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A Novel Biomarker - Heart Type Fattyacid Binding Protein (H-FABP) in Patient with Acute Coronary Syndrome

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Abstract: ***Background: Acute coronary syndrome (ACS) is one among the foremost common reason for death in India and also the leading reason for death worldwide. Cardiac biomarkers have had a waggish shock on the superintendence of this disease and are now a pivotal factor in diagnosis and prognosis. Material and methods: Two year cross-sectional study was done among 60 patients presenting with signs and symptoms suggestive of acute coronary syndrome were enrolled as study participants. Results: Out of 60 ACS cases 25(41.67%) were presented within 4 hours of onset of symptoms and 100% had complaint of chest pain followed by breathlessness 25%and palpitation 15%. acute myocardial infarction was found in 28.33%. efficacy of H-FABP among AMI and Non-AMI patient during the time interval of 0 to 24 hours has got good sensitivity and had statistical significance with p<0.05.***

Keywords: ACS, Cardiac biomarkers, H-FABP

1. Introduction

Acute coronary syndrome (ACS) is one among the foremost common reason for death in India and also the leading reason for death worldwide.[1]

The final clinical make of ACS might vary from assuredly benign to potentially devasting. Therefore, any risk stratification of this disease condition is imperative. It has been unique focus that 50% of patients hospitalized for ACS ultimately leave the hospital with different diagnosis.[2] Management of ACS is resource-intensive and therefore correct risk stratification is obligatory to avoid uncalled of to hospitalizations and interventional procedures. The ensign clinical works for risk stratification such as history, physical examination and EKG though beyond question necessary might encourage be inadequate within the majority of cases. This has led to go out for circulating markers that higher establish identification and therefore aid in acceptable and fast patient triage.[3]

Recent contemplation or academic work in laboratories and therefore the emergency department have delineated that heart type fatty acid binding protein (H-FABP), a new cardiac biomarker ,has come up in discovering myocardial damage possible from zero to four hours after onslaught of ischemia and, accordingly regarded as the earliest plasma marker available.[4-7]

A nightstand test for H-FABP, catering conclusion within 15 minutes[8] may doubtlessly scale back diagnostic ambivalence for patients shaky of ACS.

Present study was carried out to find diagnostic utility of cardiac biomarker- heart type fatty acid binding protein (H-FABP), in patients presenting with acute coronary syndrome in a tertiary care hospital.

2. Materials and Methods

This two year cross-sectional study was done carried out at Department of Medicine, Dr D.Y. Patil Hospital and Medical Research Centre, from October 2016 to September 2018.A total of 60 patients presenting with signs and symptoms suggestive of acute coronary syndrome were enrolled as study participants.

Inclusion Criteria: Patients presenting with clinical features of acute myocardial ischemia as of -Retrosternal pain with or without radiation to left arm**,** Palpitations**,** Shortness of breath**,** Lower jaw painandLeft arm pain and epigastric pain.

Exclusion Criteria: Chest pain of more than 24 hours duration**,** past history of myocardial infarctionandAge less than 14years
Institutional ethics committee clearance was obtained before start of study.

3. Methods

Clinical assessment:
When a patients presenting with acute coronary syndrome to emergency department and or medicineoutpatient department immediate Electro Cardio gram (ECG) and cardiac biomarkers were done and patients were further evaluated and details were enrolled in preformed proforma. Once the patient was admitted general examination along with detailed systemic examination was done.

Diagnostic Definition of AMI:
Diagnoses were classified into 2 groups: AMI and non-AMI. The diagnosis of AMI was based on the following WHO criteria: (1) sustained retrosternal chest pain, (2) development of a new Q wave following ST elevation, or prolonged ST-T changes, and (3) characteristic elevation of cardiac enzymes.

Informed consent
The purpose of the study and details of protocols were discussed with the patients and informed consent was obtained.

The patients underwent for Electrocardiography, CK MB, Troponin I, H-FABP, and Chest X-ray, 2D echocardiography, Lipid profile, Renal and Liver function tests to rule out other conditions.

