BLOOD PRESSURE, LIPID PROFILE AND LIPID PEROXIDATION IN DIABETIC HYPERTENSIVE PATIENTS

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Abstract

Background and Objective: Hypertension is correlated with the incidence of atherosclerosis. Hence, in the present work was undertaken to investigate the association of Blood pressure, Lipid profile and lipid peroxidation in hypertensive type II Diabetes Mellitus patients.

Materials and Methods: In this study 40 cases of borderline to mild essential hypertensive subjects of age group 45–69 years and 40 healthy age and sex matched subjects were used. Patients were selected as per the detailed history and routine examination and were excluded if any secondary cause of hypertension or any chronic complication. Systolic (SBP) and diastolic blood pressure (DBP) of all subjects were recorded. 12 hours fasting blood samples were collected from all subjects for biochemical analysis. Lipid profile and Fasting Blood Glucose were measured by enzymatic methods in semiautoanalyzer. Serum MDA was measured by spectrophotometric method. The data were analyzed for Statistical significance using one way ANOVA and $P<0.05$ was the level of significance.

Results: There was a significant increase ($p=0.0001$) in the FBS level, SBP, DBP, Total cholesterol, Triglyceride level and LDL-Cholesterol level in Non-Diabetic Nonhypertensive Controls. The MDA level was significantly increased ($p=0.05$) in Diabetic hypertensive patients.

Conclusion: Our study revealed that Lipid profile, MDA and Blood Sugar has interactive connection with type II diabetic mellitus. It is therefore recommended that healthcare providers should consider testing diabetic patients for complications due to hyperlipidemia as a part of the treatment.

Keywords: Systolic Blood Pressure, Diastolic Blood Pressure, Lipid Profile, MDA Level

1. Introduction:

Recently, much attention has been focused on the antioxidant defense system in oxidative stress and cardiovascular diseases. Polyunsaturated fatty acids are essential for normal growth and development and may play an important role in the prevention and treatment of coronary heart disease, hypertension, diabetes, and arthritis and other inflammatory and autoimmune disorders[1].

Presently, in India, prevalence of hypertension is 59.9 and 69.9 per thousand males and females in urban areas and 35.5 and 35.9 per thousand males and females in rural population respectively[2]. Out of all cases of hypertension, only 5-10% have some definable cause and rest 90–95% are essential, also called as primary or idiopathic type[3] .Since, hypertension is a risk factor for cardiovascular mortality and morbidity, prevention of its complications, and its early diagnosis and intervention are warranted. Serum uric acid has been proposed to be an index of severity as well as the risk factor for morbidity and mortality of essential hypertension[4, 5].

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia. It is characterized by elevation of blood glucose concentration. DM is classified on the basis of the pathogenesis processes that lead to hyperglycemia as type I and type II Diabetes mellitus. Type II DM is an impaired substantial public health burden in United States. It affected 15 million Americans with excessive risk of blindness, renal failure, low extremity and cardiovascular diseases [6,7]. It is the most common form of diabetes accounting for 90% of cases. An estimated 370 million will have type II diabetes and have important potential therapeutic implication now that can arise from the diseases. These complications include diabetic retinopathy, nephropathy, neuropathy and acute coronary diseases. The development and severity of these

complications are dependent on the duration of the diseases and how well it is managed. While the cases for this disparity in diabetes incidence is multifunctional recent evidence suggest that nutrition particularly magnesium intake may play a role.

Hypertension is correlated with the incidence of atherosclerosis [8, 9]. Previous clinical and epidemiological studies have de-fined plasma lipoprotein levels such as reduced high density lipoprotein-cholesterol (HDL-C), increased total cholesterol (TC) and low density lipoprotein-cholesterol (LDL-C) etc. as strong predictors of artherosclerosis and hypertension[10].

The lipid peroxidation of the biological system can be determined by estimating the melondialdehyde (MDA), which is a secondary end product of the oxidation polyunsaturated fatty acid. MDA is considered as a key index of lipid peroxidation. There are convincing experimental and chemical evidences that show increased ROS in both type I and type II DM and that the onset of diabetes is associated with oxidative stress. But the association of Blood pressure, Lipid profile and Lipid peroxidation in Diabetic hypertensive patients was not well documented. Therefore, the present work was undertaken to investigate the association of Blood pressure, Lipid profile and lipid peroxidation in hypertensive type II Diabetes Mellitus patients.

