



SCREENING OF CARDIAC DISEASES IN THE SUBJECTS BELONGING TO THE URBAN AREA WITH CALCIUM, IRON, CHOLESTEROL AND TRIGLYCERIDES

Medical Biochemistry

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ABSTRACT

Cardiac Function Tests are used to categorize cardiac dysfunction, severity of cardiac diseases, and for the follow-up of cardiac diseases. Cardiac disease is any condition that causes inflammation or tissue damage and affects cardiac function. The aim of the study was the evaluation of serum iron and calcium parameters in patients with cardiac disease for cardiac function test and analysis of the relationships between serum level of iron and calcium in women and men according to age in group's examined. Therefore, this study was carried out to investigate serum iron, calcium and cholesterol, triglycerides status in cardiac diseases. The blood samples were analyzed for serum iron, calcium, cholesterol and triglycerides level. Significantly decreased levels of serum iron, calcium and increased levels of serum total cholesterol and triglycerides ($p < 0.0001$).

KEYWORDS

INTRODUCTION

In recent years, studies with intravenous iron agents in patients with iron deficiency and cardiovascular diseases indicated new insights in the improvement of therapy.¹ Experimental studies support the understanding of iron metabolism.¹ Primary hypercholesterolemia is the root cause for major health issues like coronary heart disease and atherosclerosis.² Intravenous iron therapy improves the exercise capacity in patients with systolic heart failure and iron deficiency.³ The American College of Physicians developed this guideline to present the evidence and provide clinical recommendations on the treatment of anemia and iron deficiency in adult patients with heart disease.^{4,5} Mitochondrial reactive oxygen species (ROS) have emerged as an important mechanism of disease and redox signaling in the cardiovascular system. ⁵ Anemia is a common comorbidity in heart failure (HF), and is associated with increased morbidity and mortality. ⁶ Iron deficiencies is the most common cause of anemia and to estimate the prevalence of anemia in adult congenital heart disease patients. ⁷ Low serum calcium level is related to a higher prevalence of cardiovascular disease and coronary heart disease. ⁸ Evidence for an association between calcium intake and risk of cardiovascular death remains controversial.⁹

Various biochemical parameters that are presently determine in serum/plasma – total cholesterol, triglycerides, iron and calcium for the screening and diagnosis of cardiac diseases, as well as to determine the changes that occurs in the metabolic process associated with the cardiac disease complications. The purpose of this research is to establish biochemical parameters for the screening and diagnosis of cardiac diseases and its complication with risk factors of serum calcium, iron, cholesterol and triglycerides parameters and to determine the interrelationship of cholesterol and other diagnosed parameters through them.

MATERIALS AND METHODS

This study was conducted at the Department of Biochemistry S.S. Medical College Rewa (M.P.) in the year 2014. Source of data- All the laboratory investigation was performed in patients. The study group compared of 74 subjects from 5-90 years of age in screening programmed of cardiac disease. Patients was screened in central pathology lab of Biochemistry section, S.G.M.H., S.S. Medical College Rewa (M.P.) assigned for this study. Subject's history was recorded for all the groups. Alcohol users, smokers, suffering from other diseases, HIV and cancer patients were excluded, all those taken supplements iron, calcium tablets were not included in this study. Collection of samples- Venous blood was collected from all subjects after 12 hours overnight fasting. 3ml of venous blood as sample was collected as routine diagnosis of the subjects and stored in a sterile vial. The blood was allowed to clot of room temperature. The clot was rimmed centrifuged; serum was separated by low-speed centrifugation and stored in a sterile vial. Hemolyzed and lipemic serum samples were rejected. Biochemical analysis-Serum total cholesterol, triglycerides, iron and calcium were estimated. Present work was approved by institutional research ethical committee (Human Studies).

Statistical analysis-

Mean and standard deviation were determined for each variable in all groups. All the results were expressed as mean $\pm$ SD. Student "t" test was used to assess statistical significance of the result within age and sex.

OBSERVATION

The present study was done with an aim to screen the subjects 05-90 years of age in Rewa city for cardiac diseases. The serum iron and calcium level obtained then correlated with other parameters.

