ORIGINAL RESEARCH PAPER
VOLUME-6 | ISSUE-5 | MAY - 2017 | ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

Levels of serum Ferritin in Myocardial Infarction patients of western U.P.

Biochemistry

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ABSTRACT

Introduction : World health organization estimated in 2004 that 12.2% of worldwide deaths were from ischemic heart disease which is leading cause of death in myocardial infarction. National health and nutritional examination survey, 1988-1994, first time reported a significant positive association in iron storage and heart disease risk. Due to the scarcity of this type of study in Western UP, we did this study to find out the relation of serum ferritin with MI

Materials methods : A total of 50 patients who were confirmed of having MI on the basis of lipid profile, CKMB, SGOT, SGPT, Trop I, ECG and Chest X Ray were included in the study. Serum ferritin level was estimated in study group on day 1 and day 6 of MI attack while only once in control.

Serum ferritin was estimated by enzyme linked fluorescent assay on Mini Vidas auto analyzer from Biomerieux.

Results : The present study conducted on MI patients of western U.P. showed that serum ferritin levels on day 1 of MI was 60.64 ±19.07 and day 6 of MI was 224.4 ± 96.86 ng/ml which was significantly higher on day 6. The value of serum ferritin in controls was 75.59 ± 35.89 ng/ml.

Conclusion : Serum ferritin levels were found to be lower on day 1 and elevated on day 6 in MI patients which was statistically significant when compared with the values of control group.

KEYWORDS:

MI, Ferritin, CKMB, Trop I

Introduction

World Health Organization estimated in 2004, that 12.2% of worldwide deaths were from ischemic heart disease which is leading cause of death in myocardial infarction (MI)[1]. Most MIs occurs due to coronary artery disease. Risk factors include high blood pressure, smoking, diabetes, lack of exercise, obesity, high blood cholesterol, poor diet and excessive alcohol intake among others[2,3]. The mechanism of an MI often involves the complete blockage of a coronary artery caused by a rupture of an atherosclerotic plaque[4]. MIs are less commonly caused by coronary artery spasms, which may be due to cocaine, significant emotional stress and extreme cold, among others[5,6]. A number of tests are useful to help with diagnosis, including electrocardiograms (ECGs), blood tests and coronary angiography[7]. An ECG may confirm an ST elevation MI if ST elevation is present[8]. Commonly used blood tests include troponin and less often creatinine kinase Mb[7].

WHO criteria[9] formulated in 1979 have classically been used to diagnose MI; a patient is diagnosed with MI if two (probable) or three definite of the following criteria are satisfied:

(a)- clinical history of ischemic type chest pain lasting for more than 20 minutes (b)- changes in serial ECG tracings (c)- rise and fall of serum cardiac biomarkers

Ferritin is ubiquitous intracellular protein that stores iron and release it in controlled fashion.

The protein is produced by almost all living organism, including algae, bacteria, higher plants and animals. In humans, it acts as a buffer against iron deficiency and iron overload[10]. ferritin is found in most tissues as a cytosolic protein, but small amounts are secreted into the serum where it functions as an iron carrier. Ferritin serves to store iron in non toxic form, to deposit it in safe form and to transport it to areas where it is required[11].

Free iron is toxic to cells as it acts as a catalyst in the formation of free radicles from reactive oxygen species via the Fenton reaction. Hence vertebrates evolve an elaborate set of protective mechanism to bind iron in various tissue compartments[12]. With in cells, iron is stored in a protein complex as ferritin or hemosiderin. Free iron - a catalyst of the production of free radicles – has been implicated in ischemic myocardial damage and lipid peroxidation(LP). Hypotheses as to how free iron may accelerate the progression of atherosclerosis or contribute to myocardial injury after ischemic event have been generated from basic research.

National Health and Nutrition Examination Survey, 1988-1994, first time reported a significant, positive association in iron storage and heart disease risk. Very less Indian studies were available in the literature. So the study was done to find out the relation of serum ferritin with myocardial infarction.

