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COPPER, MAGNESIUM AND ZINC LEVELS IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

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ABSTRACT

Objective The aim of the present study was to determine the levels of copper, magnesium and zinc in patients with acute myocardial infarction as compared with controls.

Methods- Sixty-five samples from acute myocardial infarction patients and healthy control subjects were collected and centrifuged to obtain the supernatant liquid, serum for analysis. Trace Metal (Cu, Mg and Zn) were determined by Atomic Absorption Spectroscopy using air-acetylene flame (AAS, Model Varian A-20).

Results- Serum magnesium and copper levels were increased and decreased zinc levels in AMI patients as compared to the controls.

Conclusion- Trace metals insufficiency may play a main role in the progression of acute myocardial infarction. Imbalanced levels of trace metals may assume to participate in the causes of acute myocardial infarction. Further research is needed for the use of trace metals as a marker.

Keywords: Copper, Magnesium, Zinc, Acute myocardial infarction, Atomic Absorption Spectroscopy

INTRODUCTION

Acute Myocardial Infarction is a part of acute coronary syndrome categorized by a typical clinical syndrome comprising of chest pain, dyspnea **(1).** Conversely, it has focusing attention on trace elements and the risk factors for AMI **(2)**. It is reported that the serum concentration of magnesium, copper and zinc were changing in acute myocardial infarction patients as compared to the controls **(3)**.

Though acute myocardial infarction requires maximum studies, more evidences on its feasible reasons are necessary to envision its impending frequency, that is amongst an superficially healthy population progression after acute myocardial infarction in those with a low risk to high risk individuals can distinguish them, moreover, further information is needed around several factors and concentration of trace metals in patients with acute myocardial infarction as may useful markers. **(4, 5)**.

The aim of the present study was to determine the levels of copper, zinc and magnesium in patients with acute myocardial infarction as compared with controls.

MATERIALS AND METHODS

The case group was selected from patients visiting or admitted the cardiology at LUMHS City Hospital for angiography or medical treatment. The inclusion criterion for the case group was structural AMI diagnosed by echocardiography or angiography. The echocardiographic studies comprised using an echocardiographic machine. All the measurements were performed by one cardiologist. **(6)**

Determination of trace metals sixty-five blood samples from AMI patients and thirty-five controls were collected and immediately centrifuged to obtain the supernatant liquid, serum for analysis. Cu, Mg and Zn were determined by Atomic Absorption Spectroscopy using air-acetylene flame (AAS, Model Varian A-20). Each blood sample was centrifuged at 5000 rpm for 20 min. The supernatant blood serum was used for the analysis of trace metals copper, magnesium, and zinc using AAS inserting appropriate hollow cathode lamp in it.

All standards used were of analytical grade. **(7, 8)**

RESULTS

Fig 1 shows the demographic profile, which was represent age, total cases of AMI and male female ratio, figure 2 shows serum trace metals levels in the patients with AMI and

