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DIFFERENTIAL EXPRESSION OF CARDIAC BIOMARKER BASED ON GENDER, AGE, DIABETIC, BLOOD PRESSURE, SMOKING AND DRINKING IN PATIENTS OF MYOCARDIAL INFARCTION.

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ABSTRACT

The ideal serum marker for myocardial injury would be specific to myocardium, highly sensitive and quantitative with rapidly increased serum levels for early diagnosis. The first account of the use of a biochemical marker in the study of myocardial injury was published by La Due and colleagues in the journal Science in 1954. The study is carried out in 65 myocardial patients, the objective of the study to evaluate these cardiac markers and their significance effect of these enzymes in gender (Male & Female), age (<= 40, 41-50, 51-60, 61-70 & >70), diabetic (Diabetic & Non-diabetic patients), Blood Pressure (Normal & Abnormal B P patients), smoking (Smokers & Non-smokers), and drinking (Drunkard & Teetotaler). Male and female affected by myocardial infarction has no much difference in the cardiac enzymes in the blood. The different age group of myocardial patients has not shown much variation in the level of cardiac marker. Smoking, drinking, diabetics and blood pressure increase the risk of getting myocardial infarction.

KEYWORDS: myocardial infarction, cardiac marker, Creatinine Kinase, CK-NAC, LDH, SGOT and SGPT.

INTRODUCTION

The first account of the use of a biochemical marker in the study of myocardial injury was published by **La Due** and colleagues in the journal *Science* in 1954. They measured serum glutamate oxaloacetic transaminase activity from a few hours to up to 15 days in a group of patients immediately after an acute myocardial infarction (AMI).

They reported that enzyme activity increased above the reference range a few hours after AMI, reached a peak after 2 or 3 days and Cardiac biomarkers in myocardial infarction then returned to baseline within a week. Prolonged elevation of a marker in the blood may be useful for diagnosing the few patients who present late, after early markers have returned to baseline values.

The early appearance of a marker released into the bloodstream soon after an injury may facilitate early diagnosis. When developing assays it is important that they are sensitive, specific and have a short turnaround time, to allow results to be available within a clinically useful timeframe (**Azzazy, *et al.*, 2005**).

Characteristics of an ideal cardiac marker are: i) High sensitivity- Abundant in cardiac tissue, ii) High specificity - Absent from non-myocardial tissue; Not detectable in blood from non-diseased subjects, iii) Release - Rapid release for early diagnosis; Long half-life in blood for late diagnosis, iv) Analytical - Cost effective; Short turnaround time; Precise Accurate and v) Clinical - Ability to influence therapy and so improve patient outcome; Validated by clinical studies. (**Kemp, *et al.*, 2004**)

The requirement that marker release should be in proportion to the extent of myocardial injury has led to the use of cardiac markers to estimate the size or severity of an injury. The reasoning behind this is that the more marker released, the greater the extent of cell death, and the worse the prognosis. Assessment of infarct size has been made by examining the area under the curve of serial marker concentration *vs.* time. (**Grande, *et al.*, 1983**)

METHODOLOGY

Study population

To investigate the biochemical analysis of particular enzymes in serum which are called as cardiac markers that elevates during myocardial infarction in patients. This study is carried out in 65 myocardial patients with their consent. The objective of the study to evaluate these cardiac markers and their significance effect of these enzymes in different gender (**Male & Female**), age (**<= 40, 41 - 50, 51 - 60, 61 - 70 & >70**), diabetic (**Diabetic & Non-diabetic patients**), Blood Pressure (**Normal & Abnormal B P patients**), smoking (**Smokers & Non-smokers**), and drinking (**Drunkard & Teetotaler**) of the myocardial patients.

Serum Creatinine Kinase (CK)

To determine the level of CK in serum modified Huge colorimetric method (Dioszeghy, 1988) was performed. Creatinine reacts with diacetyl and naphthol in alkaline medium; as a result a coloured complex forms. The intensity of colour is proportional to CK activity and read at 520 nm.

$$Serum\ CPK\ Activity, IU = \frac{OD\ Test - OD\ Blank}{OD\ Std - OD\ Blank} \times 66.7$$

CK-NAC Activated

To determine the level of CK-NAC in serum modified Huge colorimetric method (Dioszeghy, 1988) was performed. Serum was added with creatinine phosphate (substrate), read initial absorbance after 45 sec, followed by the measure of absorbance in 1, 2 and 3 minutes. Determine the mean absorbance change per minute$(\Delta\ A/min)$.

