



**ORIGINAL RESEARCH PAPER**

**Medical Science**

**STUDY ON PLASMA HOMOCYSTEINE LEVELS AS A RISK FACTOR IN ISCHAEMIC HEART DISEASE**

**KEY WORDS:** plasma Homocysteine level, Hyperhomocysteinemia, Ischaemic heart disease(IHD), dyslipidemia, atherosclerotic vascular disease and congestive heart failure.

**Dr. Monika Jayaswal\***

Tutor, Department of Biochemistry, Darbhanga Medical College, Laheriasarai, Darbhanga, Bihar \*Corresponding Author

**Dr.(prof.) Sude Kumar Singh**

Professor & Head , Department Of Biochemistry, Darbhanga Medical College, Laheriasarai, Darbhanga, Bihar

**ABSTRACT**

Ischaemic heart disease(IHD) is a condition in which there is an inadequate supply of blood and oxygen to the myocardium, it typically occurs where there is an imbalance between myocardial oxygen supply and demand. According to WHO fact sheet in 2007, Cardiovascular diseases are the number one cause of death globally. The modifiable risk factors are smoking, hypertension, obesity, dyslipidemia, atherogenic diet, physical inactivity, diabetes mellitus etc and recently some newer ones are hyperhomocysteinemia, prothrombotic factors, proinflammatory factors, impaired fasting glucose and subclinical atherosclerosis and lipoprotein(a). Aims and Objectives are to identify the possible risk factors associated to Ischemic heart Diseases, to determine Plasma Homocysteine levels in cases and controls and to assess the relationship between Homocysteine and other previous Parameters. Smokers were found to have more incidence of IHD and statistically significant. IHD was more common in patients with hypertension, diabetic patients have increased propensity for IHD, mere increased risk of IHD in alcoholics association with age is not commentable but disease was more common in patients with increased body mass index although association was not significant, no causal relationship of hemoglobin with IHD but total leucocyte count and ESR was significant higher in patients, patients with IHD had increased total cholesterol, triglycerides , LDL, and serum homocysteine level which was statistically associated. The mean homocysteine level were higher in obese patients, diabetics, hypertensives, females, patients on mixed diet, hypertension and smokers. Thus our study although validating the view that increased Homocysteine levels are associated with IHD, needs further verification in larger prospective studies. In conclusion, plasma Homocysteine levels were correlating with IHD and it can be taken as an independent risk factor for IHD.

**INTRODUCTION**

Ischaemic heart disease(IHD) is a condition in which there is an inadequate supply of blood and oxygen to the myocardium, it typically occurs where there is an imbalance between myocardial oxygen supply and demand. According to WHO fact sheet in 2007, Cardiovascular diseases are the number one cause of death globally and over 80% of these deaths take place in low and middle income countries and occurs almost equally in both men and women. Also according to WHO committee report in 2004, about 30% of all global deaths are due to coronary artery disease. The major risk factors can be divided into modifiable and non-modifiable.

The modifiable risk factors are smoking, hypertension, obesity, dyslipidemia, atherogenic diet, physical inactivity, diabetes mellitus etc and recently some newer ones are hyperhomocysteinemia, prothrombotic factors, proinflammatory factors, impaired fasting glucose and subclinical atherosclerosis and lipoprotein(a).

Among the non-modifiable risk factors are gender, age, family history, associated genetic factors.

Homocysteine is a sulphur containing intermediary amino acid which is derived from demethylation of methionine. Normal range of Homocysteine is 5-15 umol/litre with a mean value of 13 umol/litre in males and 10 in females in western countries. Kang and co-workers have classified Hyperhomocysteinemia as follows :  
 Moderate : 15-30 micromol/litre  
 Intermediate: 30-100 micromol/litre  
 Severe : >100 micromol/litre

Hyperhomocysteinemia may be due to genetic insufficiency of enzymes needed for metabolism, nutritional deficits in vitamin cofactors, other circumstances such as drugs and associated medical conditions like CKD, diabetic nephropathy etc. Similarly low intake and low plasma concentrations of folate and vitamin B6 and B12 have been associated with increased homocysteine levels. Recently Hyperhomocysteinemia has been linked to cardiovascular diseases including coronary heart disease, myocardial infarction, thrombotic and atherosclerotic vascular disease and congestive heart failure. A plasma Homocysteine increment of 5umol/litre was associated with a 50% increase in cardiovascular mortality.

Among the cardiovascular mortality group the strongest association of plasma Homocysteine level was observed for Cerebrovascular disease.

Medical fraternity is still witnessing different opinions regarding need to treat Hyperhomocysteinemia. Hyperhomocysteinemia has been linked to cardiovascular disease by various authors but this association is casual or it remains uncertain. The association between Homocysteine levels and IHD has been observed in retrospective rather in prospective studies.