2. Materials and Methods:

This study was conducted in the Department of Physiology, Shivamogga institute of Medical Sciences, Shivamogga on 40 cases of borderline to mild essential hypertensive (with SBP of 140-159 and DBP of 90-99) subjects of age group 45–69 (Group-B) years attending the outpatient departments and admitted to Medicine and Cardiology after the institutional ethical clearance. 40 healthy age and sex matched subjects (Group-A) were taken as controls. Patients were selected as per the detailed history and routine examination and were excluded if any secondary cause of hypertension or any chronic complication. Before initiation of the study, written voluntary consent was obtained from each subject separately, after explaining their participation in the study in their local language.

Systolic (SBP) and diastolic blood pressure (DBP) of all subjects were recorded. 12 hours fasting blood samples were collected from all subjects for biochemical analysis. Lipid profile and Fasting Blood Glucose were measured by enzymatic methods in semiautoanalyzer. Serum MDA was measured by spectrophotometric method[11] as a measure of lipid peroxidation status.

2.1 Statistical analysis: The data were analyzed for Statistical significance using one way ANOVA and $P<0.05$ was considered as the level of significance.

3. Result:

Data obtained in our study revealed that, there is a very significant increase($p=0.0001$) in the Fasting Blood Glucose level, Systolic Blood Pressure, Diastolic Blood Pressure, Total cholesterol, Triglyceride level and LDL-Cholesterol level (Fig-1 to 6) when compared Non-Diabetic Nonhypertensive Controls (Group-A) with Diabetic hypertensive patients. The MDA level was significantly increased ($p=0.05$) in Diabetic hypertensive patients as compared to Non-Diabetic Nonhypertensive Controls (Group-A).

4. Discussion:

Plasma lipid profile, which is altered in hypertensive patients[12, 13] appears to be a significant factor in the development of premature atherosclerosis and includes an increase in total cholesterol, LDL cholesterol and decrease in HDL cholesterol and phospholipids. Similar result was observed in this study, which shows increase in total cholesterol, LDL cholesterol triacylglycerol and decrease in HDL chole-sterol and phospholipids. It also shows an increase in cholesterol / phospholipid ratio, thereby resulting in disruption of membrane fluidity and leading to membrane alteration of function

In this study, an association was established between serum MDA level and diabetes mellitus. There is a positive correlation between blood glucose level and Melondialdehyde (MDA) in Non-Diabetic Nonhypertensive Controls when compared with Diabetic hypertensive patients.

The concentration of MDA was highly increased in diabetics as compared to non diabetics. This is due to the fact that the formation of lipid peroxides, which is a risk

factor for the development of several diseases by the formation of Melondialdehyde and production of lipid peroxidation which may lead to other systemic disorders[14].MDA which is a peroxidative product acts as a key indicator of high levels of free radicals. In view of the observed association between serum lead concentration and DM, in this study, one may suggest that increased serum lead in diabetes is probably a contributory factor for production of reactive oxygen species (ROS) which declines kidney functioning. This may lead to pancreatic and renal cell lysis and cause decline production of insulin as well.

Conclusion:

Our study revealed that Lipid profile, MDA and Blood Sugar has interactive connection with type II diabetic mellitus. MDA level is significantly higher in Diabetics compared with nondiabetic controls. The high serum Cholesterol level may also be related to the cardiovascular complication associated with disease based on this finding, it is therefore recommended that healthcare providers should consider testing diabetic patients for complications due to hyperlipidemia as a part of the treatment.

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Figures:

Fig 1: Fasting Blood Glucose level in Non-Diabetic Nonhypertensive Controls (Group-A) and Diabetic hypertensive patients (Group-B). Data were expressed as Mean + S.D, n=40 each.

