Section: Miscellaneous

Original Research Article

SERUM FERRITIN AS A RISK FACTOR FOR CARDIOVASCULAR DISEASES

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ABSTRACT

Background: Iron; the second most abundant metal, is essential for the human body, although it can also be toxic due to oxidative stress. Iron overload has been known as a risk factor in the progression of atherosclerosis. **Objective:** To estimate serum Ferritin levels, serum CPK-MB and B-type Natriuretic Peptide (BNP) levels amongst CVD patients. **Materials and Methods:** The study was conducted on 50 CVD patients. Serum ferritin, serum CPK-MB and NP were estimated in the department of biochemistry. **Result:** The mean serum CPK-MB level was found to be 34.46 IU/L, mean serum BNP level was 9269.475 pg/ml and the mean serum ferritin level was 242.98 ng/ml. About 40% of the patient had higher serum ferritin level than reference range (hyperferritinemia) and about 40% had serum ferritin level below reference range (hypoferritinemia). **Conclusion:** Derangements in iron metabolism (either low or high serum ferritin level) may be associated with a higher risk of heart incidents. This is evident from the study and supported by the other studies carried out around the world.

INTRODUCTION

Iron is the second most abundant metal in the Earth's crust. Despite being present in trace amounts, it is essential for the human body, although it can also be toxic due to oxidative stress generation by the Fenton reaction, causing organic biomolecule oxidation.[1]

Cardiovascular disease (CVD) is the single largest cause of mortality in the world and results from the combination of environmental and genetic factors. In this respect, though iron is essential for many physiological processes, iron overload has been known as a risk factor in the progression of atherosclerosis.[2] The relationship between iron and cardiovascular disease was proposed in 1981 by Jerome Sullivan.[3] Since then, numerous epidemiological studies have been conducted to test this hypothesis. Evidence which supports the hypothesis that the iron may be associated with CVD, large number of studies published to date; the role of iron in cardiovascular disease still generates a fair amount of debate, due to a marked disparity in results.[4,5]

The current study aims to assess the serum ferritin level among CVD and AMI patients visiting the hospital.

Aim and Objective: To estimate serum Ferritin levels, serum CPK-MB and B-type Natriuretic Peptide (BNP) levels amongst CVD patients.

MATERIALS AND METHODS

The study was conducted in the Department of Biochemistry in collaboration with the Department of Medicine, Adesh Medical College and Hospital, Mohri, Shahbad (M), Haryana among 50 coronary vascular disease (CVD)/coronary artery disease (CAD) of either sex. Informed consent was obtained from the patients/first degree relative. Serum Ferritin was analyzed using Fluorimetric Enzyme Immunoassay method.[6]

RESULTS

The mean serum CPK-MB level was found to be 34.46 IU/L (reference range= upto 24 IU/L), mean serum BNP level was 9269.475 pg/ml (reference range= upto 25 pg/ml) and the mean serum ferritin level was 242.98 ng/ml (reference range= 25-280 ng/ml among male and <73.3 ng/ml among female) as shown in the Table 1.

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Table 1: Biochemical Parameters of the patients

No. of Participants	Age (Mean±SD)	CPK-MB (Mean±SD)	Troponin I (Mean±SD)	BNP (Mean±SD)	Ferritin (Mean±SD)
50	65.66±11	34.46±41	335.11±837	9269.47±1000	242.98±317

DISCUSSION

There was wide variation in the serum ferritin level among the patients going as low as 3.0 ng/ml and as high as 1050 ng/dl with increased serum BNP level. About 30% of the patient had normal CPK-MB level while only 1 (one) patient had normal BNP with normal CPK-MB, rest all of them had increased BNP level. About 40% of the patient had higher serum ferritin level than reference range (hyperferritinemia) and about 40% had serum ferritin level below reference range (hypoferritinemia).

Cardiovascular disease is a worldwide community health problem. Several causes lead to the increased risk of CVD and AMI. The current study demonstrates increased as well as decreased serum ferritin level among the patients. A study conducted by Pourmoghaddas et al (2013) in Iranian people found that high iron store, as assessed by serum ferritin, was associated with the increased risk of coronary artery disease.[5] Similarly, Lapice et al (2013) suggested that extreme conditions of iron deficiency, as well as of iron overload, are associated with modestly increased CVD risk.[7] Tuomainen et al (1998) suggested that men with high body iron stores (low TfR/F ratio) had a twofold to threefold increased risk of the first acute myocardial infarction (AMI).[8] But Morrison et al (1994) assessed the relation of serum iron, dietary iron, and use of iron supplements to the risk of fatal AMI among both men and women in a cohort study with 9920 participants and the authors found no important association between either dietary iron consumption or taking iron supplements and risk of fatal AMI.[9] Silvestre OM et al. (2017) reported derangements in iron metabolism (low or high serum ferritin level), were associated with higher risk of incident HF in a general population, even without concurrent anemia.[10] Kadoglou NPE et all (2017) in the UK, found that high ferritin levels in men with no major chronic disease and low ferritin levels in all women were associated with increased all-cause mortality after adjusting for covariates.[11] A case-control study on in Tamil Nadu by Aishwarya S et al (2022) among 50 subjects reported high ferritin and iron as strong causative agents form AMI.[12] Similar result was found in Karnataka by Chaitanya Kumar S et al (2023), in Rajasthan by Ishran R et al (2016).[13,14] While Sriteja N et al (2024) found lower serum ferritin level among the CVD patients.[15] A study carried out by Bhimavat Set al. (2022) in Maharashtra concluded that low serum ferritin was significantly associated with higher grades of Killip classification of heart failure.[16]

The current study also represents deranged ferritin level among CVD and AMI patients. Therefore, it is safer to say that derangements in iron metabolism (either low or high serum ferritin level) may be associated with a higher risk of incident heart. Various studies demonstrate iron imbalance may play a role in the incidence of HF.

CONCLUSION

Despite being present in trace amounts, iron is essential for the human body, although it can also be toxic due to oxidative stress generation and ferritin reflects the iron store in body. Cardiovascular disease (CVD) is the single largest cause of mortality in the world and results from various factors. The relationship between iron and cardiovascular disease was proposed in 1981. Evidence which supports the hypothesis that the iron may be associated with CVD, large number of studies published to date; the role of iron in cardiovascular disease still generates a fair amount of debate, due to a marked disparity in results. The current study was conducted in the Department of Biochemistry in collaboration with the Department of Medicine, Adesh Medical college. Serum ferritin level was found to be higher in 40% of the patient while 40% of the patients also had lower level of serum ferritin. More study is required to establish the relation between abnormal iron metabolism and CVD.

Author's Contributions

All the authors have contributed equally.

Conflict of Interest: The authors declare that there is no conflict of interest.

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