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RESEARCH ARTICLE

A STUDY OF INSULIN RESISTANCE IN CASE OF ESSENTIAL HYPERTENSION IN NON DIABETIC PATIENTS

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ABSTRACT

The patients with essential hypertension are increasing all over the world. There may be development of insulin resistance and hyperinsulinemia in essential hypertension. An association between essential hypertension and defective insulin secretion has been identified. Clinical Studies have shown that about 50% of hypertensive individuals have hyperinsulinemia orglucose intolerance, whereas up to 80% of patients with type 2 diabetes have hypertension.

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INTRODUCTION

Insulin resistance is the fundamental defect in the development of type 2 diabetes mellitus, hypertension and cardiovascular diseases. Hypertension is major health problem with widespread and sometimes devastating consequences. According to previous statistics, it has been estimated that 26.4% of the adult population has hypertension – defined as systolic blood pressure of 140mm Hgor diastolic blood pressure of 90mm Hg–and the total number of adults with hypertension is approximately one billion worldwide. This number is predicted to increase to a total of 1.56 billion in 2025 134,135. Epidemiological studies have shown that hypertension is present in 25% of urban and 10% of rural population in India136. Worldwide, 57 million disability-adjusted life years (3.7% of total) are attributed to high blood pressure. Globally, 51% of stroke and 45% of ischemic heart disease deaths are attributable to high systolic blood pressure 138. In addition, hypertension is a major risk factor for heart failure, aneurysms of the arteries (e.g. aortic aneurysm), and peripheral arterial disease, and is a cause of chronic kidney disease. For prevention and treatment, it is very important to have an accurate understanding of the path physiology of disease. Insulin, like salt intake, alcohol consumption, obesity and aging may be determinant of Blood pressure variability and may possibly contribute to the pathogenesis of essential hypertension.

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Thus blood pressure inversely related to insulin sensitivity and so directly with plasma insulin level. Insulin resistance and hypertension are the components of metabolic syndrome and often coexist 137, in this study we are trying to know relation of insulin resistance with essential hypertension.

Aims and Objective

- To study insulin resistance in case of essential hypertension.
- Access the relationship between blood pressure and insulin resistance in non-diabetic patients.

METHODS

All the patients, both male and female, who are meet our selection criteria and comes in OPD and admitted in medicine department in C.U. Shah medical college and hospital, Surendranagar over a period of august, 2016 to august,2018. 100 cases were selected and cross sectional study was done. Study groups were selected with obtaining detailed history and thorough physical examination, routine investigation like hemoglobin, blood count, urine examination, serum creatinine, blood sugar, fasting lipid profile, serum electrolyte, fasting serum insulin level, serum uric acid, fundoscopy and in appropriate cases HbA1c, renal arterial Doppler, and ultrasonography of abdomen and pelvis.

Inclusion Criteria

- Blood pressure >=140/90
- Patient belonging eithersex
- Age > 18 years and < 70years
- BMI < 30kg/m2
- Nondiabetic

Exclusion Criteria

- Age < 18 years and > 70years
- Severe obesity (BMI > 30kg/m2)
- History of cardiac, renal or endocrinal disorder

RESULTS AND ANALYSIS

In our study total subject are 100 in which 50 hypertensive (study group) and 50 are nonhypertensive. Table 6 showing Age distribution among this group in both in number as well as in percentage. Total subject is more in age group 51-65 year it is 40%. We excluded extreme of age in our study as child have less hypertension and old age has more hypertensive and comorbidities. So 36-65 year group represented almost 73%subject.

Table 1. Age distribution in both group

AGE GROUP	Nonhypertensive No. (in%)	Hypertensive No. (in%)	Total No. (%)
≤ 20	3 (6%)	1 (2%)	4 (4%)
21-35	9 (18%)	10 (20%)	19 (19%)
36-50	19 (38%)	14 (28%)	33 (33%)
51-65	16 (32%)	24 (48%)	40 (40%)
>65	3 (6%)	1 (2%)	4 (4%)
Total	50 (100%)	50 (100%)	100 (100%)

Table 1 represent age distribution in Colum bar hypertensive aremore in 51-65 year age group it is 48% while it is only 2% in ≤ 20 year age group.

Table 2. Mean age distribution in both group

	Age
Nonhypertensive	46.78 ±13.6
Hypertensive	48.78 ±14.4
P value	0.355 (Non significant)

Table-2 showing mean age of both group and in table 2 p value which is >0.001. So it is statically non-significant, in other word no significant age difference in both groups.

