ORIGINAL RESEARCH

Ischemia Modified Albumin (IMA): A Promising Marker in Ischemic Heart Disease Journeying Beyond Conventional Measures

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ABSTRACT
Background: Acute myocardial infarction and ischemic cardiac conditions are one of the most difficult situations emergency physician has to deal in view of exercising clinical decisions regarding admission or discharge from the emergency department. Ischemic Modified Albumin (IMA) is a laboratory test that measures the level of modified albumin in the blood. Albumin is a protein produced by the liver and plays a crucial role in carrying various substances in the bloodstream, such as hormones, drugs, and fatty acids. **Aim**: The present study was conducted to assess ischemia modified albumin (IMA) as a novel marker in ischemic heart disease. **Materials & Methods:** 74 cases of ischemic heart disease of both genders was recorded. ST-segment elevation myocardial infarction (STEMI) was diagnosed if there was ST segment elevation >0.1mv in 2 or more contiguous leads with cardiac troponin (cTnT) >0.05ng/ml; non-ST-segment elevation myocardial infarction (NSTEMI) was diagnosed if EKG did not show ST-segment elevation and troponin (cTnT) was >0.05ng/ml. Estimation of ischemic modified albumin (IMA) and TnT was done. **Results:** Out of 74 patients, males were 40 and females were 34. The mean IMA and TnT level in 15 cases of COPD asthma was 95.1 and 0.0118, 20 cases of CAD was 97.2 and 0.054, in 12 cases of GERD Gastritis was 101.8 and 0.035, 6 cases of pneumonia was 97.2 and 0.017, in 2 cases of TIA stroke was 99.4 and 0.01, in 8 cases of anemia was 93.2 and 0.02, in 6 cases of sepsis was 142.9 and 0.014 and in 4 cases of pancreatitis was 102.7 and 0.22 respectively. The difference was significant (P< 0.05). Hospitalization < 5 days was seen in 60, 5-9 days in 8 and >10 days in 4 patients. Readmission was seen in 8. Interventions done was stress in 7, Echo in 8 and CT A (angio) in 4 patients. The difference was significant (P<0.05). **Conclusion:** Ischemia-modified albumin may be utilized as a novel marker of ischemia to rule out acute coronary syndrome along with troponin and electrocardiogram in the emergency departments.

Key words: Ischemia-modified albumin, troponin, electrocardiogram

INTRODUCTION

Acute myocardial infarction and ischemic cardiac conditions are one of the most difficult situations emergency physician has to deal in view of exercising clinical decisions regarding admission or discharge from the emergency department.[1] Ischemic Modified Albumin (IMA) is a laboratory test that measures the level of modified albumin in the blood.[2] Albumin is a protein produced by the liver and plays a crucial role in carrying various substances in the bloodstream, such as hormones, drugs, and fatty acids.[3] In conditions where there is inadequate blood supply (ischemia) to certain tissues or organs, such as in myocardial ischemia (lack of blood flow to the heart muscle) or cerebral ischemia (lack of blood flow to the brain), changes can occur in the structure of albumin. These structural changes can result in the formation of ischemic modified albumin.[4]

The IMA test is primarily used as a marker to assess the presence and severity of ischemia in certain

clinical conditions.[5] It is particularly used in suspected cases of acute myocardial infarction (heart attack) or acute coronary syndrome, where the blood flow to the heart muscle is compromised. Elevated levels of ischemic modified albumin may indicate ongoing ischemia and can help guide further diagnostic and treatment decisions.[6] The present study was conducted to assess ischemia modified albumin (IMA) as a novel marker in ischemic heart disease.

AIM

The present study was conducted to assess ischemia modified albumin (IMA) as a novel marker in ischemic heart disease.

MATERIALS & METHODS

The present study consisted of 74 cases of ischemic heart disease of both genders. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. ST-segment elevation myocardial infarction (STEMI) was diagnosed if there was ST segment elevation >0.1mv in 2 or more contiguous leads with cardiac troponin (cTnT) >0.05ng/ml; non-ST-segment elevation myocardial infarction (NSTEMI) was diagnosed if EKG did not show ST-segment elevation and troponin (cTnT) was >0.05ng/ml. Estimation of ischemic modified albumin (IMA) and TnT was done. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 74		
Gender	**Male**	**Female**
Number	40	34

Table I shows that out of 74 patients, males were 40 and females were 34.

