



RESEARCH ARTICLE



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## Fasting Blood Glucose Level in Patients Suffering From Hypertension

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### Abstract

High blood pressure or hypertension is defined as systolic blood pressure level higher than 140mmHg and /or diastolic blood pressure 90 mmHg. Hypertension is a most common health problem worldwide and its incidence seems to be increasing on global scale. Various complications associated with hypertension are coronary heart disease, renal disease and coronary artery disease and cerebrovascular accidents etc. This study was planned to compare the fasting blood glucose level in hypertensive patients and normal healthy controls. This prospective study was carried out in general medicine and pathology departments of Govt. Hospital in Rishikesh. In the present study, the volunteers were selected from General Medicine department of Government hospital Rishikesh from May 2009 to May 2010. Hypertension was defined as per the recommendations of JNC7th Report. After 12 hours fast the blood samples were collected from all individuals without anticoagulant and centrifuged at 3000 rpm for 5 minutes. The serum was collected in fresh vial and standard methods were followed for biochemical studies. A total of 120 volunteers were recruited for this study. Out of them 70 were hypertensive subjects (38 males and 32 females) and 50 were normotensive subjects (27 males and 23 females). The results concluded that hypertensive patients had fasting blood glucose level higher than normal healthy controls. Mean fasting blood glucose level among hypertensive patients was  $98.57 \pm 14.23$  mg/dl and that of among normal healthy controls was  $82.98 \pm 9.16$  mg/dl. The difference between the two groups was statistically significant ( $p = 0.000$ ).

**Keywords:** Hypertension, coronary heart disease, renal disease, coronary artery disease cerebrovascular accidents.

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## INTRODUCTION

High blood pressure or Hypertension is defined as the systolic blood pressure level higher than 140mmHg and /or diastolic blood pressure 90 mmHg [1]. Hypertension is a most common health problem worldwide and its incidence seems to be increasing on global scale. Various complications associated with hypertension are coronary heart disease, renal disease and coronary artery disease and cerebrovascular accidents etc. It is an iceberg disease that could be described as sleeping snake which bites when wakes up but is a controllable disease and a minimum of 5 mmHg decrease in BP can prevent 1,51,000 strokes and 1,53,000 chronic heart disease death<sup>[2]</sup>. Hypertension and diabetes are the leading co morbidities in general population as there is substantial overlap between hypertension and diabetes in both aetiology and disease mechanism<sup>[3]</sup>. Reports on development of hypertension during diabetes are available very much but the dysglycemia during high blood pressure has recently been get interest and still very few reports are available worldwide<sup>[4]</sup>. Keeping this in mind the present study was planned to find out the relationship between fasting blood glucose level of hypertensive subjects with normotensive subjects as hypertension is found to be on its increase in the study area i.e. Uttrakhand, India<sup>[5,6]</sup>.

## MATERIALS AND METHODS

### Study Area

This prospective study was carried out from May 2009 to May 2010 in Department of General Medicine and Pathology of nearby Govt. Hospital in Rishikesh. The volunteers/subjects were selected from General Medicine Department of Shanti Prapann Sharma Government Hospital, Rishikesh, Uttarakhand, India. The volunteers/subjects were informed by the oral communication regarding the aim and objectives of the present study. Both written and verbal consent have been taken from each of the participant before including study.

### Ethical issues

Ethical clearance was obtained from the management of Shanti Prapann Sharma Govt. Hospital, Rishikesh, Uttarakhand, India. Consent forms were given and duly filled by the volunteers/subjects to seek their permission before been sampled and only volunteers/subjects that agreed by signing the forms that were sampled for this study. Information on clinical signs of patients was obtained using verbal interviews and clinical records of volunteers/subjects.

### Case Study

Two groups were included in the study as follows:

**Hypertensive Cases:** 70 hypertensive volunteer subjects (38 males and 32 females) with the age range of 31-78 years.

**Normotensive Controls:** 50 normotensive volunteer subjects (27 males and 23 females) with no history of diabetes, hypertension, cardiac or renal diseases with age range of 30-79 years.

After 12 hours fast the blood samples were collected with the help of trained laboratory technician of hospital from all individuals without anticoagulant and centrifuged at 3000 rpm for 5 minutes in pathology department. The serum is collected in fresh vial and standard Glucose Oxidase Peroxidase (GOD-POD) method was used to analyze of fasting blood glucose level<sup>[7]</sup>.

### Statistical Analysis

The collected data on fasting blood glucose level were analyzed by SPSS Software version 16.0. All values were expressed as  $\pm$  S.D. Statistical significance of difference between cases and control groups were evaluated by Student's t test. A p-value of  $< 0.05$  was considered as significant.