Estimation of H-FABP
The H-FABP rapid test cassette is rapid chromatographic immunoassays for the qualitative detection of H-FABP in whole blood, serum or plasma as an aid in diagnosis of AMI.

Principle: The H-FABP cassette is a qualitative membrane-based immunoassay for the detection of H-FABP in whole blood, serum or plasma. In this test procedure capture reagent is immobilized in the test line region of the test. After the specimen is added to a specimen area of the cassette it reacts with the anti-H-FABP antibody coated colloid gold particles in the test. This mixture migrates chromatographically along the length of the test and interacts with the immobilized capture reagent. The test format can detect H-FABP in specimens. If the specimen contains H-FABP a coloured line will appear indicating a positive test. If the specimen does not contain H-FABP a line will not appear indicating the negative test. To serve as a procedure control a coloured line will always appear in the control line region, indicating that proper volume of specimen has been added and membrane wicking has occurred.The H-fabp cassette test cannot detect H-FABP at a concentration less than 8ng/ml in specimens.

Statistical analysis:
The data obtained were coded and entered into the Microsoft Excel Spreadsheet. The categorical data were expressed in terms of rates, ratios and percentages. The utility of H-FABP in diagnosis of ACS as an early biomarker was determined by calculating sensitivity, specificity, positive predictive value and negative predictive value. Association between diagnosis, duration of symptoms and presence of H-FABP was seen using chi square test and p-value less than 0.05 was considered statistically significant.

4. Results

Baseline study characteristics of study participants explained in table 1. Age range of study participants was 31-80 with maximum in age group of above 60years with M:F 1.72. Out of 60 ACS cases 25(41.67%) were presented within 4 hours of onset of symptoms and 100% had complaint of chest pain followed by breathlessness (25%) and palpitation (15%). most common associated risk factors among them was diabetes 36.67% followed by hypertension 31.67, history of alcohol 28.33%, history of tobacco chewing 23.33%, and 21.67% have history of smoking. only 6.67% have positive history of acute coronary syndrome. [Table 1]

On ECG most of the patients had IWMI (11.67%) followed by AMMI (8.33%) and ASMI (3.33%). [Table 2]

As per WHO Definition acute myocardial infarction was found in 17(28.33%) of patients who presented to hospital with acute coronary syndrome. AMI cases showed 100% presence of H-FABP among 0-4 hr, 4-18hrs and 18-24hrs groups since presentation to admission to hospital and had 100% sensitivity. The sensitivity of H-FABP tests was 100%, specificity 27.91%, PPV 35.42% and NPV 100% for patients presenting within 0 to 24 hours of onset with statistically significant p value ($p<0.05$) .

5. Discussion

Unseen ACS could impose to morbidity and mortality that might are transpired with the best treatment. Internal cardiac biomarkers play a crucial operates in securing the diagnosing of ACS. An absolute marker that might determine the onset of the unwellness could lead on to a discount within the deaths because of ACS. Because of the slowed expression of troponins in the serum, there is still a desire for better biomarker.[9]

We attempted to find diagnostic utility of cardiac biomarker-heart type fatty acid binding protein (H-FABP), in patients presenting with acute coronary syndrome.

Non-modifiable factors that influence risk for coronary artery disease include age and sex. Men have a higher risk than women.[21]The same was true in the present study. In this study, male preponderance was noted with males forming 63.33% of the study population. The commonest age group was between 51 and 60 years comprised of 33.33% of the patients whereas 28.33% of the patients were aged between 41 to 50 years. These findings were consistent with a reported by Mansoor AH, et al[10] who reported the higher risk of the acute coronary syndrome in the average age group of 57.5 years among Indians.

