



## Significance of Cardiac Enzymes in Patients with Acute Stroke

Authors

**Dr P.Mohanapriya<sup>\*1</sup>, Dr S.Sudharsan<sup>2</sup>, Dr J.T.Sathishkumar<sup>3</sup>**

<sup>\*1,3</sup>Post graduate, Department of General Medicine, Rajah Muthiah Medical College and Hospital, Annamalai University, Annamalai Nagar-608002

<sup>2</sup>Professor, Department of General Medicine, Rajah Muthiah Medical College and Hospital, Annamalai University, Annamalai Nagar-608002

### Abstract

*Stroke is a cerebrovascular event where in neurological deficit develops over minutes or hours, in a stepwise fashion, persists for twenty-four hours or more and is because of a vascular disturbance which include arterial occlusion with consequent ischemic focal infarction of the brain. Various studies confirmed myocardial damage in stroke. So this study was done to assess the cardiac damage with the usage of CK-MB, Trop -T in patients with acute stroke. Cardiac enzymes like creatine kinase (CK-MB) and Troponin-T studied in these patients showed that CK-MB which was specific for myocardial infarction loses its specificity in patients with stroke. CK-MB elevation in these patients does not indicate cardiac damage. Troponin -T was negative in most of the patients.*

**Keywords:** stroke, cardiac damage, CK-MB, Trop-T.

### Introduction

Stroke is the second most common cause of morbidity and disability worldwide. Majority of cases of strokes are reported in people over the age of 65 years and about 1/3 rd of patients die of stroke with the early onset. In twentieth century Levy showed that alteration in central nervous system (CNS) metabolism affects cardiac function<sup>(1)</sup>. Physician regularly encounters patients with ECG changes associated with CNS lesions. Repolarization disturbances and dysrhythmias in acute stroke can be due to release of catecholamines, direct neural outcomes mediated from the CNS via neurons ending on the heart<sup>(2)</sup>, or co existing ischaemic heart disease<sup>(3)</sup>.

Cardiac troponin is the important marker for myocardial damage<sup>(4)</sup>. It detects trace amounts of damaged myocardium, even though CK-MB and

ECG remains normal. Elevation in cardiac troponins may be sensitive for cardiac damage secondary to cerebral infarction, provided that patients no longer have concomitant coronary ischaemia.

Creatine - kinase-MB (CK-MB) has been found to be elevated in certain patients with ischaemic stroke, subarachnoid haemorrhage, and head trauma.

Elevated cardiac enzymes - serum glutamic oxaloacetic transaminase (SGOT), lactate dehydrogenase (LDH) and creatine phospho-kinase (CK) - have been reported in early phase of stroke. Dysfunction in sympathetic nervous system plays a role in producing MB isoenzyme from the myocardium and intracranial arterial spasm.

This study therefore aims to show how frequently cardiac enzymes are increased in acute stroke and

whether their presence would have any clinical significance.

