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MICROALBUMINURIA AND ITS ASSOCIATION WITH LIPID PROFILE IN PREHYPERTENSION

Biochemistry

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ABSTRACT

Prehypertension is a precursor of clinical hypertension and is closely related with increased incidence of cardiovascular disease. The risk factors such as high cholesterol, obesity and diabetes are seen more in people with prehypertension than in those with normal blood pressure. The present study was planned to study the association of Lipid Profile with microalbuminuria in prehypertension. For the study, 100 patients with prehypertension visiting the Medicine out-patient department of Mahatma Gandhi Medical College and Hospital, Jaipur were selected based on the predefined inclusion and exclusion criteria. Of total prehypertensive patients 32% exhibited MA. Out of the parameters of lipid profile; serum total cholesterol, triglycerides, LDL and VLDL were significantly higher in microalbuminuria as compared to normal groups. Serum HDL levels was non-significant among both groups. The study reported dyslipidemia to be associated with occurrence of microalbuminuria.

KEYWORDS

INTRODUCTION

Prehypertension is a precursor of clinical hypertension and is closely related with increased incidence of cardiovascular disease (Ferdinand KC et. al., 2007; Vasan MG et. al., 2001). Prehypertension was formerly defined as high-normal and above-optimal Blood Pressure (BP). In a normotensive person, prehypertension is defined as a systolic BP 120-139 mmHg and/or diastolic BP 80-89 mmHg based on properly measured seated BP readings on each of two or more office sittings. Compared with normal BP, hypertension is associated with an increase in cardiovascular morbidity and mortality (Qureshi AI et. al., 2005; Mainous AG et. al., 2004). The mechanism of excess risk for prehypertension is presumed to be the same as that of hypertension. It has also been shown that prehypertension is associated with subclinical atherosclerosis, and target organ damage (Cordero A et. al., 2006; Lee JE et. al., 2006; Nesbitt SD et. al., 2005).

Prehypertension is a warning sign of developing hypertension in future. High blood pressure increases the risk of heart attack, stroke, coronary heart disease, heart failure, and kidney failure. There is no cure for high BP, but there is treatment with diet, lifestyle habits and medications. Starting as low as 115/75 mmHg, the risk of heart attack and stroke doubles for every 20 point jump in systolic blood pressure and 10 point rise in diastolic blood pressure for adult aged 40-70 years. People with prehypertension may have greater risk for CVD. The risk factors such as high cholesterol, obesity and diabetes are seen more in people with prehypertension than in those with normal blood pressure. Microalbuminuria (MA) develops from progressive, subclinical, structural and functional changes within the kidney and represents a sensitive marker of early renal disease (Newman DJ et. al., 2005; Ogensen CE et. al., 1995). Microalbuminuria is typically defined as 24-hour urine albumin excretion of 30-300 mg or urinary albumin creatinine ratio (UACR) of 2.5- 30mg/mmol in men, 3.5-30 mg/mmol in women (Karalliedde J et. al., 2004).

In 1999, World Health Organization (WHO) identified microalbuminuria as a component of metabolic syndrome, an indication that microabuminuria is recognized as a predictor of CV mortality (Iberti KG et. al., 1998).

Very few studies have explored the lipid profile levels in prehypertensive patients. The study has attempted to analyze the association of MA with lipid profile in the patients enrolled.

AIMS AND OBJECTIVES

To study the relationship of dyslipidemia and microalbuminuria in prehypertensive patients.

MATERIAL AND METHOD

The study was conducted in Department of Biochemistry in association with Department of General Medicine of Mahatma Gandhi Medical College & Hospital, Jaipur.

This study was approved by the Institutional Ethics Committee. Total 100 subjects were enrolled. Patients enrolled in the study were recommended not to have heavy exercise at least 24 hours before examination.

1. Inclusion criteria

- Clinically diagnosed and biochemically confirmed cases of Prehypertension.
- Age upto 60 years, either gender.
- Patients who were willing to participate and submitted a signed consent.
- Patient willing to comply with the protocol requirements.

2. Exclusion criteria

- Patients on anti hypertensive and cholesterol lowering drugs.
- Diagnosed cases of renal failure and cardiac failure.
- Pregnant and lactating women.
- Malignant patient.
- Patients on drugs known to cause hyperuricemia or nephrotoxicity.
- Gout.

Clinical Investigations

Albumin Creatinine Ratio(ACR)
Serum Lipid Profile

STATISTICAL ANALYSIS

The prehypertensive subjects enrolled for the study (n=100) were grouped on the basis of ACR as :

- Normoalbuminuria ACR ≤ 30µg/mg (n=68)
- Microalbuminuria ACR > 30µg/mg (n=32)

Different variables in the groups were presented as mean± SD. For statistical comparison, students 't' test was applied between the two groups. To analyze the association of ACR with Serum lipid Profile. For all test $P < 0.05$ was considered as statistically significant.

RESULT AND DISCUSSION

Table:1 Distribution of Total Cholesterol, Triglycerides, LDL, VLDL and HDL in groups formed on the basis of microalbuminuria

Parameters	Normal group (n=68)	Microalbuminuria group (n=32)	t value	p value
Total Cholesterol (mg/dl)	140.96±38.12	172.84±00.16	-3.516	0.003
Triglycerides (mg/dl)	135.85±67.86	171.13±82.18	-2.264	0.026
LDL (mg/dl)	71.53±24.18	94.09±35.94	-3.701	0.000
VLDL (mg/dl)	27.17±13.57	34.23±16.44	-2.265	0.026
HDL (mg/dl)	38.32±13.15	42.25±11.10	-1.462	NS

The present study was planned to study the association of Lipid Profile

with microalbuminuria in prehypertension. For the study, 100 patients with prehypertension visiting the Medicine out-patient department of Mahatma Gandhi Medical College and Hospital, Jaipur were selected based on the predefined inclusion and exclusion criteria.

