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Study Of Serum Calcium Levels In Patients With Acute Myocardial Infarction.

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ABSTRACT

Acute myocardial infarction (AMI) is a leading cause of morbidity and mortality worldwide. The incidence of AMI is dependent on certain predisposing risk factors. In addition to the traditional risk factors, raised serum calcium level is also being considered as an associated factor for AMI. The aim of the study was to estimate the level of serum calcium in patients with Acute myocardial infarction and to compare with healthy individuals. This study includes fifty patients with Acute myocardial infarction and fifty healthy individuals recruited from Thanjavur Medical College Hospital, Thanjavur. Serum calcium was analyzed by using Arsenazo method. In result Serum calcium levels were increased in patients of myocardial infarction with 11.32±0.66 mg/dl (mean ±SD) when compared to controls with 9.08 ± 0.30 mg/dl (mean ± SD) with a statistically significant 'p' value of <0.0001. Increased serum calcium level appears to be a risk factor for Acute myocardial infarction.

Keywords: Calcium; acute myocardial infarction; myocardium; atherosclerosis.

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INTRODUCTION

Ischemic heart disease (IHD) is a condition in which there is an inadequate supply of blood and oxygen to a portion of the myocardium. Acute myocardial infarction occurs when there is an abrupt decrease in coronary blood flow, following a rapid thrombotic occlusion of coronary artery which is previously narrowed by atherosclerosis [1].

The most common triggering event is the disruption of atherosclerotic plaque in the coronary artery, which leads to activation of the clotting cascade, sometimes resulting in complete occlusion of the artery [2]. calcium supplements accelerate vascular calcification and increase mortality in patients with renal failure, in both dialysis and pre dialysis populations [3].

During Myocardial Infarction, calcium handling between sarcoplasmic reticulum and myofilaments is disrupted and calcium is diverted to the mitochondria causing edema [4]. Defective calcium handling causes reversible as well as irreversible myocardial injury.

Calcium being a major determinant of electrophysiological properties of myocardial membrane [5]. Serum calcium directly contacts with and acts on blood cells and endothelial cells, and is also essential for maintaining extracellular calcium levels [6]. Calcium levels in patients presenting with acute myocardial infarction plays a significant role in both mortality and morbidity of these patients. the link between serum calcium levels and poor outcome has been debated in different populations [7].

Increased calcium can cause abnormality in heart muscle leading to tight contraction of myocardium causing arrhythmias [8]. Increased serum calcium might cause these pathological changes by influencing calcification [9]. So, Serum Calcium level can serve as a risk factor for Acute Myocardial Infarction.

METHODS AND MATERIALS

- In this study 50 diagnosed cases of AMI and 50 age and sex matched apparently healthy subjects were selected.
- The cases were selected from Thanjavur Medical College Hospital.
- The diagnosis of AMI was based on the electrocardiogram, ischemic cardiac pain lasting at least 30 min, and change in Troponin T.
- Serum calcium in two groups were estimated.
- The Calcium estimation was based on calcium ions (Ca^{++}) reacting with Arsenazo III to form an intense purple colored complex. The absorbance of the Ca-Arsenazo III complex is measured dichromatically at 660/700 nm. The resulting increase in absorbance of the reaction mixture is directly proportional to the calcium concentration in the sample.
- Serum calcium and were compared between Cases and Controls.

RESULTS

Table shows the Serum Calcium levels of the study subjects.

Mean ± SD of Serum Calcium were 9.08 ± 0.30 mg/dL and 11.32 ± 0.66 mg/dL in Cases and Controls respectively and it was significantly higher in Cases (p=0.0001).

DISCUSSION

- Increased level of calcium causes coronary artery and peripheral arteriolar constriction by binding with the heart and smooth muscle through calcium receptor and thus it increases cardiac contractility and causes diminished oxygen supply to myocardium.
- A calcium overload also causes increased blood pressure, coronary artery calcification and progression of atherosclerosis that involves lipid as well as collagen, elastin and calcium accumulation in coronary vasculature.
- Calcium is involved in other events such as coronary spasm, thrombus formation and disruption of atherosclerotic plaque, occlusion of coronary artery following rupture of vulnerable atherosclerotic plaque which can cause myocardial infarction and sudden death.

