

EFFECT OF IRBESARTAN ON BIOCHEMICAL PARAMETERS IN OVERWEIGHT HYPERTENSIVE PATIENTS

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ABSTRACT

Irbesartan is an angiotensin receptor type 1 blocker which is used for treatment of hypertension. It has been found in various studies that some angiotensin receptor type 1 blockers induce peroxisome proliferator-activated receptor gamma. Present study is designed to study the effect of irbesartan on various biochemical parameters in overweight hypertensive patients.

MATERIAL AND METHODS

Twenty overweight hypertensive patients were selected for study and they were given 150 mg irbesartan once daily and their biochemical parameters like lipid profile, insulin concentration, FPG and HOMA-IR was measured basal and at the end of study that is six months.

RESULTS

Fasting plasma glucose decreased from 93.8 mg/dL to 85.5 with 'p'- value <0.00001. HOMA-IR score decreased from 2.702 to 1.99. We have observed that all the biochemical parameters like body weight, BMI, fasting plasma glucose, insulin, total cholesterol, LDL-cholesterol, triglyceride, HOMA-IR and blood pressure under study decreased.

CONCLUSION

The administration of irbesartan improved blood pressure, insulin, HOMA-IR and lipid profile in hypertensive overweight patients.

KEYWORDS

Irbesartan, Overweight, Biochemical Parameters.

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INTRODUCTION: The rennin angiotensin system is a hormone system that regulates blood pressure and fluid balance. Angiotensin II is a highly potent vasoactive peptide that is a pressor agent used to increase blood pressure by acting on AT 1 receptor. If there is abnormal activity of rennin angiotensin system, then blood pressure will be high and AT 1 receptor blockers are used for the treatment of hypertension. In various studies, it is found that AT 1 receptor blockers have shown to reduce the incidence of type -2 diabetes mellitus in comparison with other anti-hypertensive agent. It is also found that a subset of AT 1 receptor blockers induces PPAR- γ receptor and there by PPAR- γ mediated differentiation in adipocytes.^(1,2) So to evaluate this association, we have selected one AT-1 receptor blocker irbesartan to evaluate its effect on various biochemical parameters. Peroxisome proliferator activated receptors (PPARs) are ligand activated transcription factors of nuclear hormone receptor super family. It has three subtypes PPAR- α , PPAR- β/\square , and PPAR- γ .

Stimulation of PPAR- α reduces triglyceride level and associated with regulation of energy homeostasis. PPAR- β/\square increases fatty acid metabolism. Activation of PPAR- γ causes insulin sensitisation and enhances glucose metabolism.⁽³⁾ Irbesartan is angiotensin type-1 receptor blocker. Our study is aimed to evaluate the effect of irbesartan on various metabolic parameters in overweight hypertensive patients in our region.

MATERIAL AND METHOD: A total twenty patients participated in this prospective six months open-label study. Patients were recruited from department of general medicine, Gems Medical College, Srikakulam, Andhra Pradesh. Patients were selected as per exclusion and inclusion criteria.

Inclusion Criteria	Exclusion Criteria
BP- 135/85 mm of Hg	<ul style="list-style-type: none"> Diabetes mellitus Chronic kidney diseases
BMI between 25 to 30 kg/m ²	<ul style="list-style-type: none"> Heart failure Taking any other medicine
TG - >150 mg/dL	
HDL - <40 mg/dL in male >50 mg/dL in female	

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All the parameters like body weight, BMI, fasting plasma glucose, insulin, total cholesterol, LDL-cholesterol, triglyceride, HOMA-IR and blood pressure was measured at the start of the study and were followed regularly. Final parameters were measured after 6 months. This study was approved from Institutional Ethics Committee and written informed consent was obtained from each patient before they enrolled for study. All the patients were taking 150 mg irbesartan orally once daily.

Hexokinase method was used for estimation of plasma glucose. For total cholesterol, we used Liebermann Burchard reaction colorimetric method, triglyceride was estimated by method of Neri and Fringe. HDL concentration was estimated by precipitation method. LDL concentration was calculated by WHO formula, $LDL - cholesterol = total\ cholesterol - TG/5 - HDL\ (mg/dL)$.⁽⁴⁾ Plasma insulin was determined by using enzyme linked immunosorbent assay.

HOMA-IR was calculated by using this formula $(FPI \times FPG)/22.5$.⁽⁵⁾ Paired t – test was used for statistical analysis and 'p'-value <0.05 was considered statistically significant.

