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Original Research Paper

Study of Microalbuminuria and Serum lipid profile in Nondiabetic Nonhypertensive subjects with Myocardial Infarction in Ajmer District.

Biochemistry

KEYWORDS: Cardiovascular disease, Microalbuminuria, Acute myocardial infarction Total Cholesterol, Triglyceride, HDL cholesterol,

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ABSTRACT

Background : Cardiovascular disease (CVD) is fast emerging as a prominent health problem and is one of the major cause of morbidity and mortality in the developing countries. Microalbuminuria (MAU) is a common phenomenon in patients with cardiovascular disease worldwide. The American Diabetes Association (ADA) and the National Kidney Foundation (NKF) define microalbuminuria as an albumin⁄creatinine ratio (ACR) between 30 - 300 µg⁄mg in both men and women. Our study was aimed to find out the prevalence of microalbuminuria and the status of serum lipid profile in nondiabetic and nonhypertensive subjects with myocardial infarction & healthy controls and also to find out association of Microalbuminuria with age, weight, BMI and serum lipid profile . This study was limited and this topic needs to be further worked upon. Materials and methods:The present study was conducted on 50 non diabetic non hypertensive subjects with myocardial infarction. Cases were selected from Cardiology ward of Jawahar Lal Nehru Medical College and Associated Group of Hospital, Ajmer. Age and sex matched healthy controls (n=25), (group-1) were recruited from Jawahar Lal Nehru Medical College and Associated Group of Hospital, Ajmer. Anthropometric para- meters and biochemical estimation were performed after taking approval from Ethical Committee. The serum total cholesterol (TC), triglyceride (TG) and HDL cholesterol (HDL-C) were determined enzymatically, while LDL cholesterol (LDL-C) was calculated using the Friedewald formula. Microalbuminuria was determined By Clinitek microalbumin test Results: In our study out of the 50 cases 64% (n=32) had microalbuminuria. The difference was statistically significant P <0.001. The Mean±SD of Age, Weight and BMI were more in microalbuminuric cases than healthy controls and were statistically significant (P<0.05). The mean values of serum TC, Serum TG and serum LDL-C in microalbuminuric cases compared to healthy controls were significantly (P<0.001) raised while the mean value of serum HDL-C in microalbuminuric cases compared to healthy controls was decreased significantly (P<0.001). Conclusion: The observations of this study has revealed that the prevalence rates of microalb-uminuria in non-diabetic non-hypertensive subjects with myocardial Infarction was 64% . There was a significant increase in the levels of TC, TG and LDL cholesterol among microalb- uminuric cases. Microalbuminuria can be used as a predictor for the early detection of cardiovascular changes along with the lipid profile markers in the general population to prevent the morbidity and mortality which are associated with acute myocardial infarction.

Introduction

Cardiovascular disease (CVD) is fast emerging as a prominent health problem and is one of the major cause of morbidity and mortality in the developing countries. Coronary heart disease has been defined by WHO as impairment of heart function due to inadequate blood flow to the heart compared to its needs, caused by obstructive changes in coronary flow. Acute myocardial infarction (AMI) is one of the commonest diseases amongst hospitalized patients in industrialized countries. The mortality rate of AMI is approximately 30% and for every 1 in 25 patients who survive the initial hospitalization, dies in the first year after AMI (1). Indians are four times more prone to AMI as compared to the people of other countries due to a combination of the genetic and lifestyle factors that promote metabolic dysfunction. Microalbuminuria (MAU) is a common phenomenon in patients with cardiovascular disease worldwide. MAU is defined as an urinary albumin excretion rate between 20–200 mg/l or 30–300 mg/day. The American Diabetes Association (ADA) and the National Kidney Foundation (NKF) define microalbuminuria as an albumin⁄creatinine ratio (ACR) between 30 and 300 µg⁄mg in both men and women (2, 3). MAU is closely associated with cardiovascular risk factors such as age, smoking, hypertension, diabetes, dyslipidemia and lack of physical activity (4, 5, 6). Data from several studies over the last two decades have demonstrated that MAU is not only a predictor of diabetic complications but also a powerful independent risk factor for coronary artery disease (CAD), moreover, MAU predicts development of ischemic cardiovascular events related to the development of atherosclerosis (7). However, the exact mechanism of the accelerated atherosclerosis in microalbuminuria is not clear. Abnormal vasodilatation, endothelial dysfunc- tion, inflammation and abnormal coagulation may be involved in this process. Investigators have postulated that MAU may be a marker of risk, even in apparently healthy people, because it reflects vascular damage in the kidneys and in the systemic endothelial dysfunction(8, 9, 10). Several studies have shown an increased association between MAU and abnormalities in serum lipoproteins. These lipid abnormalities include low levels of HDL as well as high levels of LDL, total triglycerides and lipoprotein a. The most consistent association between lipoprotein abnormalities and MAU is a low level of HDL (11, 12). The presence of MAU is of great diagnostic value since MAU represents a very sensitive manifestation of abnormal vascular permeability. Its applications as a marker of target organ damage for cardio- vascular disease include risk assessments, eva- luation of disease severity and prognosis (13). MAU is also detected in the presence of an acute coronary syndrome or peripheral vascular disease, it is proportional to the severity of the infarct size or claudication (14). As Indians are at a high risk for the development of cardiovascular events, it clearly demands the importance of cost-effective markers for the detection of the early cardiovascular changes. Our study was aimed to find out the prevalence of microalbuminuria and the status of serum lipid profile in non-diabetic and non-hypertensive subjects with myocardial infarction

