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RATIO OF CPK-MB AND TROPONIN LEVEL WITH MI AMONG ACS PATIENTS - A CROSS-SECTIONAL STUDY

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Abstract

Myocardial infarction (MI), also referred to as a heart attack, is a condition that affects the blood vessels that supply the heart muscle, namely, the coronary arteries. The cardiac troponins have emerged as the preferred cardiac indicators for individuals with ACS, outperforming CK-MB and myoglobin in terms of clinical significance. The aim of this study was to assess the ratio of Creatine Phosphokinase MB and Troponin level and its ratio in patients with MI among Acute Coronary Syndrome patients. Methods. The study was carried out using a descriptive research design and a quantitative research technique. A total of 60 patients with acute coronary syndrome were the subjects of the data collection in the month of May 2023. The results showed that the ratio between levels of CPK-MB/Troponin was significantly elevated when compared with MI patients (15.53+4.79). The ratio of level of creatine phosphokinase-MB and troponin was found to be statistically significant among ACS patients.

Keywords: CPK-MB, Troponin, Acute Coronary Syndrome, Myocardial Infraction.

INTRODUCTION

Myocardial infarction (MI), also referred to as a heart attack, is a condition that affects the blood vessels that supply the heart muscle, namely the coronary arteries. A portion of cardiac muscle that experiences either no blood flow or insufficient blood flow to support its function is referred to as infracted. This entire process is known as a myocardial infarction.[1] An acute coronary syndrome (ACS) typically occurs when there is a rupture or erosion of an atherosclerotic plaque, leading to the creation of a blood clot on top of it. Atherosclerosis is the underlying mechanism involved, which is a persistent condition where the walls of arteries harden due to the buildup of fatty substances like cholesterol and cells that are inflammatory. The buildup of this substance leads to the development of an atherosclerotic plaque, surrounded by connective tissue. This plaque can gradually and considerably limit the arterial lumen, resulting in symptoms such as angina pectoris or potentially leading to an acute coronary syndrome (ACS).[2]

Cardiac markers are used to identify and evaluate the risk of persons who are suffering chest pain and are believed to have acute coronary syndrome (ACS). They are also utilized to treat and predict the outcome of patients with acute heart failure, pulmonary embolism, and other medical conditions. Cardiac markers can be categorized based on their specific indications. There are markers that indicate myocardial necrosis, such as creatine kinase-MB (CK-MB) fraction, myoglobin, and cardiac troponins. Another category includes markers that signify myocardial ischemia, such as ischemia modified albumin. Additionally, there are markers that suggest myocardial stress, such as natriuretic peptides. Finally, there are markers of fibrosis and prognosis, such as C-reactive protein (CRP), soluble CD40 ligand (sCD40L), and homocysteine.[3]

The cardiac troponins have emerged as the preferred cardiac indicators for individuals with ACS, outperforming CK-MB and myoglobin in terms of clinical significance. Cardiac troponin plays a vital part in defining acute myocardial infarction (MI) according to the consensus recommendations established by the European Society of Cardiology (ESC) and the American College of Cardiology (ACC). These recommendations advise measuring cardiac biomarkers upon initial presentation in patients with suspected myocardial infarction (MI). Currently, the suggested biomarker for diagnosing acute MI is cardiac troponin, as it offers higher specificity and accuracy. [4,5,6,8]

Patients with normal CK-MB levels but elevated troponin levels are classified as mild myocardial damage or microinfarction, while those with raised levels of both are classified as acute myocardial infarction. Cardiac troponins can stay elevated for up to two weeks after heart attack symptoms appear, making them valuable indicators of recent heart attacks. Elevated troponin levels can identify those at higher risk of mortality or acute myocardial infarction, and can also help identify low-risk patients who may be discharged with careful monitoring. A study found that those with a normal ECG and troponin I test had a low risk of significant cardiac events.[9]

Hence, the objectives of the study were 1. To assess the Creatine Phosphokinase – MB and Troponin level and its ratio in patients with Myocardial Infarction among Acute Coronary Syndrome patients and To determine the association between the ratio of Creatine Phosphokinase –MB and Troponin level with Myocardial infarction patients and their demographic variables.

METHODS AND MATERIALS

The study in SMCH was carried out using a descriptive research design and a quantitative research technique. Patients with acute coronary syndrome and myocardial infarction were the subjects of the data collection in the month of May 2023. Using convenient sampling technique, a total of 60 patients were chosen. The subjects were told the goal of the study. The patients' signed agreement was acquired, and the subjects were guaranteed about the privacy and confidentiality of the data they shared. Patients admitted with myocardial infarction and acute coronary syndrome's reports were gathered, including their troponin and CPK-MB levels. Angiogram reports, serum level test reports troponin level and CPK-MB, and patient's other test results were also gathered. The ratio of CPK-MB and troponin levels with myocardial infarction among acute coronary syndrome was evaluated, according to the findings.

RESULTS AND DISCUSSION

A Majority of individuals 24 (40%) were between the ages of 58 and 77, Compared to 19 (31.6%), 17, and 28.3%, Respectively, who were between the ages of 38 and 57. 30 People were Female, or 51.6%, Compared to 29 Males, or 48.3%. In Terms of Religion, there were 19 Muslims (3.6%), 15 Hindus (25%) And 26 Christians (43.3%). 35 People Had Only Completed Secondary School, 22 had a Bachelor's Degree or Less, and 3 had a Postgraduate Degree, according to the Educational Status, which was 35 (58. 3%).The Percentage of Heavy Workers was 32 (53.3%), Moderate Workers were 21, and Sedative workers were 7, Respectively. According to Income, 40 People (66.6%) were paid between Rs. 1,000,000 and 3,00,000 per year, while 11 People (18.3%) were paid less than Rs. 1,000,000. 37 (22%) of the 85 (51%) People were city dwellers, and 49 (29.4%) had previous Job Experience.