After obtaining informed consent, all patients were subjected to blood pressure measurement; routine blood chemistry and spot urine examination for Albumin Creatinine Ratio(ACR).

Of total prehypertensive patients 32% exhibited MA.

In a study by Sabarwal RK et. al., 2008, the prevalence of MA in hypertensive patients was observed to be 33.3%. The mean ACR for normoalbuminuria group was 15.13±7.34µg/mg whereas that for MA was 115.8±82.6 µg/mg.

Lipid profile is a panel of blood tests that serves as an initial broad medical screening tool for abnormalities in lipids, such as Cholesterol, TG and HDL.

In the study S. Lipid profile was estimated for all enrolled subjects. On comparing the various components of lipid profile (namely CHOL, TG, HDL, LDL, VLDL) among the normoalbuminuria and microalbuminuria groups it was observed that:

- The mean S. Cholesterol (CHOL) levels were as high as 172.84 ± 50.16 mg/dl in microalbuminuria whereas normoalbuminuria subjects has a mean of 140.96 ± 38.12 mg/dl.
- S. Triglycerides (TG) also showed a statistically higher mean 171.13 ± 82.18 mg/dl in microalbuminuria subjects (P=0.026).
- S. LDL was also found to be significantly higher in the microalbuminuria subjects (P=0.026).
- S. VLDL were as high as 34.23 ± 16.44 in microalbuminuria whereas low in normoalbuminuria subjects (P=0.026).

However HDL did not show any significant variation among the two groups. Previous cross sectional studies of different populations have demonstrated that pre-hypertensive individuals have high TC, TG, LDL and VLDL than normotensive subjects (Isezuo SA et. al., 2011; Ferguson TS et. al., 2010; Hageman PA et. al., 2010; Janhorbani M et. al., 2008; Cordero A et. al., 2006; Grotto I et. al., 2006; Lee JH et. al., 2006; Tsai PS et. al., 2005). Some studies have reported that dyslipidemia could predict occurrence of incident hypertension by years (Tohidi M et. al., 2011; Laaksonen DE et. al., 2008; Halperin RO et. al., 2006).

Dyslipidemia, specially elevated S. TG & S. LDL may lead to endothelial dysfunction, the loss of vasomotor reactivity & arterial stiffness (Oparil S et. al., 2013). Recently identified live X receptor, which is a potential regulator of rennin expression can be activated by lipid particles (Laaksonen DE et. al., 2008; Zelcer N et. al., 2006). The activation of rennin-angiotensin-aldosterone system (RAAS) increase BP and also leads (via angiotensin II) to Plasminogen Activator Inhibitor (PAI) expression (Feener EP et. al., 1995).

In hypertrigycerdemia subjects there is a significant increase in blood pressure. Reaven GM et. al., 2011 observed that hypertriglyceridemia leads to increased levels of markers of insulin resistance & abdominal obesity. The association between insulin resistance & prehypertension or hypertension (Reaven GM et. al., 2011) has been reported previously (Knobler H et. al., 2011; Hwu CM et. al., 2009; Cordero A et. al., 2006).

In renal tubules sodium is directly reabsorbed by hyper-insulinemia and this may lead to fluid retention. Insulin activates sympathetic nervous system, increases catecholamine levels and activity of RAAS (Kern W et. al., 2000; Reaven GM et. al., 1996; Rooney DP et. al., 1991).

Insulin resistance is usually related to BP in prehypertensive and hypertensive patients and it is able to predict incident hypertension (Hwu CM et. al., 2009; Lai TS et. al., 2009; Saad MF et. al., 2004). In all dyslipidemic patients abdominal obesity seems to play an independent role in BP elevation.

The findings of the above study suggest a strong association of incidence of microalbuminuria with dyslipidemia in prehypertension. Dyslipidemia is an independent contributing factor for cardiovascular complications. The study therefore recommends further research on the influence of various inflammatory markers on components of lipid profile in prehypertension.

SUMMARY AND CONCLUSSION

Prehypertension remains an important public health challenge all over the world. It has been defined as systolic blood pressure (SBP) 120 to 139 or diastolic blood pressure (DBP) 80-89 mmHg, based on two or more properly measured seated blood pressure (BP) readings on each of two or more office visits. Prehypertension tends to increase in severity over time and associates with increased incidence of cardiovascular disease (CVD).

Microalbuminuria has been proposed as a potential atherosclerotic risk factors in hypertensive individuals. On the basis of presence or absence of microalbuminuria, the subjects were grouped as:
Normoalbuminuria ACR ≤30 µg/mg (n=68)
Microalbuminuria ACR >30 µg/mg (n=32)

Lipid profile is an important screening test for patients of CVD. Therefore, lipid profile components were also compared among the groups constituted in the study. Out of the parameters of lipid profile; serum total cholesterol, triglycerides, LDL and VLDL were significantly higher in microalbuminuria as compared to normal groups.

Serum HDL levels was non-significant among both groups. The study reported dyslipidemia to be associated with occurrence of microalbuminuria. Patients with prehypertension should therefore undergo regular screening for these otherwise independent risk markers. Further research on influence of various inflammatory markers on microalbuminuria and lipid profile may be interesting to explore.

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