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and healthy controls and also to find out association of microalbuminuria with age, weight, BMI and serum lipid profile . This study was limited and this topic needs to be further worked upon.

Materials and Methods

The present study is a case control study, conducted on 50 non diabetic non hypertensive subjects with myocardial infarction. Patients were diagnosed as acute myocardial infarction on the basis of ST-segment elevation, clinical history, physical examination & biochemical markers. Cases were selected from Cardiology ward of Jawahar Lal Nehru Medical College and Associated Group of Hospital, Ajmer. Age and sex matched healthy controls (n = 25) with no symptoms of coronary artery disease with a normal ECG (group-1) both male and female between 30 - 60 years of age were recruited from Jawahar Lal Nehru Medical College and Associated Group of Hospital, Ajmer. The present study is approved by Institutional Ethical Committee.

Exclusion criteria: Age <30 and >60 years, diabetes mellitus, history of hypertension, congestive cardiac failure, renal disease, macro-albuminuria, Pregnant, lactating women. Height and weight were measured with the subject in light clothes without shoes, and BMI was calculated by using the formula: [BMI = weight (Kgs) /height (metre)2]. Serum total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high density lipoprotein cholesterol (HDL-C), and triglyceride (TG) levels were classified on the basis of the Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP III) (15). Elevated TC was defined as having TC levels of (>200mg/dL), Low HDL-C was defined as having HDL-C levels of (<40mg/dL) elevated LDL-C was defined as having LDL-C levels of (>130mg/dL), Elevated TG was defined as having triglyceride levels of (>150mg/dL). Blood samples were collected after an overnight fast (12-14hrs) under aseptic conditions from all the study participants. All samples were centrifuged and analyzed for Serum cholesterol, Serum Triglyceride, Serum HDL, LDL-Cholesterol. The serum total cholesterol (TC), triglyceride (TG) and HDL cholesterol (HDL-C) were determined enzymatically, while LDL cholesterol (LDL-C) was calculated using the Friedewald formula. Early morning mid stream urine samples were collected under strict aseptic precautions. In the laboratory, urine sample was visually and chemically examined with dipstick test. Microalbuminuria was determined By Clinitek microalbumin test

Statistical analysis: all data were analysed by SPSS-13 version.

Results

A total of 75 subjects were studied. The results are summarized in Tables and Figures. Table 1 and Fig 1 shows that all the healthy subjects were microalbumin test negative . Out of 50 patients of Non-diabetic Non-hypertensive Subjects with Myocardial Infarction , 32 (64%) patients were microalbumin test positive and 18 (36%) were microalbumin test negative. The difference among cases and controls was statistically significant P <0.001 (Table 1). The Table-2,3, Figure-2 shows that the Mean±SD of Age weight and BMI were more in microalbuminuric case than healthy controls . Microalbuminuria was seen in older age group. The mean age group difference noted among cases and controls showed that microalbuminuria was found in older age group (51.0 ± 7.43) cases as compared to controls (47.5 ± 9.0). The difference was statistically significant P<0.05 .The Table-2, 3 Figure-2 shows that the Mean±SD of weight and BMI were more in microalbuminuric cases than healthy controls and the difference was statistically significant (P<0.05). The Table-4, Figure-3 shows that the level of serum TC (216.0 ± 33.6 v/s 163.0 ± 28.4), serum TG (156.2 ± 32.2 v/s 107.0 ± 44.5) and serum LDL-C (142.0 ± 32.0 v/s 88.0 ± 47.0) in microalbuminuric cases compared to healthy controls were significantly (P<0.001) raised while serum HDL-C level (43.2 ± 4.7 v/s 49.0 ± 3.50) was low in microalbuminuric cases compared to healthy controls & was statistically significant (P<0.001).