All patients were given irbesartan 150 mg once daily, were followed regularly.

RESULTS: Out of twenty patients, there were 12 males and 8 females. Mean age of the patient was 44.8 years. Mean body weight of patient before and after treatment was 80.4 kg and 77.1 kg respectively. The body mass index mean value also decreased from 27.28 kg/m² to 25.8 kg/m². Fasting plasma glucose mean concentration decreased from 93.8 to 85.5 mg/dL. Mean of fasting plasma insulin concentration before and after treatment was 11.68 mIU/L and 9.38 mIU/L respectively. HOMA-IR score was calculated and its mean value before and after treatment was 2.702 and 1.99 respectively. Plasma triglyceride level reduced from mean value 169.1 mg/dL to 147.2 mg/dL after 6 months of treatment. Total cholesterol reduced from mean value 233 mg/dL to 202.1 mg/dL. HDL-C concentration increased, the mean of HDL-C increased from 40.8 mg/dL to 44.8 mg/dL. LDL-C mean value decreased to 158.8 mg/dL from basal value 128.22 mg/dL.

	Mean (Before Treatment)	Mean (After Treatment)	t- value	p- value
Age	44.6			
Sex (M/F)	12/8			
SBP (mm of Hg)	166.4	133.5	9.05	<0.0001
DBP (mm of Hg)	91.9	80.2	9.24	<0.0001
Weight (kg)	80.4	77.1	7	<0.05
BMI kg/m ²	27.28	25.8	5.792	<0.00002
Fasting plasma glucose (mg/dL)	93.8	85.5	6.1	<0.0001
Fasting plasma insulin (mIU/L)	11.68	9.38	10.67	<0.00001
HOMA-IR	2.702	1.99	10.14	<0.00001
TG (mg/dL)	169.1	147.2	11.977	<0.0001
HD L(mg/dL)	40.8	44.8	6.708	<0.05
Total chol. (mg/dL)	233	202.1	8.190	<0.05
LDL (mg/dL)	158.8	128.22	7.1378	<0.05

Table 1: Various Parameter before and after Study

DISCUSSION: In our study, we have found that mean body weight of individual decreased from 80.4 kg to 77.1 kg and mean body mass index also decreased which may be due to awareness of the individual and health education. This observation is not similar to the study of Deluis et al,⁽⁶⁾ there was no significant change in BMI noticed by him, this is because of difference in study population and various local factors. Systolic and diastolic blood pressure decreased significantly, which is similar to the work of various authors, Negro et al, Rizos et al^(6,7) because irbesartan is an AT-1 receptor blocker.

Fasting plasma glucose decreased significantly, which is similar to the study of Deluis et al, and Negro et al, but not similar to the study of Rizos et al. This may be due to improvement in the sensitivity of insulin because of effect of irbesartan on PPAR-γ receptor.^(6,7,8) HOMA-IR value decreased from 2.702 to 1.99 (mean), which is similar to the work of various authors.^(9,10,11) Lipid profile of all the patients also changed.

Triglyceride concentration decreased, LDL value decreased, total cholesterol concentration also decreased and HDL-C increased, all these findings were similar to the work of various authors.⁽¹²⁾ This indicates that irbesartan improve lipid profile and insulin sensitivity which is clear from its decrease in HOMA-IR value. PPAR-γ receptor controls the expression of genes implicated in intra- and extracellular lipid metabolism, most notably those involved in peroxisomal beta-oxidation. PPAR gamma is highly expressed in fat to facilitate glucose and lipid uptake, stimulate glucose oxidation, decrease free fatty acid level and ameliorate insulin resistance. So changes in above parameters indicate that irbesartan has effect on PPAR-γ receptor and by that there is decrease in various biochemical parameters which is similar to various studies.^(13,14)

CONCLUSION: AT-1 receptor blocker is used very frequently for treatment of hypertension. It has been found that these AT-1 receptor blockers have peroxisome proliferator-activated receptor gamma agonistic activity.

We have studied the effect of irbesartan on various biochemical parameters for six months. After six months treatment with irbesartan, it was found in our study that insulin sensitivity has changed and it is in the form of changes in HOMA-IR and biochemical parameters like fasting plasma glucose, insulin, total cholesterol, LDL-cholesterol, triglyceride concentration decreased and HDL concentration increased. An extensive study is required for more information on this.

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