Following cardiac muscle damage, H-FABP is freed into the circulation by cardiac muscle cells and is fleetly freed of the circulation by renal filtration.[11] It additionally explicit that urine concentration of H-FABP correspond with the severity of the cardiac muscle injury. Hayashida et al[12] had illustrated urine and plasma H-FABP levels could be a reliable cardiac marker for diagnosis of cardiac muscle injury in patients sustaining cardiac surgery. Antecedent articles have shown bigger than eightieth sensitivity of H-FABP among the amount of zero to four hrs. for identification of AMI.[13]H-FABP and myoglobin share identical dynamics manifold studies have converged on the comparison of H-FABP and myoglobin levels at presentation.

There are studies that had shown area under the curve for H-FABP to be considerably above myoglobin.[14-17] Individual research by Glatz et al.[15] has moreover illustrated an augmented area under the ROC for H-FABP than myoglobin in patients admitted 3-6 h following symptom onset. A research by Ruzgar et al.[18] attested sensitivity of TnT 38%, sensitivityof CK-MB 76% and sensitivity of H-FABP 95% in patients confessed in six hours of chest pain onset. Between 6 and 24 hours, the sensitivity concerning troponin was 100% and CK-MB was 90%, following 24 hours H-FABP was 91%, the sensitivity of H-FABP drastically slashed to 27.3%.

In the present study also H -FABP, done in all patients (n=60) and results were analyzed according to the time frame of presentation with the acute coronary syndrome like 0 to 4 hours, 4 to 18hrs, and 18 to 24hrs. Further patients presenting with the acute coronary syndrome were divided into AMI (n=17) and non-AMI (n=43) and diagnostic value of H –FABP was calculated for time duration of presentation and AMI and non AMI ACS.In this study efficacy of H-FABP among AMI and Non-AMI patient during the time interval of 0 to 24 hours has got good sensitivity and has statistical significance with $p<0.05$.

Another study[19] found sensitivity of 89% regarding H-FABP in 2 hours of retro sternal pain. Our study results are in agreement with the preceding studies illustrating high sensitivity and low specificity of H-FABP. These results infer the fact that H-FABP should be strongly adapted in diagnosing of ACS.

In this study results confirm that, because of the time progress, troponin levels begin rising larger than six hours once theonset of symptoms, where H-FABP is typically obstinate in patients within 0 to 4 hours of the acute myocardial injury. Very few studies been performed on H-FABP and all of those studies possess a better performance of H-FABP and its advantage to evaluate myocardial infarction in patients presenting with ACS. Our study results are also in accordance with them.

6. Conclusion

H-FABP appears to be a valuable cardiac biochemical marker for the acute coronary syndrome, its recognition and quantification should be a value for the early diagnosis of AMI in the very early phase. H-FABP has proven to be a good alternative to the conventional cardiac biomarkers because of its superior diagnostic validity.

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fatty acid-binding protein and troponin T tests. Circ J 2004;68:144-8.

Table 1: Baseline characteristics of study participants

Variables	No of cases	Percentage
Age (Yrs)		
31 - 40	4	6.67
41 - 50	17	28.33
51 - 60	20	33.33
61 & above	19	31.67
Gender		
Male	38	63.33
Female	22	36.67
Duration (Hrs)		
0 - 4	25	41.67
4-18	19	31.66
18 - 24	16	26.67
Complaints		
Chest pain	60	100
Breathlessness	15	25
Palpitations	9	15
Lower jaw pain	8	13.33
AMI	17	28.33
Non AMI	43	71.67

Table 2: ECG finding among study participants

ECG finding	No of cases	Percentage (n=60)
ASMI	2	3.33
AWMI	5	8.33
ILMI	3	5
RVMI	1	1.67
IWMI	7	11.67
LBBB	1	1.67
ST depression	1	1.67
Sinus bradycardia	1	1.67
Normal	41	68.33

Table 3: Diagnostic utility of H-FABP in relation to time of presentation

Presentation	Sensitivity	Specificity	PPV	NPV
0-4(n=25)	100%	21.05%	28.57%	100%
4-18(n=19)	100%	50%	27.27%	100%
18-24(n=16)	100%		50%	
0-24(n=60)	100%	27.19%	35.42%	100%