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High serum calcium level increases the risk of heart failure, stroke, and type 2 diabetes mellitus [9].

- Thus, the increased total serum calcium appears to be a marker of cardio vascular disease.

Table 1: Sex Distribution

Sex Distribution	Control	Cases
Total No	**50**	**50**
Males	**30**	**30**
Females	**20**	**20**

Table 2: Age Distribution

Age Distribution	Control	Cases
<30 Years	**0**	**0**
30 – 40 Years	**4**	**4**
40 – 50 Years	**14**	**14**
50 – 60 Years	**17**	**17**
>60 Years	**15**	**15**
Total	**50**	**50**

Table 3: Mean Serum Calcium Levels

	Control	Cases
Total No	**50**	**50**
Mean Serum Calcium Level	**9.08 ± 0.30 mg/dL**	**11.32 ± 0.66 mg/dL**

Figure 1

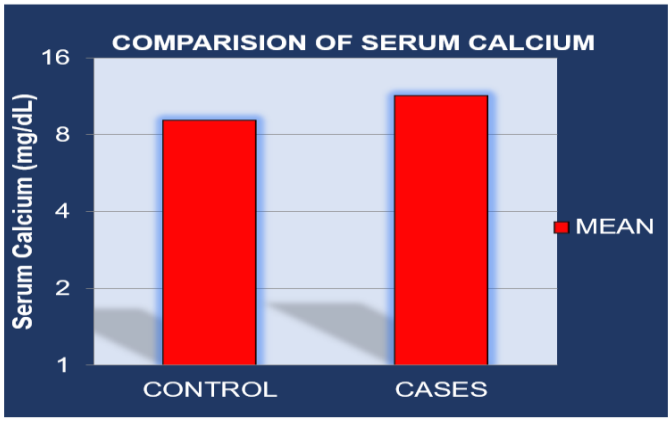

Figure 2: Sex Distribution

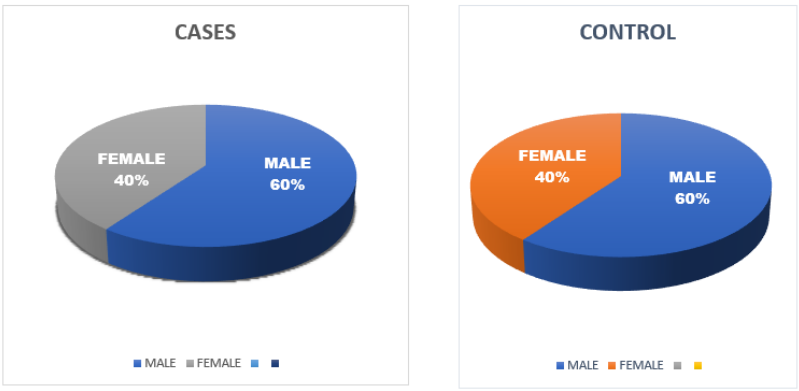

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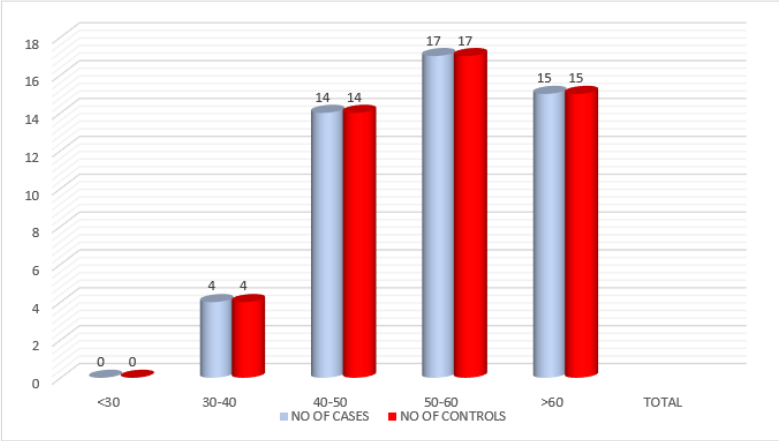
Figure 3: Age Distribution



CONCLUSION

Serum calcium levels were increased in patients of myocardial infarction when compared to controls with a significant 'p' value of <0.0001. Increased serum calcium level appears to be a risk factor for Acute myocardial infarction.

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