



## ROLE OF INSULIN RESISTANCE IN NEWLY DETECTED HYPERTENSIVES

### General Medicine

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### ABSTRACT

The aim of the present study was to evaluate the correlation between insulin resistance, metabolic syndrome and their associated factors in hypertensive patients. This comparative study was conducted on 100 patients who attended to the Department of Medicine, R D Gardi Memorial Medical College, Ujjain, Madhya Pradesh, India. 50 patients of both sexes having essential hypertension were participated in the study and considered as hypertensive group. Other healthy 50 patients of similar sex and age group were studied as control group (normotensive) for comparison. Insulin resistance was estimated by using homeostasis model assessment (HOMA-IR) method. Mean age of the patients of hypertensive group was  $49.79 \pm 17.04$  years and mean age of normotensive group was  $51.94 \pm 16.64$  years. Male preponderance was observed in both the groups. Out of 50 from each group, 19 (38%) of hypertensive patients and 7 (14%) of normotensive patients had insulin resistance. Metabolic syndrome was noted in 23 (46%) and 10 (20%) cases of hypertensive and normotensive groups respectively and this difference was found to be statistically significant ( $p=0.01$ ). The mean fasting and post prandial blood sugar levels were almost similar in both groups ( $p=0.03$ ). Mean total cholesterol levels were significantly lower in hypertensive groups than that of normotensive group ( $p=0.03$ ). The mean serum insulin levels were high in hypertensive groups than that of normotensive group which was statistically significant ( $p=0.00$ ). Mean HOMA-IR, waist size and waist hip ratio (WHR) was significantly ( $p=0.02$ ) higher in hypertensive group than that of control group.

### KEYWORDS

Correlation, Hypertension, Insulin resistance.

### INTRODUCTION

Insulin resistance and hyperinsulinemia are recognized risk factors for cardiovascular disease (CVD). Some reports suggested that insulin resistance syndrome (IRS) is associated with hypertension, while others did not support this view. The prevalence of hypertension is rising rapidly worldwide and the impact is particularly being felt in developing countries. This is due to the epidemiological transition taking place in developing countries leading to alarming increases in noncommunicable diseases, especially diabetes and hypertension. It is possible that risk factors for hypertension vary between developed and developing nations due to changes in genetic and environmental factors (e.g. different levels of obesity, physical activity, and dietary habits). Thus, studies looking at the relationship between insulin resistance and hypertension in developing countries like India are of great interest. Diabetes mellitus and impaired glucose tolerance (IGT) have been shown to increase the risk of future cardiovascular morbidity and mortality. Thus, in hypertensive patients, early diagnosis and treatment of an abnormal glucose metabolism may be particularly important to reduce cardiovascular disease. Hence, the present study was conducted with the aim to evaluate the correlation between insulin resistance, metabolic syndrome and their associated factors in hypertensive patients

### MATERIAL AND METHOD

This comparative study was conducted on 100 patients who attended to the Department of Medicine. 50 patients of both sexes having essential hypertension were participated in the study and considered as hypertensive group. Other healthy 50 patients of similar sex and age group were studied as control group (normotensive) for comparison. Adult patients above 14 years and patients who qualify JNC 7 criteria of hypertension were included in the study. Exclusion criteria were patients suffering from diabetes, polycystic ovarian disease, tuberculosis, other systemic illness, liver disorders, renal disorders, congestive cardiac failure, patients on oral contraceptive pills, patients on statins and other medications that are known to affect the study and pregnant women. Informed consent was taken from all the participants. Anthropometric measurements such as height, weight and BMI were taken for all the patients. Blood samples for the estimation of all the parameters were collected from the patients after an overnight fasting. Insulin levels were assessed by electrochemiluminescence immuno assay using commercially available kits. Lipid profile and sugar levels were analyzed using commercially

available kits. Insulin resistance was estimated by using homeostasis model assessment (HOMA-IR) method.