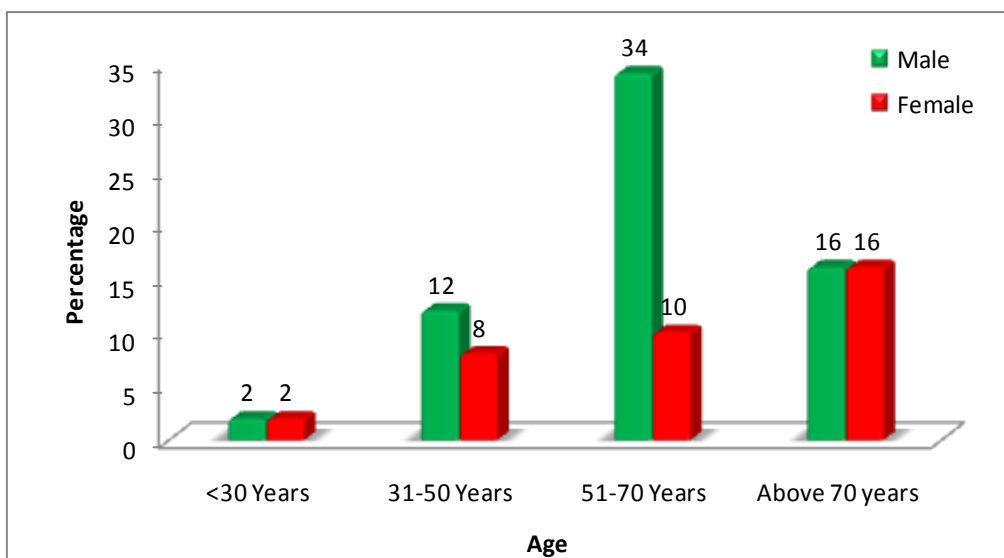
**Methodology**

This study was conducted at Rajah Muthiah Medical College and Hospital, Chidambaram, during the period between November 2015 and April 2017. 50 patients who was admitted with acute stroke within 72 hours of onset was taken up for the study. Patients with preceding stroke, CAD, those on statins, antiplatelets were excluded from the study. Clinical examination, cardiac enzymes like CK-MB, Trop-T, ECG and Echo was done.

**Observations and Results**

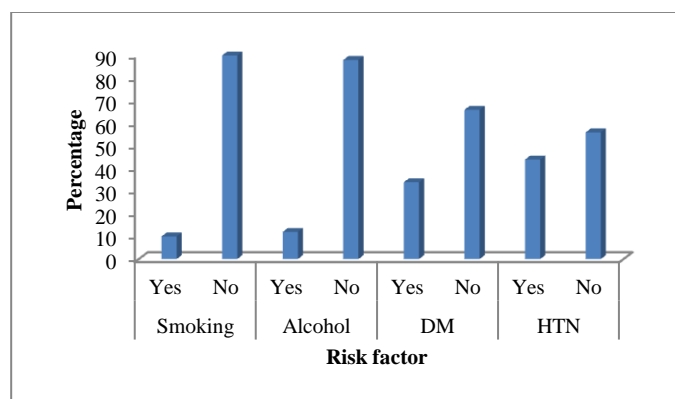
**Table 1: Age Vs Sex Distribution**

Age	SEX				Total
	Male		Female		
	N	%	N	%	
<30 Years	1	2	1	2	2
31-50 Years	6	12	4	8	10
51-70 Years	17	34	5	10	22
Above 70 years	8	16	8	16	16
Total	32	64	18	36	50



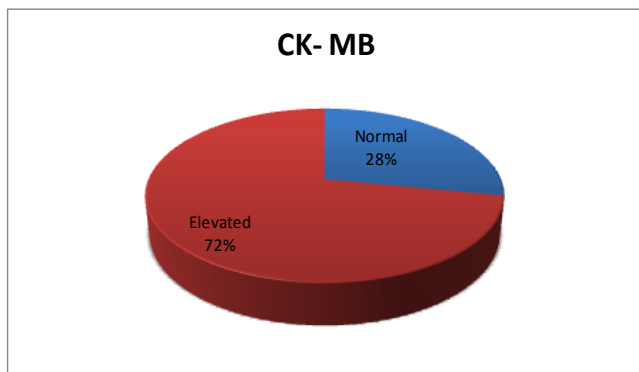
**Table 2: Risk Factor Distribution**

		No. of patients	Percentage
Smoking	Yes	5	10.0
	No	45	90.0
Alcohol	Yes	6	12.0
	No	44	88.0
DM	Yes	17	34.0
	No	33	66.0
HTN	Yes	22	44.0
	No	28	56.0