Table II Final diagnosis

Diagnosis	Number	IMA	TnT
COPD Asthma	15	95.1	0.0118
Coronary Artery Disease	20	97.2	0.054
GERD Gastritis	12	101.8	0.035
Pneumonia	6	97.2	0.017
TIA stroke	2	99.4	0.01
Anemia	8	93.2	0.02
Sepsis	6	142.9	0.014
Pancreatitis	4	102.7	0.22

Table II, graph I shows that the mean IMA and TnT level in 15 cases of COPD asthma was 95.1 and 0.0118, 20 cases of CAD was 97.2 and 0.054, in 12 cases of GERD Gastritis was 101.8 and 0.035, 6 cases of pneumonia was 97.2 and 0.017, in 2 cases of TIA stroke was 99.4 and 0.01, in 8 cases of anemia was 93.2 and 0.02, in 6 cases of sepsis was 142.9 and 0.014 and in 4 cases of pancreatitis was 102.7 and 0.22 respectively. The difference was significant (P< 0.05).

Graph I Final diagnosis

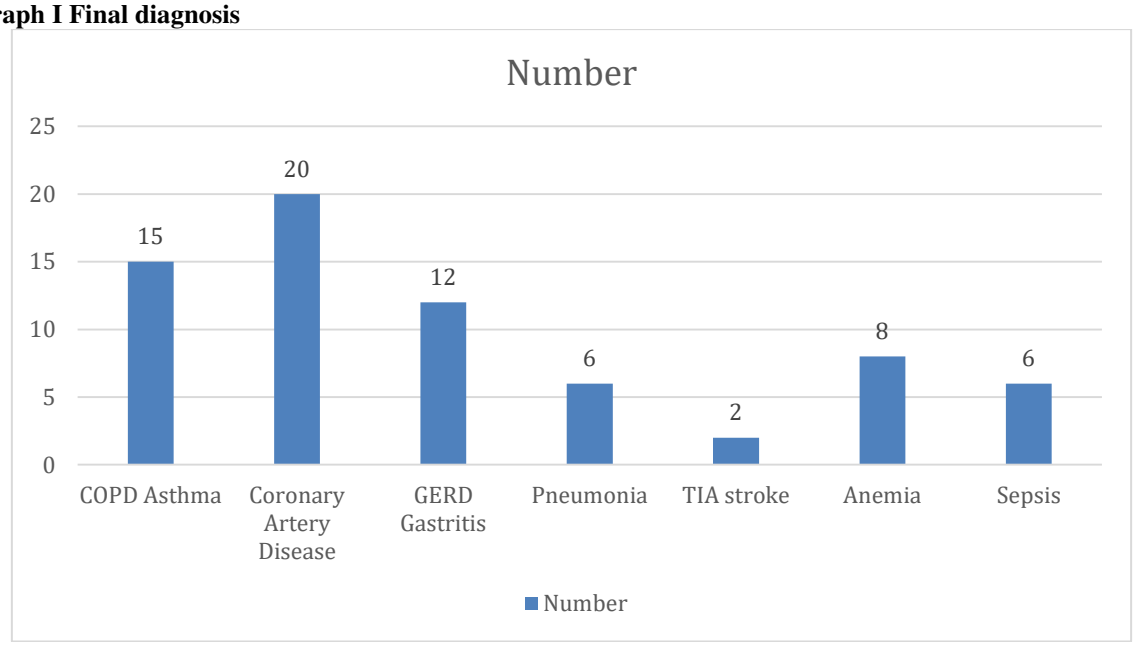

Table III Assessment of parameters

Parameters	Variables	Number	IMA	TnT	P value
Hospitalization (Days)	< 5 days	60	98.2	0.16	0.01
	5-9 days	8	102.5	0.12	
	>10 days	4	100.1	0.07	
Readmission	Yes	8	101.8	0.07	0.04
	No	66	97.2	0.18	
Interventions	Stress	7	98.3	0.10	0.05
	Echo	8	98.2	0.02	
	CT A (angio)	4	104.2	0.10	

Table III shows that hospitalization < 5 days was seen in 60, 5-9 days in 8 and >10 days in 4 patients. Readmission was seen in 8. Interventions done was stress in 7, Echo in 8 and CT A (angio) in 4 patients. The difference was significant (P<0.05).