$$CPK\ Activity\ IU = 4127 \times \Delta A/min$$

LDH

To determine the level of LDH UV – Kinetic method (Genistein, 1997) was performed. Increase in OD after 45 sec by the interval of 1 minute. Read initial absorbance after 45 sec, followed by the measure of absorbance in 1, 2 and 3 minutes. Determine the mean absorbance change per minute$(\Delta\ A/min)$.

$$LDH, IU = 9807 \times \Delta A/min$$

SGOT: To determine the level of SGOT UV – Kinetic method (Tietz, 1990) was performed. Decrease in OD after 45 sec by the interval of 1 minute. Read initial absorbance after 45 sec, followed by the measure of absorbance in 1, 2 and 3 minutes. Determine the mean absorbance change per minute$(\Delta\ A/min)$.

$$SGOT, IU = 1015 \times \Delta A/min$$

SGPT

To determine the level of SGPT UV – Kinetic method (Tietz, 1976) was performed. Decrease in OD at 340nm after 45 sec by the interval of 1 minute. Read initial absorbance after 45 sec, followed by the measure of absorbance in 1, 2 and 3 minutes. Determine the mean absorbance change per minute$(\Delta\ A/min)$.

$$SGPT, IU = 1015 \times \Delta A/min$$

RESULT AND DISCUSSION

Enzyme parameters with respect to gender

Biochemical analysis of myocardial subjects revealed that, since P value was greater than 0.05, the null hypothesis was accepted and 5% of significance level. Hence there was no significant difference between mean rank of male and female with respect to enzymes parameters (**Figure 1)**. This data with analyzed with respect to gender and Mann-Whitnev statistical tool was used.

Enzyme parameters with respect to different age group

The present study showed that, since P value was greater than 0.05, the null hypothesis was accepted and 5% of significance level. Hence there was no significant difference between mean rank of age group with regard to enzyme parameters (**Figure 2**). The data was analyzed with respect to age group and Kruskal-wallis 1-way ANOVA statistical tool was used.

Enzyme parameters with respect to diabetic and non diabetic patients

Biochemical analysis of myocardial subjects verified that, since P value was greater than 0.05, the null hypothesis was accepted and 5% of significance level. Hence there was no significant difference between mean rank of diabetic patients and non diabetic patients (**Figure 3)**. The data was analyzed with respect to diabetics and non diabetics and Mann-Whitnev statistical tool was used.

Enzyme parameters with respect to patients with normal and abnormal BP

The enzyme parameters with respect to blood pressure of myocardial subjects revealed that, since P value was accepted and 5% level of significance. Hence there was no significant difference between mean rank of normal and abnormal blood pressure (**Figure 4**). The data was analyzed using Mann-Whitnev statistical tool.

Enzyme parameters with respect to smokers and non-smokers

The present study showed that, since P value was less than 0.05, there was significant difference between smokers and non smokers with respect to CK-NAC. Here null hypothesis was rejected and 5% level of significance. In the case of other enzymes, since P value is greater than 0.05, the null hypothesis was accepted and 5% significance level. So there was no significant difference between smokers and non smokers with respect to other enzymes (**Figure 5**). The data was analyzed with respect to smoking using Mann-Whitnev statistical tool.

Enzyme parameters with respect to drunkard and teetotaler

Biochemical analysis of myocardial subjects revealed that since P value was greater than 0.05, the null hypothesis was accepted and 5% significance level. So there was no significant difference between drunkard and teetotaler with respect to other enzymes (**Figure 6**). The data was analysed with alcohol and Mann-Whitnev statistical tool was used.