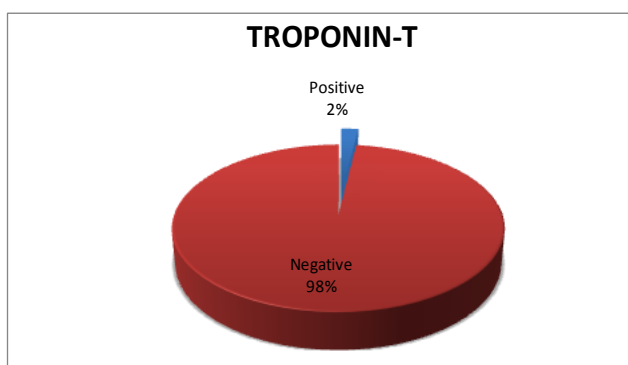
**Table - 3: CK-MB levels in acute stroke**

CK- MB	No. of patients	Percentage
Normal	14	28.0
Elevated	36	72.0
Total	50	100.0



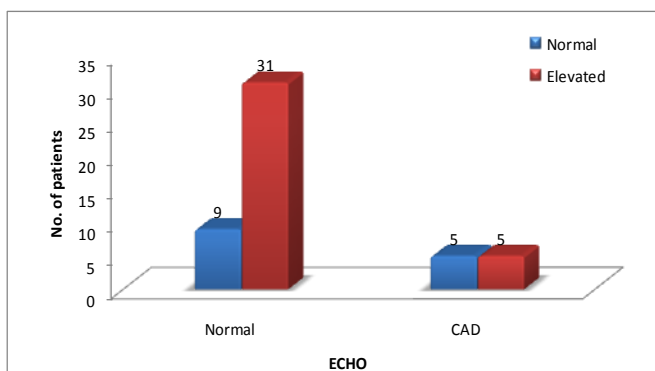
**Table 4:** TROP –T levels in acute stroke

	No. of patients	Percentage
Positive	1	2.0
Negative	49	98.0
Total	50	100.0



**Table -5:** ECHO vs CK-MB Co-Relation

ECHO	CK- MB		Total
	Normal	Elevated	
Normal	9	31	40
CAD	5	5	10
Total	14	36	50



**Discussion**

This study consists of 50 cases of acute stroke in whom cardiac enzymes like CK-MB, Trop T,

ECG and Echo was done. Of these 50 cases, 36 patients had raised CK-MB. 31 of them had normal ECG and Echo whilst the rest had ECG and Echo findings of CAD. Trop-T was normal in majority of cases.

Males are most commonly affected in stroke. Studies (Nayak et al, Lipska et al) done on ischemic stroke in the age group between 15-45 years from India reported a male preponderance<sup>(5,6)</sup>.

But in our study, the most common age group is amongst 51-70 yrs . According to Carolei et al<sup>(7)</sup>, Kwon et al<sup>(8)</sup>, Varona et al<sup>(9)</sup> found that of all subtypes of stroke in young adults, thrombotic stroke was the most common followed by embolic and hemorrhagic.

According to Mehindiratta MM et al Smoking, Alcoholism, Hypertension were found to be related to ischemic stroke<sup>(10)</sup>.

Diabetes was not observed to be a risk factor in Sweden and Taiwan but in our study (34%) Diabetes had been reported. It corresponds to Lipska study<sup>(11)</sup>. Dr. Bogarapu Kiranmayi M.D et al found that Cardiac enzymes like CK-MB which are specific for myocardial infarction loses its specificity in patients with stroke. Elevated CK-MB levels in stroke patients does not always reveals myocardial damage. This shows that CK-MB is not the only marker of cardiac myocytolysis. Abnormally excessive levels of plasma catecholamine secondary to rapidly increase in intracranial pressure<sup>(13)</sup>, skeletal muscle damage as a result of a multiple injections<sup>(14)</sup>, negative caloric balance<sup>(15)</sup> can be some of the reasons attributed to the elevation of CK-MB levels in these patients.