### RESULTS

Mean age of the patients of hypertensive group was  $49.79 \pm 17.04$  years and mean age of normotensive group was  $51.94 \pm 16.64$  years. Male preponderance was observed in both the groups. Mean age of males in both the groups was  $50.464 \pm 17.64$  and  $52.83 \pm 18.86$  years respectively and mean age of females in both the groups were  $48.78 \pm 16.86$  and  $51.64 \pm 15.78$  years respectively. Out of 50 in each group, 19 (38%) of hypertensive patients and 7 (14%) of normotensive patients had insulin resistance. Statistically significant difference was seen between the two groups with  $p$  value of 0.01. Insulin resistance was more in the age group of 45-59 and  $>60$  years in both males and females in both groups. It was observed that out of 50 cases in each group, metabolic syndrome was noted in 23 (46%) and 10 (20%) cases of hypertensive and normotensive groups respectively and this difference was found to be statistically significant ( $p=0.01$ ). Out of 50 cases of hypertensive group, 23 (46%) have metabolic syndrome. Among them 13 (46.42%) males and 10 (45.45%) females had metabolic syndrome. The occurrence of metabolic syndrome was more over the age of  $>45$  years both in males and females. There are 36 cases over the age of  $>45$  years. Out of 36 cases, 21 cases have metabolic syndrome. In normotensive group, the incidence of metabolic syndrome was increased with the increase in age and both sexes showed almost similar number of cases with metabolic syndrome. Statistically significant difference ( $p=0.04$ ) was seen for the incidence of metabolic syndrome between males of both groups whereas in case of females the difference was statistically insignificant ( $p=0.33$ ). BMI  $>25$  kg/m<sup>2</sup> was present in 27 (54%) patients of hypertensive and 14 (28%) patients of normotensive groups and this difference between the two groups was statistically significant ( $p<0.01$ ). The mean fasting and post prandial blood sugar levels were almost similar in both groups. Mean triglyceride values of both the groups were almost similar. The mean serum insulin levels were high in hypertensive groups than that of normotensive group which was statistically significant ( $p=0.00$ ). Mean HOMA-IR, waist size and waist hip ratio (WHR) was significantly ( $p=0.02$ ) higher in hypertensive group than that of control group.

### DISCUSSION

Present study examined the relationship between insulin resistance and hypertension and we also study the relationship between

hypertension and metabolic syndrome. Our study included 50 hypertensive and 50 normotensive persons, and we calculated the insulin resistance by HOMA-IR. The results of the present study showed that fasting blood sugar level, PPBS, HDL cholesterol, serum triglycerides, fasting serum insulin were significantly higher in hypertensive patient as compared to normotensive. These results of our study were comparable with previous study of Sinha et al. In this study, significantly higher fasting blood sugar (>110 mg/dl) was seen in hypertensive patient (50%) than normotensive patients (24%). Similar findings were noted in the study carried out by Garcia-Puig et al (glucose metabolism in hypertension) and found an abnormal glucose metabolism 68.5% of hypertensive cases. Increased insulin resistance results in elevated insulin levels that in turn alter the blood pressure by activating sympathetic system and by increasing sodium reabsorption. In our study, HOMA-IR was significantly higher in hypertensive patients 2.81 ( $\pm 0.6$ ) than in normotensive patients ( $2.41 \pm 0.07$ ). Similar observations were made by Sinha et al. In our series, metabolic syndrome was present in 46% of hypertensive patient and 20% of normotensive person with a p value of 0.01. Metabolic syndrome was almost equally present in males (46.42%) and females (45.45%) in hypertensive group. But in normotensive group metabolic syndrome was higher in females (27.77%) than males (15.62%).

### CONCLUSION

Our study confirmed the existence of positive correlation between insulin resistance and hypertension. Correlation between metabolic syndrome, hypertension and insulin resistance was also demonstrated in this study and concluded that majority of the hypertensive patients who had metabolic syndrome are also having insulin resistance and confirms that insulin resistance was the major cause of metabolic syndrome.

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