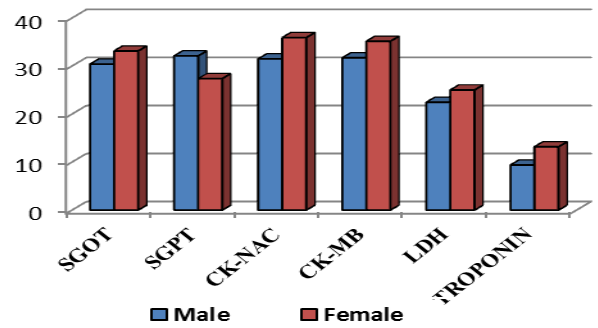

Figure 1: Difference in the level of Cardiac Enzyme in Male & Female

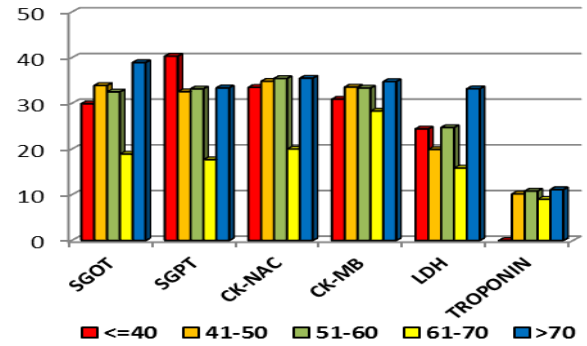

Figure 2: Difference in the level of Cardiac Enzyme in different age groups

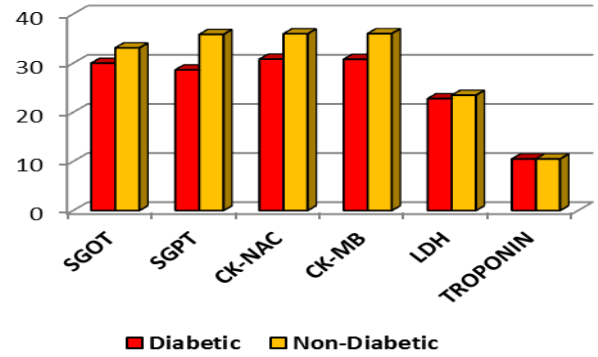

Figure 3: Difference in the level of Cardiac Enzyme in Diabetic & Non-diabetic patients

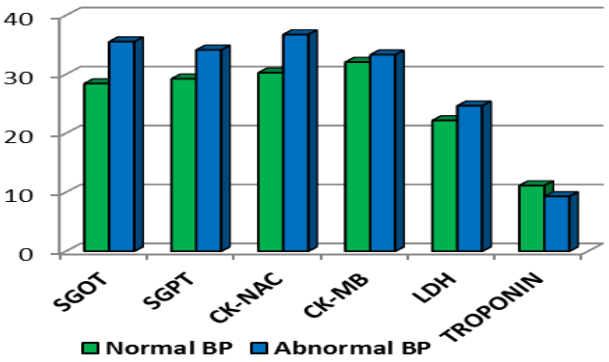

Figure 4: Difference in the level of Cardiac Enzyme in Normal & Abnormal B P patients

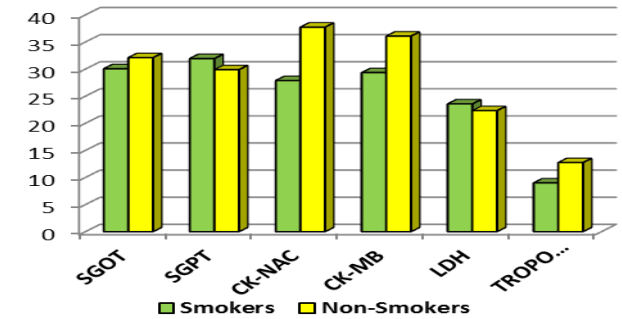

Figure 5: Difference in the level of Cardiac Enzyme in Smokers & Non-smokers

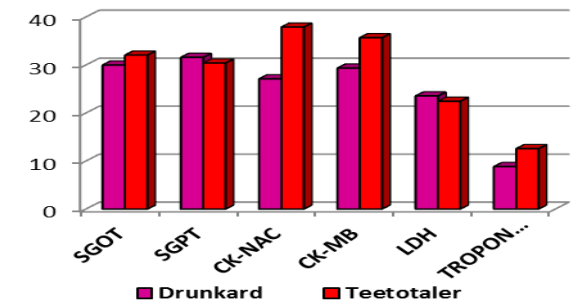

Figure 6: Difference in the level of Cardiac Enzyme in Drunkard & Teetotaler

CONCLUSION

Cardiac biomarkers play an important role in the risk stratification and choice of treatment strategies for patients with acute coronary syndromes (ACS). A detected elevation in a

particular marker may lead to early diagnosis and treatment and thus improved patient outcomes. The results of biochemical parameters were analysed using statistical tool and found to be no significance between male & female, age(<= 40, 41 - 50, 51 - 60, 61 - 70 & >70), Diabetic & Non-diabetic patients, Normal & Abnormal Blood Pressure patients, Smokers & Non-smokers, and Drunkard & Teetotaler of the myocardial patients. Male and female affected by myocardial infarction has no much difference in the cardiac enzymes in the blood. The different age group of myocardial patients has not shown much variation in the level of cardiac marker. Smoking, drinking, diabetics and blood pressure increase the risk of getting myocardial infarction.

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