A study carried out in the University of Babylon, Iraq 2010 to determine the prognostic Significance of Troponin T and Creatine Kinase-MB in sera of patients with Acute Ischaemic Stroke<sup>(16)</sup>. This observation concludes that patients with raised Trop-T had myocardial damage and the extent correlates with stroke severity. Elevated CK-MB was found to be of non cardiac origin. The findings of our study correlates with the above studies. We determined that most of the patients

with elevated CK-MB had normal ECG and Echo findings, suggestive of non cardiac origin.

### Conclusion

In this study patients with raised CKMB levels did not have myocardial damage as the ECG and ECHO was normal. The elevation of CK-MB does no longer indicate acute coronary damage and the ECG changes moreover do not correlate with myocardial damage.

Troponin –T, a specific marker of myocardial damage, does not increase after stroke. Normal Trop-T along with raised CK-MB suggests that, CK-MB is not the only biological marker for myocytolysis. Hence CK-MB elevations in stroke patients are possibly to be of non cardiac origin.

### Bibliography

1. Levy A. The exiting cause of ventricular fibrillation in animals under chloroform anesthesia. *Heart*. 1913; 4: 319-78.
2. Davis TP, Alexander J, Lesch M. Electrocardiographic changes Associated with acute cerebrovascular disease: a clinical review. *Prog Cardiovasc Dis*. 1993; 36: 245-60.
3. Hasdai D, Haim M, Behar S, Boyako V, Battler A. Acute coronary syndromes in patients with prior cerebrovascular events: lessons from the Euro-Heart Survey of Acute Coronary syndromes. *Am Heart J*. 2003; 146: 832-8.
4. Weidler DJ. Myocardial damage and cardiac arrhythmias after Intracranial heamorrhage: A critical review. *Stroke*.1974; 5: 759-764.
5. Nayak SD, Nair M, Radhakrishnan K. Sarma PS. Ischemic stroke in the young adult: clinical features risk factors and outcome. *Nat Med. J India*1997;10:107-12.
6. Lipska K, Sylaja PN, Sarma PS, Thangappan KR, Kutty VR, Vasam RS, et al. Risk factors for acute ischemic stroke in young adults in South India. *J Neurol Neurosurg psychiatry* 2007; 78; 959-963.
7. Carolei A, Marinic, Ferranti E, Frontoni M, Prencipe M, et al 1993. A prospective study of cerebral ischemic in young; analysis of pathogenic determinants. The national research council study group stroke 24: 362-367.
8. Kwon SU, Kim JS, Lee JH, Lee Mc (2000) Ischemic stroke in young adults. *Acta Neurol Scand* 101: 19-24.
9. Varona JF, Guerra, JM, Bermej OF (2004) stroke in young adults. *Med clin (Barc)* 122: 70-74.
10. Mehindratta MM, Agarwal P, Sen K, Sharma B, Stroke in young adults; A study from a Univesity hospital in North India. *Med Sci Monit* 2004; CR 535-541.
11. Clinical profile of stroke in eastern Nepal; Kathmandu university medical jou. 2006.
12. Dr. Bogarapu Kiranmayi M.D1, et al, (Department of Biochemistry, Siddhartha Medical College, Vijayawada, Andhra Pradesh, India) 2015 conducted a study on Evaluation of CK MB levels in Acute Ischemic stroke.
13. Prognostic significance of admission levels of Troponin I in patients with acute ischemic stroke E Di Angelantonio, M. Fiorelli and et al *J Neural Neurosurg Psychiatry* 2005; 76: 76-81, doi: 10.1136/innp.2004.041491.
14. Hakan Ay, MD; Ethem Murat Arsava, MD; Okay Saribas, MD Creatine Kinase – MB elevation after stroke is not cardiac in origin – *Stroke* 2002; 33: 286-289.
15. Thomas P.Davis, Jay Alexander, Michael Lesch Electrocardiographic changes associated with acute cerebrovascular disease: A clinical review *Progress in Cardiovascular Diseases – 1993 Nov-Dec; 36(3): 245-260.*