Table.1-The level of calcium, iron, total cholesterol and triglycerides in different age groups-

Variables	Age group of 05-30 years		Age group of 31-60 yrs		Age group of 61-90 yrs	
	Male (n=08)	Female (n=07)	Male (n=23)	Female (n=17)	Male (n=13)	Female (n=14)
Serum Calcium (mg/dl)	7.8 $\pm$ 05.21	7.20 $\pm$ 10.37	6.80 $\pm$ 04.98	6.30 $\pm$ 81.67	5.50 $\pm$ 15.44	5.02 $\pm$ 31.72
Serum Iron (mg/dl)	78.73 $\pm$ 37.12	75.64 $\pm$ 22.30	70.24 $\pm$ 18.51	67.15 $\pm$ 31.23	60.63 $\pm$ 24.83	58.70 $\pm$ 15.47
Total cholesterol (mg/dl)	270 $\pm$ 12.26	250 $\pm$ 70.74	285.08 $\pm$ 80.96	280.05 $\pm$ 62.99	298.78 $\pm$ 71.85	296.53 $\pm$ 70.52
Serum Triglycerides (mg/dl)	190.28 $\pm$ 99.2	180.66 $\pm$ 22.85	271.45 $\pm$ 38.25	260.33 $\pm$ 29.00	294.69 $\pm$ 54.69	290.42 $\pm$ 38.62

Table II-Correlation coefficient and significance in the study group.

parameter	Correlation coefficient	P value
Triglycerides and serum iron	-0.53	P < 0.0001
Triglycerides and serum calcium	-0.57	P < 0.0001
Serum calcium and serum iron	+0.65	P < 0.0001
Total cholesterol and serum iron	-0.70	P < 0.0001
Total cholesterol and serum calcium	-0.54	P < 0.0001

RESULT

The present study was done with an aim to screen the subjects 5-90 years of age in urban region for cardiac diseases. The serum iron level obtained was then correlated with other parameters. Descriptive statics of diagnostic parameters presented in Table I. There was a statistically significant decreased level of the serum calcium, iron and increased serum total cholesterol and triglycerides level in all groups. Table II-Description about correlation coefficient and significance with

diagnosed parameters in the study groups.

DISCUSSION

Iron deficiency (ID) was an emerging problem in patients with chronic heart failure (HF) and can be a potential therapeutic target. Iron deficiency was common in patients with chronic HF, relates to disease severity, and a strong and independent predictor of outcome.¹⁰ Women were more likely to have atypical cardiovascular symptoms compared with men. The exercise stress test was the initial test for women with suspected or known CAD.¹¹ An inverse, independent association between adult and coronary artery calcium.¹² Many observational prospective studies had confirmed the inverse relationship between high-density lipoprotein (HDL) cholesterol and coronary heart disease.¹³ Elevated non fasting remnant cholesterol and low-density lipoprotein (LDL) cholesterol were causally associated with ischemic heart disease (IHD).¹⁴ Iron deficiency was an important co-morbidity in patients with heart failure (HF).¹⁰ Experimental evidence suggested that iron therapy in iron-deficient animals may activate molecular pathways that can be cardio-protective.¹⁵ The association between total iron binding capacity (TIBC) and coronary artery disease risk. A weak association was found between TIBC levels and decreased CAD risk.¹⁶ Even though anemia was a significant comorbidity regularly observed in patients with chronic heart failure (HF).¹⁷ Anemia and iron deficiency were common in patients with heart failure (HF), and were associated with worse symptoms and adverse outcomes in this population.¹⁸ Heart failure, a common condition affecting older patients, associated with increased hospitalization and mortality rates among geriatric patients.¹⁹ Serum calcium levels in the elderly, as hypocalcemia was a reversible cause of heart failure.¹⁹ Observations suggest that hypocalcemia could be a reversible cause of cardiomyopathy and congestive heart failure.^{20,21} Hypocalcemic dilated cardiomyopathy was a cause of heart failure in adults.^{22, 23, 24} Hypocalcemic cardiomyopathy in infants was characterized by heart failure in a previously normal infant with hypocalcemia without organic cardiac lesion.²⁵

CONCLUSION

In the present study in patients at the acute and chronic phase risks of the diseases. Decreased iron may lead to abnormal synthesis of cholesterol and triglycerides. On the other hand prolonged deficiency of iron and calcium may lead to abnormal production of cholesterol and triglycerides. Calcium, cholesterol, triglycerides and iron are the strong predictor for the occurrence of both for cardiac disease and its severity and complications. Iron and calcium is important predictor for understanding to the severity in cardiac diseases and its complications.

A well accepted fact the increasing incidence of disease with advancing age a possible explanation for the association of age and disease is based on the implication of iron and calcium deficiency in the pathogenesis of several disorders. Long term follow up in a large number of patients would be necessary to confirm these results.

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