The below Figure (Fig 1) depicts the ratio of level of CPK -MB and Troponin with myocardial Infarction among ACS patients. 9 (15%) had mild, 27 (45%) had moderate, 18 (30%) had severe, and 6 (10%) had extremely severe. However, in the MI, there were 27 (45%) cases of mild, 17 (28.3%) cases of moderate, 8 (13.3%) cases of severe, and 8 (13.3%) cases of extremely severe.

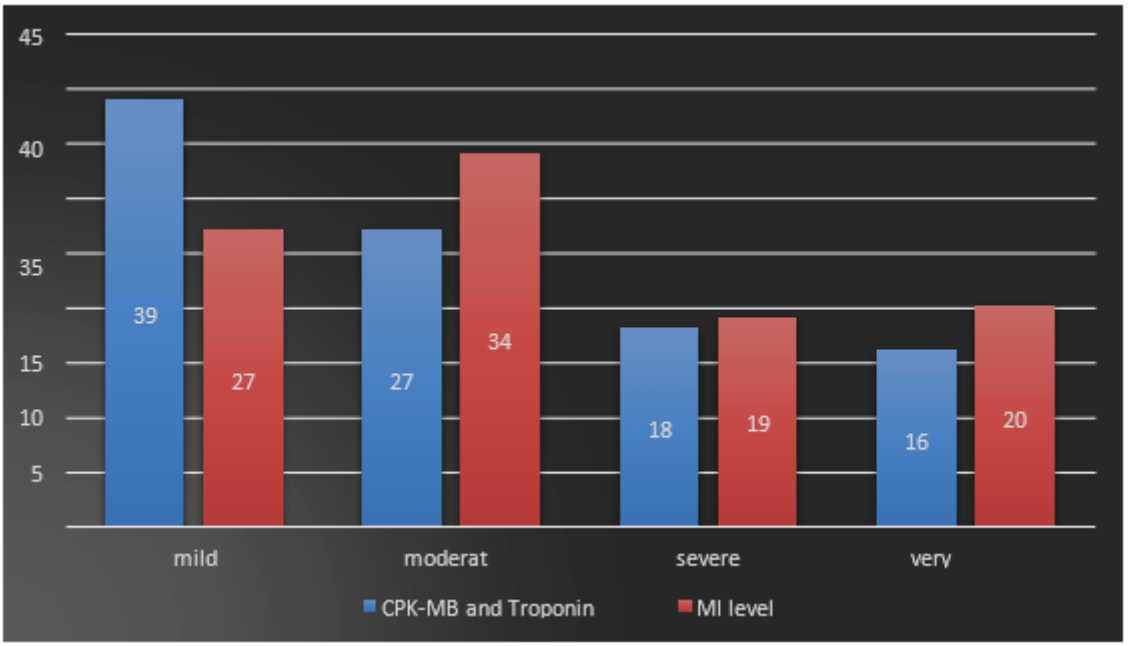

Figure 1: Percentage Distribution of ratio of level of CPK-MB and Troponin among ACS patients

Table 1: Relationship between the ratio of level of CPK-MB and Troponin in Myocardial Infarction among ACS patients

Pain	Mean	S. D	Mean Difference& %	Paired 't' test & p-value
CPK-MB and troponinlevel	28.33	6.59	**12.08 (20.1%)**	**t = 16.209 p=0.0001, S*** **
MI level	15.53	4.79		

***p<0.001, S – Significant

The table above states that, relationship between the ratio of level of CPK-MB and Troponin in Myocardial Infarction among ACS patients was proved statistically significant with the mean value of CPK-MB and Troponin level score was 28.33±6.59 when compared with MI patients (15.53±4.79). The mean difference score was 12.08, and the mean difference percentage was 20.1%. Statistical significance was determined at the $p<0.001$ level for the computed paired "t" test result of $t = 16.209$.

Similarly the study conducted by Hassan Motamed et al (2023) aimed to identify a method for distinguishing between myocardial infarction and unstable angina using creatine kinase-MB and creatine phosphokinase ratios. A retrospective epidemiological analysis of 260 patients with non-ST elevation myocardial infarction and 260 patients with unstable angina was conducted. The results showed that the creatine kinase-MB/creatine phosphokinase ratio was significantly elevated in patients with non-ST elevation myocardial infarction compared to those with unstable angina. [10]

Association of ratio of CPK-MB and Troponin level in MI among ACS patients with their demographic variables shows that age ($X2=13.4264$), sex ($X2 = 5.9399$), Religion ($X2 = 9.7962$), Educational status ($X2 = 20.6667$), Occupational status ($X2 = 11.3558$), Income per annum ($X2 = 1.967$), marital status ($X2 = 7.9012$), working experience ($X2 = 8.9845$) and residential area ($X2 =16.3814$) were not statistically significant at the level of $P<0.05$

CONCLUSION

The ratio between levels of CPK-MB and Troponin with myocardial infarction among Acute Coronary Syndrome patients was evaluated and found to be statistically significant.

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