DISCUSSION

Ischemia-modified albumin (IMA) is a biomarker of ischemia in several clinical scenarios and it is highly sensitive for the diagnosis of myocardial ischemia in patients presenting with symptoms of acute chest pain.[7] It has been shown to increase in presence of myocardial ischemia associated with percutaneous coronary intervention (PCI) and is also high in conditions of high oxidative stress.[8] It's important to note that the IMA test is just one component of a comprehensive evaluation for ischemic conditions. It is typically used in conjunction with other clinical assessments, electrocardiogram (ECG), cardiac enzyme tests, and imaging studies to provide a more complete picture of the patient's condition.[9,10] The present study was conducted to assess ischemia modified albumin (IMA) as a novel marker in ischemic heart disease.

We found that out of 74 patients, males were 40 and females were 34. Nepal et al[11] in their study a total of 351 patients presented with chest pain and subsequently were evaluated in the emergency department. Sensitivity and specificity of ischemia modified albumin (IMA) test was 80% and 50% respectively and positive predictive value and negative predictive values were 17% and 88% respectively. There were no further differences in cardiac events or interventions in higher ischemia modified albumin (IMA) group as compared to troponin (cTnT). People with higher ischemia modified albumin (IMA) showed longer hospitalization days, needing nursing home or skilled nursing facility on discharge due to high discharge needs and had more readmissions as compared to troponin. However, Higher ischemia modified albumin (IMA) did not predict more cardiovascular events during hospital stay, rather troponin (cTnT) test predicted arrhythmia more than ischemia modified albumin (IMA) test.

We observed that the mean IMA and TnT level in 15 cases of COPD asthma was 95.1 and 0.0118, 20 cases of CAD was 97.2 and 0.054, in 12 cases of GERD Gastritis was 101.8 and 0.035, 6 cases of pneumonia was 97.2 and 0.017, in 2 cases of TIA stroke was 99.4 and 0.01, in 8 cases of anemia was 93.2 and 0.02, in 6 cases of sepsis was 142.9 and 0.014 and in 4 cases of pancreatitis was 102.7 and 0.22 respectively. Sharma et al[12] in a sample of 114 renal transplant candidates found that ischemia modified albumin (IMA) and troponin (cTnT) combined not alone were independent predictors of death. Ischemia modified albumin (IMA) above 95 U/ml predicted long-term mortality with a sensitivity of 75% and a specificity of 72%.

We found that hospitalization < 5 days was seen in 60, 5-9 days in 8 and >10 days in 4 patients. Readmission was seen in 8. Interventions done was stress in 7, Echo in 8 and CT A (angio) in 4 patients. Worster et al[13] evaluated 189 patients with chest pain within 6 hours of onset of symptoms. Using cut-off ischemia modified albumin (IMA) of 80 U/ml, they documented 24 serious adverse outcomes at 72 hours including death, myocardial infarction (MI), congestive heart failure (CHF), and refractory chest pain. They had maximum sensitivity of 92.3% and specificity of 24.3% suggesting ischemia-modified albumin (IMA) to be a poor predictor of serious cardiac events in the short term

The limitation the study is small sample size.

CONCLUSION

In conclusion, the present study explored the potential of Ischemia Modified Albumin (IMA) as a novel marker in ischemic heart disease. The findings indicated that IMA levels showed significant variations among different clinical conditions, with elevated levels observed in patients with coronary artery disease, stroke, sepsis, and pancreatitis, among others. However, the study also highlighted certain limitations and discrepancies in the predictive value of IMA compared to other established markers such as cardiac troponin (cTnT).

While IMA demonstrated sensitivity in detecting myocardial ischemia and acute chest pain symptoms, its specificity was comparatively lower. Furthermore, the study revealed that higher IMA levels were associated with prolonged hospitalization, increased readmissions, and a higher need for post-discharge care. However, it did not consistently predict cardiovascular events during hospital stays.

The results obtained in this study are consistent with previous research, which also showcased the potential of IMA as a biomarker for ischemic conditions. However, further investigations involving larger

sample sizes and diverse populations are warranted to establish its clinical utility and determine its role in risk stratification and management decisions.

It is important to note that while IMA can provide valuable insights, it should not be considered a standalone diagnostic tool. Its integration with other diagnostic modalities, including electrocardiograms, cardiac enzymes, and imaging studies, is crucial for a comprehensive evaluation of ischemic heart disease.

In summary, IMA holds promise as a potential marker for assessing ischemic heart disease. Its ability to detect myocardial ischemia and its association with clinical outcomes make it a valuable addition to the diagnostic armamentarium. However, further research is needed to elucidate its role in risk stratification, treatment decisions, and long-term prognostication in patients with ischemic heart disease.

CONFLICT OF INTEREST

None declared

SOURCE OF SUPPORT

Nil

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