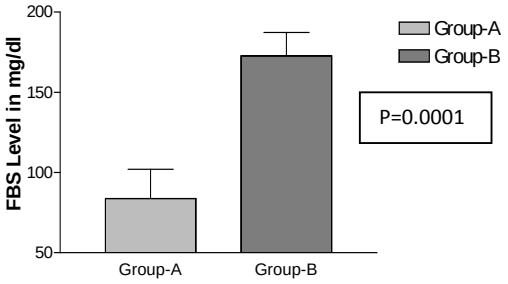


Fig 2: Systolic Blood Pressure in Non-Diabetic Nonhypertensive Controls (Group-A) and Diabetic hypertensive patients (Group-B). Data were expressed as Mean ± S.D, n=40 each.

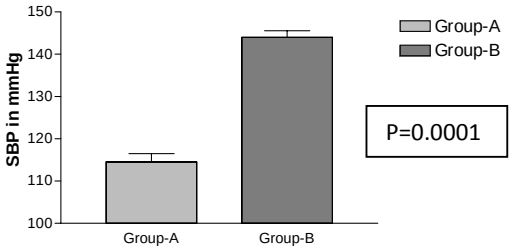


Fig 3: Diastolic Blood Pressure in Non-Diabetic Nonhypertensive Controls (Group-A) and Diabetic hypertensive patients (Group-B). Data were expressed as Mean ± S.D, n=40 each.

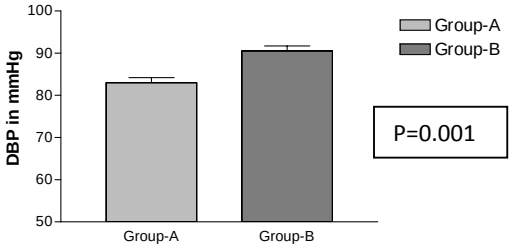


Fig 4: Total Cholesterol level in Non-Diabetic Nonhypertensive Controls (Group-A) and Diabetic hypertensive patients (Group-B). Data were expressed as Mean ± S.D, n=40 each.

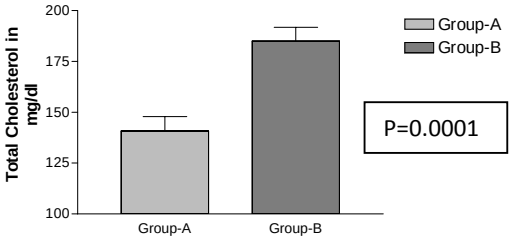
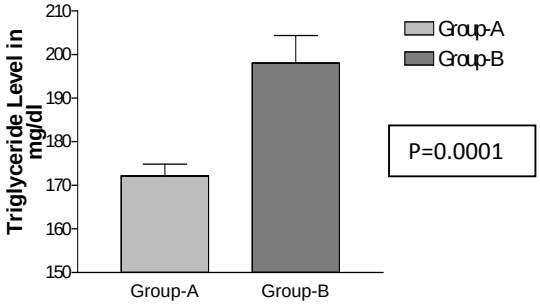


Fig 5: Triglyceride level in Non-Diabetic Nonhypertensive Controls (Group-A) and Diabetic hypertensive patients (Group-B).



Data were expressed as Mean ± S.D, n=40 each.

Fig 6: LDL-Cholesterol level in Non-Diabetic Nonhypertensive Controls (Group-A) and Diabetic hypertensive patients (Group-B). Data were expressed as Mean ± S.D, n=40 each.

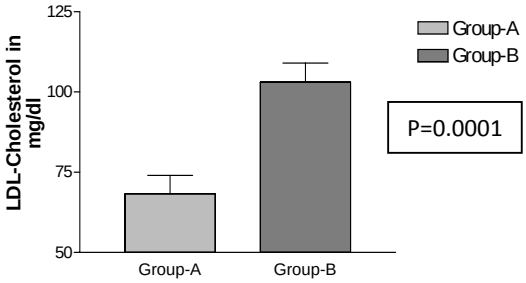


Fig 7: MDA level in Non-Diabetic Nonhypertensive Controls (Group-A) and Diabetic hypertensive patients (Group-B). Data were expressed as Mean ± S.D, n=40 each.