Materials and methods

Patients reporting in OPD/ emergency of the hospital of Subharti Medical college, Meerut, with complaints of chest pain were enrolled for the present study after obtaining ethical clearance from the institute. Informed consent and a detailed history was taken and recorded on data sheets for each individual patient. These selected patients were subjected to complete physical/systemic examination and findings noted. Lipid profile, CKMB, SGPT, SGOT, routine urinary microscopy, ECG and plain X ray chest was done in all cases. Cardiac marker like Trop I was done in few required cases. A total of 50 such patients who were confirmed of having acute MI with the help of above mentioned investigations were finally included in the present study which constituted the study group.

Suspected or diagnosed patients of DM, Neoplastic disease, liver disease, alcoholism, primary/secondary hemochromatosis were especially not included in the present study.

Fifty (age and sex matched) healthy volunteers were identified and included in the study as controls. Similar follow up of these volunteers was also conducted. Special test of serum ferritin level was done on day 1 of MI and day 6 of MI in study group patients while it was done only once in control group. Venous blood sample from anti-cubital vein was collected in central laboratory of the hospital of Subharti medical college. Serum ferritin of these patients was

estimated by enzyme linked fluorescent assay on Minividas auto analyzer from Biomerieux.Data analysis was done by student t test and values were given in Mean ± SD.

Results

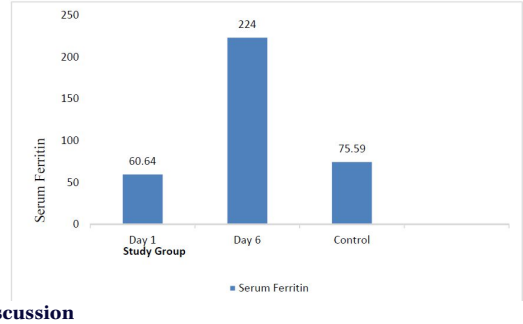
The present study was conducted on 50 patients of MI (study group) and 50 healthy volunteers (control group) with following results and observations.

Table 1 - Serum ferritin levels in study group and controls

Serum Ferritin (in ng/mL)		N	Mean ± SD	P value
Study group	Day 1 of MI	50	60.64 ± 19.07	0.011
	Day 6 of MI	50	224.40 ± 96.86	0.000
Control		50	75.59 ± 35.89	

In this study we observed that the level of serum ferritin in study group on day 6 was higher than day 1 of MI. The values were also statistically significant (p value < 0.05)

Figure 1 showing serum ferritin level at day 1 and day 6 in MI patients and controls



Discussion

Incidence of coronary artery disease is increasing in India. According to Reddy and Yusuf[13] 2.39 million people in India died of CAD in 1990 and this may double up by the year 2015. Sullivan[14] postulated a link between iron stores and the risk of ischemic heart disease as early as 1981. Salonen JT et al[15] also suggested a link between iron storage and MI. Our findings were in agreement with findings of Bharthi & Chandrakar[16] who concluded the medium serum ferritin levels were significantly higher in cases as compared to control. According to Moroz C et al[17] there was a gradual increase in ferritin levels post MI. Shipra et al[18] also found the value of ferritin to be statistically significant when compared to control. Strongest supporting evidence comes from a cohort study of eastern Finnish men, in whom high concentration of serum ferritin was positively associated with the incidence of MI[19]. Furthermore, serum ferritin was observed to be one of the strongest indicators of the presence and progression of carotid artery disease[20]. Blood donation, which depletes iron stores, was associated with reduced risk of MI and cardiovascular disease[21,22].

Conclusion

Serum ferritin levels were found to be lower and statistically significant in AMI patients on day 1 of the disease when compared with the values of ferritin in control. These serum ferritin values were almost three times higher on day 6th of MI patients as compared to the values in control group and values were also statistically significant. So it can be concluded that there exist an association between serum ferritin and MI.

Acknowledgement

The study was self funded and there was no conflict of interest among the authors.

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