controls; there was an increase in serum copper and magnesium levels in AMI patient as compared to control. Serum Zinc levels were decreased in the AMI patient as compared to the controls.
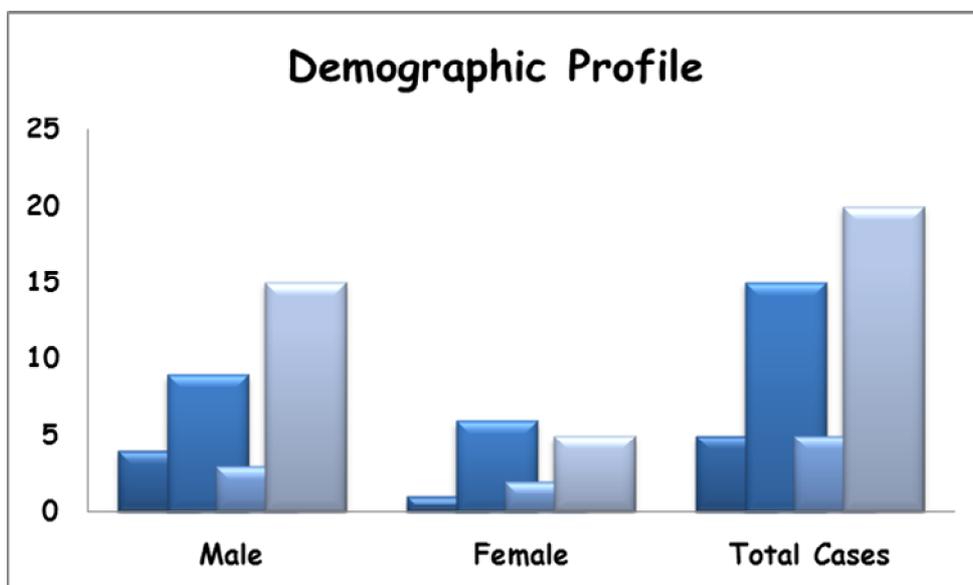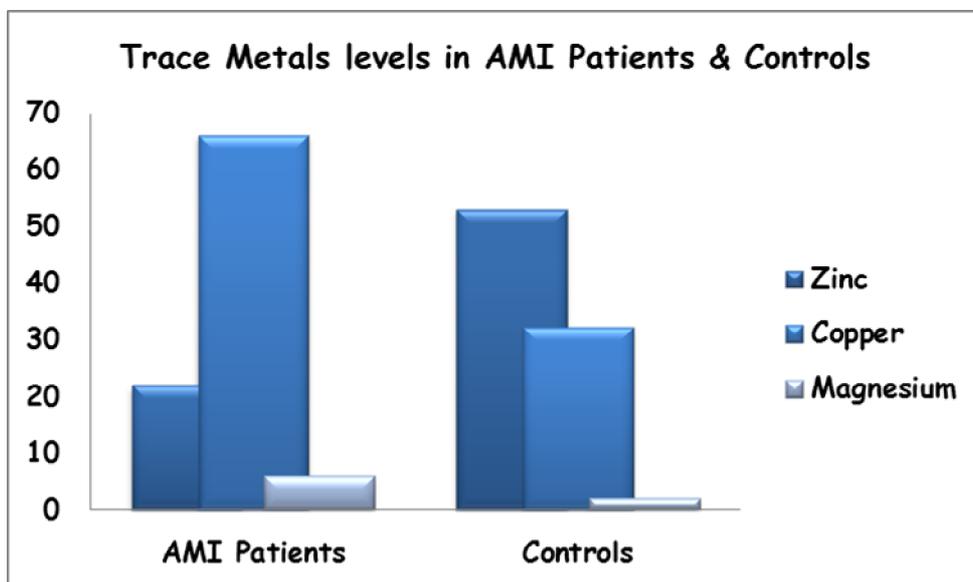

Fig: 1: Demographic profile

Fig: 2: Trace Metals levels in Acute Myocardial Infarction patients and Controls

DISCUSSION

In the present study it was observed that increased serum copper and magnesium levels, whereas zinc level was, decreased in acute myocardial infarction patients as compared to the controls. It was observed that heart disease is principally a disease of zinc and copper metabolic disorder and that is such disease, the ratio of the concentration of zinc to copper in serum or plasma should be increased than controls. It was also observed that in patients with acute myocardial infarction increase serum copper levels as compared to controls**. (9-12).**

AMI, CAD and atherosclerosis are the main cause of death; occurrence of these diseases in has reached immeasurable level **(13-15).** Trace metals are essential component and a variety of metalloenzymes for the maintenance of myocardial integrity. Disturbance of metals concentration in serum is the main reason of acute myocardial infarction **(16, 17).** The variation in magnesium concentration in acute myocardial infarction is controversial in some study magnesium concentration was shown lower and in some study there is a higher. In order to verify this controversy the present study was carried out, our results in shows increased concentration of magnesium in

serum, the current studies confirmed that the magnesium is a cofactor of creatine kinase enzyme which converts creatine into creatine phosphate or phosphocreatine **(18).** Increased concentration of serum magnesium may exclude of magnesium not merely through the infracted left ventricle but moreover in the right ventricle and the non-necrotic left ventricle **(19, 20).**

It was reported that reduced serum zinc levels in patients with acute myocardial infarction in current study comparable results were found and shows reduced of serum zinc levels in acute myocardial infarction patients as compared to controls. A zinc level of acute myocardial infarction patients was not varying as compared to the healthy subjects. Decrease serum zinc concentration has been found in various types of heart disease, in acute myocardial infarction, serum zinc concentration was found to be significant decreased **(21)**. Serum copper concentration is a component of a particular defense system to contribute further copper by the position of infarction towards decrease its substance and the capacity of impairment **(22), i**n addition, the elevated of copper containing enzyme ceruloplasmin, and acute phase reactant, may cause for the elevated copper level **(23, 24).**

CONCLUSION

The serum trace metals variation in heart diseases equivalent to the severity of the disorder. Trace metals insufficiency may play a main role in the progression of acute myocardial infarction. Imbalanced levels of metals may assume to participate in the causes of acute myocardial infarction. Further research is needed for the use of metals as a marker.

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