## RESULTS

Total 120 subjects comprising of 70 hypertensive cases and 50 controls were included in the present study. Measurement of blood pressure and blood glucose were done in both the groups. The age wise distribution of the study subjects is given as shown in Table 1. The hypertensive cases were in the age group of 31-78 years. The mean age of hypertensive subjects was 57.11 years (SD  $\pm$  13.48 years) whereas the controls were in the age group of 30-79 and mean age was 50.54 years (SD  $\pm$  14.42 years). Out of 70 cases 38 were males and 32 were females and in case of 50 controls 27 were males and 23 were females.

Age in years	Cases		Controls	
	Male	Female	Male	Female
30-39	04	02	06	07
40-49	06	07	07	05
50-59	09	10	06	05
60-69	09	03	04	02
70-79	10	10	04	04
Total	38	32	27	23

**Table 1: Age wise distribution in hypertensive cases and normotensive controls**

The blood pressure was measured separately as systolic blood pressure and diastolic blood pressure. The results of blood pressure measurement are shown in Table 2. The mean systolic blood pressure (SBP) of hypertensive subjects was 156.57mmHg (SD  $\pm$  24.61 mm of Hg) and that of controls was 113.52 mmHg (SD  $\pm$  3.47 mm of Hg). The mean systolic blood pressure was found to be higher in hypertensive subjects than controls ( $p < 0.05$ ). Mean diastolic blood pressure

(DBP) of hypertensive cases was 95.11mmHg (SD ± 7.21 mm of Hg) and that of controls was 73.66mmHg (SD ± 3.32 mm of Hg). The mean diastolic blood pressure of hypertensive cases was found to be higher than controls (p < 0.05).

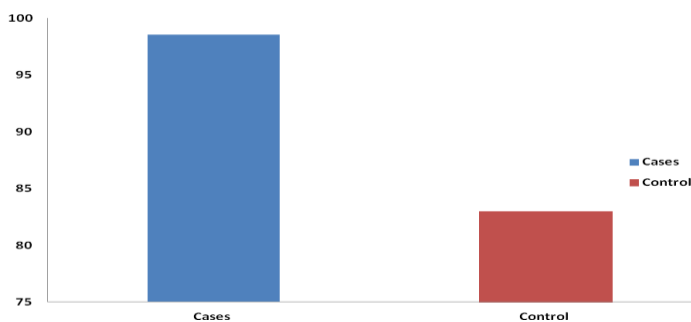
Variables	Cases		Control		t value
	Mean	SD	Mean	SD	
SBP(mmHg)	156.57	24.61	113.52	3.47	12.26*
DBP(mmHg)	95.11	7.21	73.66	3.32	19.594 *

**Table 2: Comparison of Mean SBP and Mean DBP between hypertensive cases and normotensive controls**  
SD (Standard deviation), \*indicates p< 0.05

Mean fasting blood glucose level after 12 hours fasting in hypertensive cases was 98.57± 14.23 mg/dl and that of among normal healthy controls was 82.98 ± 9.16 mg/dl. The mean fasting blood glucose in hypertensive cases was higher than normal healthy controls and the difference between the two groups was found to be statistically significant (p = 0.000). The results of fasting blood glucose levels are shown in Table 3 and Figure 1.

Subjects	No. of Cases	Fasting Blood Sugar
Hypertensive	70	98.57± 14.23
Healthy Controls	50	82.98 ± 9.16
Significance		p< 0.000

**Table 3: Comparison of Mean FBS between hypertensive cases and normotensive controls**



**Figure 1: Comparisons of fasting Blood Glucose level in hypertensive cases and normotensive controls**

Hypertension is a multifactorial disorder but any individual risk factor can contribute to overall increase in blood pressure [8]. Studies had shown that subjects with hypertension have a marked increase in the prevalence of hypercholesterolemia [9], hypertriglyceridemia [9], hypomagnesaemia, diabetes, insulin resistance and obesity [10]. Present study showed the statistically significant higher level of fasting blood glucose level in hypertensive cases than normotensive controls. Some other studies also had shown the higher results of blood glucose level during hypertension. A study done by Salmasi AM et al., have shown in their study that the prevalence of glucose abnormalities in hypertensive patients attending a hospital hypertension clinic is sufficiently high [11]. A

study done by Muhammad et al in Lahore, among hypertensive patients have shown that the blood glucose level of hypertensive patients was higher and statistically significant. But simultaneously they conclude that the significance may be due to the presence of 55 % diabetic cases present in hypertensive groups [12]. A study among south Indian hypertensive patients also has shown higher blood glucose level 101.62 ± 33.78 mg/dl in hypertensive patients than that of 82.46 ± 10.8 mg/dl in healthy controls. The study revealed the higher and statistically significant difference of blood glucose levels between hypertensive patients and healthy controls [13]. A study done in the year 2012 in Nigeria [14] on essential hypertensive patients had shown that significantly higher level of blood sugar was seen among hypertensive than controls.

In the present study, raised fasting blood glucose levels were identified in patients having hypertension. Therefore healthcare providers must not only identify and treat patients with hypertension but also make them aware of associated consequences of hypertension. They must promote a healthy lifestyle and prevention strategies to decrease the prevalence of hypertension in the general population.

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