This study is taken up to find if elevated Homocysteine levels contributes to atherosclerosis and is there any positive or significant correlation between elevated Homocysteine levels and IHD and whether it is related to other risk factors or can be taken as an independent risk factor for IHD.

**AIMS AND OBJECTIVES**

- To identify the possible risk factors associated to Ischemic heart Diseases..
- To determine Plasma Homocysteine levels in cases and controls.
- Assess the relationship between Homocysteine and other previous Parameters.

**MATERIALS AND METHODS**

This was a prospective study of patients of Ischemic Heart Disease who reported to Darbhanga Medical College & Hospital, Laheriasarai, Darbhanga, Bihar. The study was conducted on 100 patients admitted in medicine wards , emergency and ICU . Out of these 50 were cases of IHD diagnosed here at our hospital or who were previously been diagnosed of the same with proper evidence and documentation. Apart from this 50 Age and Sex matched controls were taken without any evidence of IHD. Data was collected from these inpatients who fulfilled the inclusion and exclusion criteria of the study and observation was done accordingly. This study was performed during the Period of December 2016 to November 2018.

**Inclusion criteria**

All cases of established IHD between ages 18 to 65 of both sexes with either of these :  
 1. History of myocardial infarction

2. ECG suggestive of IHD
3. Cardiac enzymes suggestive of myocardial infarction
4. 2D electrocardiographic finding of wall motion abnormality suggestive of ischaemia
5. Previously diagnosed by stress testing or coronary angiography.

**Exclusion criteria**

1. Patients <18 or >65 years.
2. Patients on hemodialysis
3. Patients with AKI or CKD
4. Pregnant patients
5. Patients taking HRT, methotrexate, theophylline, metformin, niacin, folate, vitamin B12, vitamin B6 and other drugs or agents which can affect study.

Detailed history including history of risk factors if any was taken. It included the presenting symptoms with duration, significant past history especially about various risk factors for atherosclerosis like smoking, diabetes, hypertension, history of IHD etc. Treatment history of the various comorbidities were also taken in detail. All patients underwent a detailed physical examination and investigations like TLC, ESR, hemoglobin < fasting and post prandial blood glucose, renal function tests, lipid profile, cardiac enzymes like CK-MB, 12 lead ECG, Chest x-ray, 2D echocardiography etc were done. Apart from this every patient had plasma Homocysteine level performed.

**OBSERVATIONS**

Out of 100 patients selected 55 were males and 45 females which was statistically non significant for gender distribution. Majority of patients were on mixed diet and there was no statistical significant association between type of diet and disease under study. Smokers were found to have more incidence of IHD and statistically significant. IHD was more common in patients with hypertension, diabetic patients have increased propensity for IHD, mere increased risk of IHD in alcoholics association with age is not commentable but disease was more common in patients with increased body mass index although association was not significant, no causal relationship of hemoglobin with IHD but total leucocyte count and ESR was significant higher in patients, patients with IHD had increased total cholesterol, triglycerides, LDL, and serum homocysteine level which was statistically associated. The mean homocysteine level were higher in obese patients, diabetics, hypertensives, females, patients on mixed diet, hypertension and smokers.

**SUMMARY & CONCLUSION :-**

1. The study population included 50 cases (28 males and 22 females) and 50 controls (27 males and 23 females) with mean age of cases were 53.1 years and that of controls was 53.7 years.
2. Homocysteine levels were found to have significant correlation with IHD with p<0.05. The mean levels of homocysteine was significantly higher in the cases compared to the controls.
3. Our study also shows that homocysteine levels can be considered as an independent risk factor for IHD.
4. There is a significant and positive correlation between raised homocysteine levels and hypertension as well as diabetes.
5. Body mass index was higher in cases as compared to controls.
6. Clinical data showed that blood cholesterol, high low density lipoprotein, low high density lipoprotein, raised ESR, raised total leucocyte count, and smoking are risk factors for IHD with significant association.
7. Mean Homocysteine levels are also higher in obese, smokers, hypertensives, diabetics, females, and persons on mixed diet as well as those with dyslipidemia.

Thus our study although validating the view that increased Homocysteine levels are associated with IHD, needs further verification in larger prospective studies.

In conclusion, plasma Homocysteine levels were correlating with IHD and it can be taken as an independent risk factor for IHD.

**REFERENCES**

1. Harrisons principles of internal medicine, 20th edition
2. Braunwalds heart disease – 7th edition
3. API textbook of medicine – 10th edition
4. American heart association(2009) heart disease and stroke statistics 2009 dallas update
5. British heart association (2008) european cvs statistics. International statistical fact sheet
6. Guilliams g Thomas 2004. Homocysteine : a risk factor worth treating. The standard.
7. D'angelo a, selhub j, homocysteine and thrombotic disease, blood 1997; 90:
8. Kailash Prasad homocysteine, a risk for cardiovascular disease. international journal of angiography
9. Yoelekar MM, shete MM. homocysteine and hypertension. JAPI 2002