). MACE rate was found in 13.9% patients with normal troponin levels and 39.5% patients with elevated troponin levels. During post discharge follow up, 11 6.6% patients who died from any cause had normal troponin levels as compared to 30.2% patients who had elevated troponin levels. The difference was found to be statistically significant (p < 0.05).

**Table 2: Showing 30 day mortality as per troponin levels in study patients**

Troponin Levels	N	30 Day Mortality		P-value
		No.	%age	
< 14 ng/l	166	14	8.4	0.007*
? 14 ng/l	43	10	23.3	
Total	209	24	11.5	

**Table 3: Incidence of adverse outcomes during post discharge follow-up**

Variable	Normal Troponin		Elevated Troponin		P-value
	No.	%age	No.	%age	
Nonfatal MI	6	3.6	19	44.2	<0.001*
MACE	23	13.9	17	39.5	<0.001*
Death from any cause	11	6.6	13	30.2	<0.001*

\*Statistically Significant Difference (P-value<0.0

## Discussion:

Many studies have shown that serum Hs-cTnT in many patients with acute stroke increases significantly. The current treatment guidelines for acute ischemic stroke patients recommend troponin evaluation in acute stage<sup>3</sup>. It is still controversial whether the increase of troponin after acute ischemic stroke (AIS) is related to the mortality and disability rate of stroke patients. Most studies suggest that there is a link between them, but a few studies that hold the opposite view. Some studies have shown that elevated troponin is related to poor functional prognosis, and high troponin levels is associated with increased mortality<sup>9</sup>. The potential pathophysiological mechanism of troponin elevation in the AIS is still unclear, leading to considerable uncertainty in the diagnosis and treatment for the clinician. Darki A et al (2013)<sup>10</sup> in their study found 24 of 137 patients (17.5%) had a positive troponin level. The prevalence of elevated troponin in acute ischemic stroke was 17.5% in a study conducted by Kerr G et al (2009)<sup>8</sup>. Abdi S et al (2015)<sup>15</sup> in their study conducted on 114 patients found elevated Troponin T in 20 (17.6%). Akpinar O, et al (2017)<sup>16</sup> found 11 patients with troponin T levels above 0.014ng/ml. Similar results were seen in current study with significant trop elevation was seen in 20.6% of patients admitted with AIS.

On echocardiography majority of patients, in our study, had global hypokinesia of left ventricle (30.6%). Other echocardiographic abnormalities noted were: left ventricular hypertrophy (24.4%), diastolic dysfunction (18.2%), mitral regurgitation(4.3%), cardiomyopathy (3.3%), intracardiac thrombus(1.4%). 7.2% patients had multiple abnormal findings on echocardiography. Wrigley P et al (2017)<sup>17</sup> conducted a study in which the most frequent echocardiogram finding was cardiomyopathy with a low ejection fraction, which was found in 107 (7.8%). Yaghi S et al (2018)<sup>18</sup> investigated the yield of transthoracic echocardiography (TTE) in patients with ischemic stroke. The stroke subtypes were as follows: 315 (54.5%) cardioembolic, 150 (26.0%) large artery disease, 97 (16.8%) small vessel disease, and 16 (2.8%) other defined mechanism. Limited data from Ambrosiet al. also showed very high prevalence of diastolic dysfunction in stroke patients, although this finding is not commonly reported<sup>19</sup>. Diastolic dysfunction with preserved ejection fraction is common in elderly patients with coexisting cardiovascular conditions and in stroke patients also suggests that the study group is representative of the general stroke population.

When 30-day mortality was compared as per

troponin levels, more patients with troponin levels >14ng/l (23.3%) than patients with troponin levels <14ng/l (8.4%) had 30-day mortality. In a study conducted by Kral M et al (2013)<sup>20</sup>, the 30-day mortality rate was higher in patients with elevated cTnT.

Non-fatal MI was observed in 6 (3.6%) patients with normal troponin levels and 19 (44.2%) patients with elevated troponin levels during post-discharge follow up. MACE was found in 13.9% patients with normal troponin levels and 39.5% patients with elevated troponin levels. During post discharge follow up, 6.6% patients who died from any cause had normal troponin levels as compared to 13 (30.2%) patients who had elevated troponin levels. The difference was found to be statistically significant when adverse outcome was observed in patients who had normal or elevated troponin levels ( $p < 0.05$ ). Kim YD et al. (2017)<sup>21</sup> compared long term cerebrovascular outcomes between patients who underwent multi-detector coronary computed tomography (MDCT) and those who did not. In their study, during a follow up period of 38.0+24.8 months, 60 patients developed cardiovascular events including fatal myocardial infarction or sudden cardiac death in 29 (0.9%), non-fatal myocardial infarction in 27 (0.86%) and congestive heart failure in 4 (0.1%) patients.

#### Conclusion:

Cardiac findings and hypertropinemia are common in acute ischemic stroke patients even in the absence of concurrent myocardial infarction and hypertropinemia is independently associated with mortality. Elevation of cTnT occurs in patients with acute ischemic stroke and can be regarded as a predictor of poor functional outcome and increased mortality. Further studies are needed to determine whether cardiac evaluation in acute ischemic stroke patients might prevent the mortality.

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