Table-1PRESENCE OF MICROALBUMINURIA IN SUBJECTS STUDIED

Micro albumin Test	Group I Healthy Controls	Group II Non-diabetic Non- hypertensive Subjects with Myocardial Infarction
Micro albumin Test Negative	25	18
Micro Albumin Test Positive	00	32

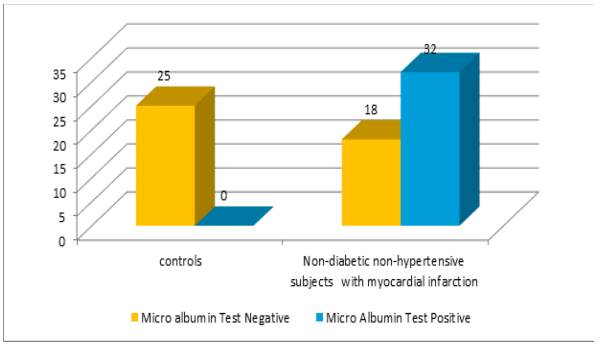

Fig-1

PRESENCE OF MICROALBUMINURIA IN SUBJECTS STUDIED

Table– 2

Comparision of Anthropometric Parameters of Healthy Subjects, Microalbumin Test Negative Cases and Microalbumin Test Positive Cases

Variable	Group1 Healthy Subjects	Group II Non-diabetic Non-hypertensive Subjects with Myocardial Infarction	
		Microalbumin Test Negative	Microalbumin Test Positive
Age (yrs)	47.5±9.0	49.6±6.91	51.0±7.43
Weight (kg)	56.9±7.5	60.5±7.4	61.4±6.9
Height. (Cm)	156.02±6.12	154.10±5.4	150.16 ± 4.6
BMI (kg/m2)	22.3±2.8	24.6±2.80	26.3±1.5

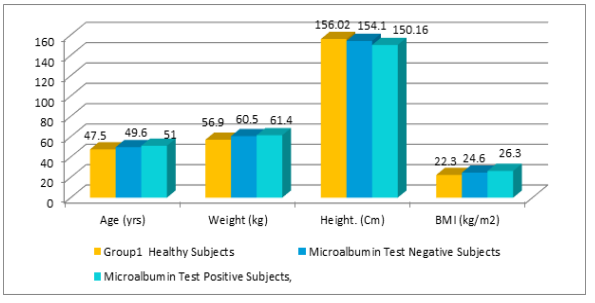

Fig-2

Comparision of Anthropometric Parameters of Healthy Subjects, Microalbumin Test Negative Cases and Microalbumin Test Positive Cases

Table– 3

Comparision of Anthropometric Parameters of Healthy Subjects and Microalbuminuric cases

Variable	Group1 Healthy Subjects	Microalbuminuric cases	P value
Age (yrs)	47.5±9.0	51.0±7.43	< 0.05
Weight (kg)	56.9±7.5	61.4±6.9	<0.05
Height. (Cm)	156.02±6.12	150.16 ± 4.6	<0.05
BMI (kg/m2)	22.3±2.8	26.3±1.5	<0.05

Table-4

Comparison of Serum Lipid level in Healthy Subjects, Microalbumin Test Negative Cases and Microalbumin Test Positive Cases

