Effect of Monotherapy with Atenolol and Enalapril on Lipid Profile in Pre and Postmenopausal Women with Essential Hypertension

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ABSTRACT

Introduction: Essential hypertension can be defined as disorder in which arterial blood pressure rises progressively over a period of month or year to the level at which, if sustained, leads to cardiovascular injury. In hypertensive patients, metabolic abnormalities like dyslipidemia are commonly observed. Studies have positively correlated total and low density lipoprotein cholesterol and coronary heart diseases. Also, elevated tyriglycerides are known to be common risk factors for coronary events. Reduction in mortality in hypertension and prolonged survival of patients with coronary heart diseases is observed with chronic treatment of atenolol and other ACE inhibitors like enalapril. The present study was aimed to evaluate the effect of atenolol and enalapril on lipid profile in pre and postmenopausal women with essential hypertension.

Material and methods: The study included normal control group, clinically healthy premenopausal (n=30) and postmenopausal (n=30) women were selected. For the premenopausal essential hypertensive women group, first time detected essential hypertensive women with age group 20-50 years were selected (n=30) and similarly for postmenopausal group, first time detected essential hypertensive women with age group 50-70 years were selected (n=30). Half the patients from premenopausal group and postmenopausal group were treated with atenolol (10-40 mg/day) and other half with enalapril (2.5-20 mg/day) as per prescription and results were compared with normal control group. All the parameters were studied before and after treatment at the interval of 3, 6 and 12 months and comparison of the results was done with normal control of pre and postmenopausal women.

Results: In the untreated group, the value of triglycerides in the pre-menopausal group was 151.2 mg/ dL while in the post-menopausal group was 155.8 mg/ dL. The value of total cholesterol in the pre-menopausal and post- menopausal group was 154.8 and 159.2 mg/ dL. On prescribing atenolol, abnormal lipid profile was observed in pre and postmenopausal hypertensive women as compared to normal control.

Conclusion: Regardless of the underlying mechnaisms, metabolic defects with pathogenic potenial are altered in hypertensive patient

Keywords: Atenolol, Enalapril, Hypertension, Lipid

INTRODUCTION

Nowadys, deaths due to cardiovascular diseases are most common in developing as well as developed nations. Essential hypertension is the major risk factor for coronary diseases. Essential hypertension can be defined as disorder in which arterial blood pressure rises progressively over a period of month or year to the level at which, if sustained, leads to cardiovascular injury.[1] So, it is utmost essential to dignose and treat the condition as soon as possible to avoid coronary heart diseases. Essential hypertension is very common in women especially postmenopausal women. In women, fastidious changes occur in the metabolism during menopause which leads to development of new risk factors that are very hazardous to female cardiovascular system like change in lipid profile, obesity, glucose intolerance and diabetes.[2]

In hypertensive patients, metabolic abnormalities like dyslipidemia are commonly observed. Studies have positively correlated total and low density lipoprotein cholesterol and coronary heart diseases.[3] Also, elevated tyriglycerides are known to be common risk factors for coronary events.[4] Left ventricular hypertrophy, left entricular diastolic dysfunction and atherosclerosis, which are common cardiac consequences of hypertension are independent risk factors for cardiovascular morbidity and mortality in pre and postmenopausal essentail hypertensive patients.[5] β adrenoreceptor antagonist (β-blockers) and angiotensin converting enzyme(ACE) inhibitors are most commonly used for the treatment of essential hypertension. B blocker atenolol is a drug of first choice for the treatment of essential hypertension because of its pharmcological effect in lowering blood pressure.[6] Reduction in mortality in hypertension and prolonged survival of patients with coronary heart diseases is observed with chronic treatment of atenolol. Similarly, ACE inhibitor enalapril have proved its ability to reduce cardiovascular morbidity and mortality in prospective trials by reducing blood pressure by blocking angiotensin converting enzyme.[7]

The present study was aimed to evaluate the effect of atenolol and enalapril on lipid profile in pre and postmenopausal women with essential hypertension.

MATERIAL AND METHODS

The study was conducted ion the medicine department of the institution. Clinical history was used for the selection of patients for the study. For normal control group, clinically healthy premenopausal (n=30) and postmenopausal (n=30) women were selected. For the premenopausal essential hypertensive women group, first time detected essential hypertensive women with age group 20-50 years were selected(n=30) and similarly for postmenopausal group, first time detected essential hypertensive

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women with age group 50-70 years were selected (n=30). Half the patients from premenopausal group and postmenopausal group were treated with atenolol (10-40 mg/day) and other half with enalapril (2.5-20 mg/day) as per prescription and results were compared with normal control group.

The patients were advised to avoid any change in the dietary habits and exercise routine during the time of study. A written informed consent was obtained from every patient participating in the study after explaining to them the advantages and procedure for the study. For the evaluation of lipid profile i.e. total cholesterol, triglycerides, LDL-cholesterol and HDL-cholesterol, fasting blood sample was withdrawn from the patient.

STATISTICAL ANALYSIS-

All the parameters were studied before and after treatment at the interval of 3, 6 and 12 months and comparison of the results was done with normal control of pre and postmenopausal women. Descriptive statistics like mean and percentages were used for data analysis.

RESULTS

Table 1, Figures 1 and 2 shows the values of triglycerides, total cholesterol, and LDL-cholesterol values and HDL-cholesterol level in untreated group. In the untreated group, the value of triglycerides in the pre-menopausal group was 151.2 mg/ dL while in the post-menopausal group was 155.8 mg/ dL. The value of total cholesterol in the pre-menopausal and post- menopausal group was 154.8 and 159.2 mg/ dL. On prescribing atenolol, abnormal lipid profile was observed in pre and postmenopausal hypertensive women as compared to normal control.