Table 3. Sex distribution in both group

Gender	Nonhypertensive No. (%)	Hypertensive No. (%)	Total No. (%)
Male	29 (58)	27 (54)	56 (56)
Female	21 (42)	23 (46)	44 (44)
Total	50 (100)	50 (100)	100 (100)

Table-3 represent gender distribution in both group which almost equal and no significant difference.

Table 4. Mean blood pressure in both group (in mmHg)

	Systolic blood pressure	Diastolic blood pressure
Nonhypertensive	121.16 ±9.37	75.32 ±6.29
Hypertensive	154.48 ±9.69	106.04 ±9.78
P value	<0.001(significant)	<0.001(significant)

Table-4 showing systolic and diastolic blood pressure ± SEM and graph-4 represent mean value of systolic and diastolic blood pressure. Pvalue is >0.001 so test is significant.

Table 5. Fasting serum insulin level in both group (in µIU/ml)

	Serum insulin level(fasting)
Nonhypertensive	8.66 ±2.7
Hypertensive	18.98 ±2.85
P value	<0.001(significant)

Table-5 shows fasting blood serum insulin level (FSI) ± SEM and mean FSI respectively and table also show p value which is<0.001 so test is significant and significant FSI different between two group.

Table 6. Insulin resistance by HOMA-IR method in both group

	HOMA-IR(insulin resistance)
Nonhypertensive	2.21 ±0.7
Hypertensive	4.99 ±0.97
P value	<0.001(significant)

Table 6 and graph-8 shows insulin resistance ± SEM by HOMA- IR method and mean insulin resistance respectively and table also show p value which is <0.001 so test is significant and significant insulin resistance different between two group.

Table 7. Fasting lipid profile including total cholesterol, triglyceride and low density lipoprotein (LDL) in both group (in mg/dl).

Fasting Lipid Profile	Nonhypertensive	Hypertensive	P value
Total Cholesterol	199.44 ±21.75	254.2 ±10.68	<0.001(significant)
Triglyceride	137.14 ±10.25	322.96 ±26.32	<0.001(significant)
LDL	137.22 ±12.5	203.52 ±10.5	<0.001(significant)

Table-7 shows fasting lipid profile including total cholesterol, triglyceride and LDL ± SEM and mean of these respectively and table also show p value which is <0.001 so test is significant and significant lipid profile different between two group.

Table 8. Fasting serum uric acid level in both group (in mg/ml)

	Serum uric acid
Nonhypertensive	3.9 ±1.33
Hypertensive	5.19 ±1.29
P value	<0.001(significant)

Table-8 showing serum uric acid ± SEM of both study group and also p value and corresponding graph-10 represent mean of serum uric acid of both group. P value is <0.001 so, test is significant.

DISCUSSION

In our study, correlation of insulin resistance with hypertension, we exclude diabetes because it is well known fact that diabetes is associated with insulin resistances in celong and many study has established relation between this. So, in our study primary aim is to identify relation between insulin resistance and hypertension. As study show FBS in nonhypertensive group is 105.38 ±7.55 mg/dl and in hypertensive it is 106.04 ±9.8 mg/dl and p value is >0.001 so it is non-significant difference.

As study show fasting serum insulin level in nonhypertensive group is 8.66 ± 2.7 µIU/ml and in hypertensive it is 18.66 ± 2.85 µIU/ml and p value is <0.001 so it is significant difference of insulin level in both group. We calculated insulin resistance by HOMA-IR method. Owr study is showing these result. In nonhypertensive it is 2.21 ± 0.7 and in hypertensive it is 4.99 ± 0.97 and p value is <0.001 so is significant difference of insulin resistance in both group.

Summary and conclusion

In this study raised serum insulin level, hyperinsulinemia, and higher insulin resistance calculated by standard HOMA-IR method is seen in hypertensive non-diabetic subject compared to non-hypertensive, non- diabetic group. So we can conclude our study Correlation analys is between HOMA-IR and both systolic and diastolic blood pressure shows positive correlation in hypertensive patients and it was statistically significant for both systolic blood pressure and diastolic pressure. Therefore, the current study concludes that Incidence of insulin resistance is higher in essential hypertensive subjects in comparison to the control subjects. Similarly obesity, dyslipidemia, raised serum uric acid also associated with essential hypertension and insulin resistance.

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