Serum Lipid level (mg/dl)	Group I Controls	Group II Non-diabetic Non-hypertensive Subjects with Myocardial Infarction	
		Microalbumin Test Negative subjects	Microalbumin Test Positive subjects
Serum Cholesterol(mg/dl)	163.0+28.4	188.6+27.7	216.0+33.6
Serum Triglycerides(mg/dl)	107.0+44.5	130.0+27.0	156.2+32.2
Serum LDL(mg/dl)	88.0+47.0	117.0+28.0	142.0+32.0
Serum HDL(mg/dl)	49.0+3.50	45.0+5.30	43.2+4.7

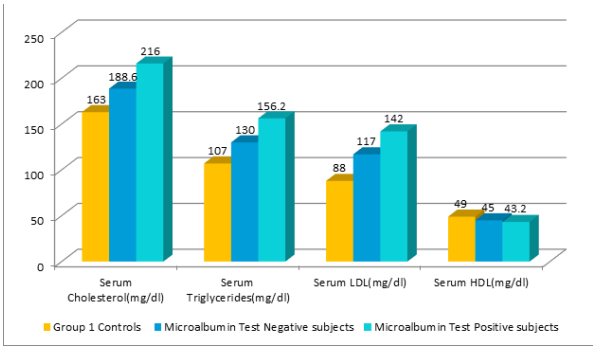

Fig -3

Comparison of Serum Lipid level in Healthy Subjects, Microalbumin Test Negative Cases and Microalbumin Test Positive Cases

Table–5

Comparision of Serum Lipid level in Healthy Subjects and Microalbuminuric cases

Serum Lipid level (mg/dl)	Group I Controls	Microalbuminuric cases	P Value
Serum cholesterol (mg/dl)	163.0+28.4	216.0+33.6	<0.001
Serum Triglycerides (mg/dl)	107.0+44.5	156.2+32.2	<0.001
Serum LDL (mg/dl)	88.0+47.0	142.0+32.0	<0.001
Serum HDL (mg/dl)	49.0+3.50	43.2+4.7	<0.001

Discussion

In our study we observed that the prevalence rates of microalbuminuria in non-diabetic non-hypertensive subjects with myocardial infarction was 64% (32/50) . Our findings are in agreement with Memon AG et al . (2015) and Basu A et al. (2015) found that the prevalence rates of microalbuminuria in non-diabetic non-hypertensive subjects with myocardial infarction was 65% (82/126) and 66% respectively (16, 17). The mean age group of microalbuminuric cases was 51.0±7.43 years and that for controls was 47.5±9.0 years. It is concordance with previous studies which showed that microalbuminuria was associated with older age group (18, 19). The mean value of BMI of microalbuminuric cases was 26.3±1.5 and that for controls was 22.3±2.8. The difference was statistically significant (P <0.05). Our finding are in agreement with previous studies which showed that there is increase in prevalence of microalbuminuria with progressive increase in BMI (20, 21, 22, 23). Haffner et al. (1990) considered microalbuminuria as a cardiovascular risk factor in the non-diabetic patients (24) . Gosling et al. (1998) also considered it to be an emerging cardiovascular risk factor (25, 26). Klausen et al. (2004) who found that MAU is a strong determinant of coronary artery disease and death independently of age, sex, hypertension, DM, renal function, and lipid profile (27). Results of our study revealed that the mean values of serum total cholesterol, Triglyceride and LDL-C were significantly higher and statistically significant among microalbuminuric cases compared to controls. The mean HDL-C level was lower among microalbuminuric cases compared to controls and was statistically significant. Our finding are in agreement with Satisha TG et al. (2011) who found a significant increase in the total cholesterol, LDL cholesterol among microalbuminuric cases (28). Previous studies have shown that elevated LDL levels increased the risk for the development of atherosclerosis. LDL cholesterol undergoes oxidation due to various factors and oxidized LDL plays a key role in the initiation and development of atherosclerotic plaque in the coronary arteries (29). However, the exact mechanism of the accelerated atherosclerosis in microabuminuria is not clear. Abnormal vasodilatation, endothelial dysfunction, inflammation and abnormal coagulation may be involved in this process.

Conclusion: In our study we observed that the prevalence rates of microalbuminuria in non-diabetic non-hypertensive Subjects with myocardial Infarction was 64% . we also found a significant increase in the total cholesterol, TG and LDL cholesterol among microalbuminuric cases. Microalbuminuria can be used as a predictor for the early detection of cardiovascular changes along with the lipid profile markers in the general population, to prevent the mortality and morbidity which are associated with acute myocardial infarction.

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