DISCUSSION

In the present study, increased triglycerides, total cholesterol, and LDL-cholesterol values and decreased HDL-cholesterol level was observed in untreated pre and postmenopausal hypertensive patients. In these patients, dyslipidemia is considered to be risk factor for cardiovascular diseases. An increase in the level of total cholesterol, triglycerides, LDL-cholesterol and decrease in HDL-cholesterol was observed. The inhibition of lipoprotein lipase, might be the pathway for increasing triglycerides during atenolol therapy which leads to increase in triglycerides.[8] The decreased level of HDL-cholesterol in pre and postmenopausal hypertensive patients may be the result of decrease in lecithin cholesterol acyltransferase leading to lower activity of the high-density lipoprotein-lecithin cholesterol acyltransferase cycle.[9] The level of total cholesterol, triglycerides, LDL-cholesterol and decrease in HDL-cholesterol was increased in these patients. On prescription of enalapril, results opposite to these findings were observed. Improved vasodilation properties and reduced vascular damage was observed in clinical studies conducted to assess anti-hypertensive treatment with angiotensin converting enzyme inhibitor. Lipid profile is improved in patients treated with ACE-inhibitor by increasing blood flow due to which triglycerides are removed by enhanced contact with lipoprotein lipase.[10] Studies conducted previously have reported that decreased formation of angiotensin-II due to inhibition by enalapril is vasodilatory. Enhanced capillary flow by vasodilation leads to increased contact with lipoprotein lipase and helps in removal of plasma triglycerides.[11] An increase in the level of high-density lipoprotein cholesterol by enalapril might also be due to activation of high density lipoprotein lecithin cholesterol acyltransferase cycle by enalapril which leads to increased activity of lipoprotein cholesterol acyltransferase.[12]

M. Stimpel et al. investigated the effect of the new ACE-inhibitor moexipril versus the β1-adrenergic blocker atenolol on metabolic parameters, adverse events (AEs) and sitting systolic (SSBP) and sitting diastolic blood pressure (SDBP) in obese postmenopausal women with hypertension (stage I and II). After a 4-week placebo run-in phase, 116 obese, postmenopausal women with primary hypertension were randomised into two treatment groups receiving once daily dosages of either moexipril 7.5 mg or atenolol 25 mg initially (mean age: 57±7 years in both groups; mean weight: 94 kg in the moexipril group and 89 kg in the atenolol group, corresponding to a body mass index (BMI) of 35.2 kg/m2 and 34.1 kg/m2 in both groups, respectively). After 4 and 8 weeks, the dosages were uptitrated to moexipril 15 mg, or if necessary to moexipril 15 mg /hydrochlorothiazide (HCTZ) 25 mg or to atenolol 50 mg and atenolol 50 mg /HCTZ 25 mg, in patients whose blood

Parameter	Pre-| menopausal	Post-menopausal
Triglycerides mg/dL	151.2	155.8
Total cholesterol mg/dL	154.8	159.2
LDL-cholesterol mg/dL	141.2	154.5
HDL-cholesterol mg/dL	70.2	42.2

Table-1: Triglycerides, total cholesterol, and LDL-cholesterol values and HDL-cholesterol level in untreated group

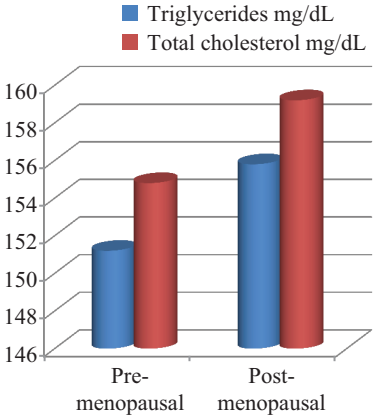

Figure-1: Triglycerides and total cholesterol in untreated group

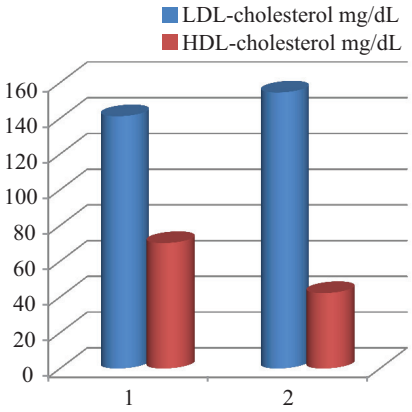

Figure-2: LDL-cholesterol values and HDL-cholesterol level in untreated group

pressure was not sufficiently controlled. At endpoint, metabolic parameters (total cholesterol, triglycerides, LDL, HDL, glucose, insulin) were not significantly altered in either treatment group. Most frequent adverse events under monotherapy (moexipril/ atenolol) were asthenia (5.3/13.0%), headache (13.2/21.7%), cough (7.9/6.5%), pharyngitis (21.1/8.7%) and peripheral oedema (5.3/13.0%). Overall at least one AE was reported in 66% of the patients treated with moexipril and in 78% of those treated with atenolol. Reduction of SSBP/SDBP at endpoint was 14.7±1.9/10.0±1.1 and 8.7±1.9/8.4±1.1 mmHg after treatment with moexipril and atenolol, respectively. The results showed that moexipril and atenolol are equally effective in reducing blood pressure without adversely affecting blood lipids and carbohydrate metabolism.[13,14]

CONCLUSION

From the above results, the authors concluded that regardless of the underlying mechnaisms, metabolic defects with pathogenic potenial are altered in hypertensive patients. However, future studies are recommended.

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