

EVALUATING THE RELATIONSHIP BETWEEN HYPERTENSION AND BLOOD GLUCOSE LEVEL- A DESCRIPTIVE CORRELATIONAL STUDY.

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Abstract.

Background:

Hyperglycemia is a condition where the body experiences an increase in blood glucose levels and insulin can't be used appropriately. Patients with diabetes mellitus experience hyperglycemia where there is an increased level of angiotensin hormone which can cause hypertension. The main approach of this study is to correlate the association of blood glucose levels with hypertension.

Materials and methods:

The type of this study was descriptive correlation. A total of 210 subjects were selected for this study of which only 166 samples were the responders and a Random sampling technique was used to analyze the subjects. The level of blood glucose was examined with semi semi-automated analyzer and a sphygmomanometer was used for blood pressure analysis.

Results:

The obtained data were integrated with "The Pearson correlation test". Of the total population included in this study, females were the responders, and mostly the responders had "Diabetes mellitus".

Conclusions:

Samples with high blood glucose levels had a great risk of blood pressure. The level of Blood glucose is interrelated with the level of blood pressure in individuals with hypertension.

Recommendation:

It is recommended that aged people always maintain their blood glucose level to lower their risk of cardiovascular diseases including hypertension.

Keywords: Hypertension, Blood Glucose, Diabetes Mellitus, Hyperinsulinemia, Jharkhand,

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1. INTRODUCTION.

The condition of hypertension has an interrelationship with diabetes mellitus. Subsequently controlling the levels of hypertension could lead to

"Hyperinsulinemia" and also increases the risk of insulin-resistant conditions like diabetes mellitus [1]. However, both conditions are related to insulin resistance in the body [2]. In the case of Hyperinsulinemia, the pancreas secretes extremely high amounts of insulin hormones and is known to increase blood pressure through various mechanisms [3, 4]. Diabetes mellitus and Hypertension

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are the most prevalent health conditions worldwide [5]. Diabetic patients along with hypertension not only make a way out to a complex treatment pathway but also to a higher risk of cardiovascular diseases [6].

Hyperglycemia is an initial sign of Diabetes mellitus as a result of an abnormal pancreas and higher levels of glucose secreted by the liver [7, 8]. Also, hyperglycemia in Diabetes mellitus patients leads to an increased angiotensin hormone that also triggers high levels of blood pressure and hypertension [9]. This may be because of the contractility effect that surpasses the vasorelaxation effect. The increased level of contractility can be due to the result of α adrenergic level. Hypertension is mostly found in patients with Diabetes mellitus [10]. Every individual with Diabetes mellitus and hypertension should have a normal range of blood pressure (130/80 mmHg) as a precaution to avoid various other health issues [11, 12].

Blood pressure refers to the level of blood flowing within a pressure against the blood vessels. The normal value of estimated systolic pressure is 120-125 mmHg, and the normal value of estimated diastolic pressure is 80-85 mmHg [13, 14]. High levels of blood glucose have a great risk of blood pressure and the level of blood glucose is interrelated to the level of blood pressure in individuals with the condition of hypertension [15]. This study aims to correlate the association of blood glucose levels with hypertension in [clinical Biochemistry] under Clinical Pathology MGMCH, Jamshedpur, Jharkhand, India.

2. MATERIALS AND METHODS.

2.1. Study Design and Sample.

The type of this study conducted was descriptive correlation. A total of 210 subjects with the condition of hypertension were selected for this study. The subjects were estimated with the Slovin formula and the resulting 166 subjects were the responders. A random sampling method was used by selecting the names of the subjects.

2.2. Inclusion and exclusion criteria.

The inclusion criteria for the study were [50-70] years people and are available for initial physical

tasks and the exclusion criteria of the study were the patients admitted in hospitals and those with stroke. The analyzed data was obtained from August 2023 to September 2023.

2.3. Data Collection.

The controlled variables in this study were the level of blood glucose collected from simple tests using a semi-automated analyzer. The resulting values were considered normal when they were lower than 140 mg/dl and were considered hyperglycemic when higher than 180 mg/dl. On the other hand, the response variable in this study was BP analyzed by measuring the blood pressure of the individuals with a sphygmomanometer on the right-hand side of the arm. The resulting values were considered normal for systolic when they are lower than 140-145 mmHg and for diastolic the resulting values must be lower than 90-95 mmHg. It is considered as level 1 hypertension when the systolic value is around 140-160 mmHg and for diastolic the value is around 90-100 mmHg. Similarly, it is considered to be level 2 hypertension when the systolic pressure the value is greater or equal to 161, and for diastolic pressure the value is greater or equal to 101 mmHg.

3. RESULTS.

Among the 210 subjects only 166 were the responders out of which the majority were only females in several 116 subjects, nearly 70% and most of the responders had Diabetes mellitus in several 128 subjects which is around 78% [Table 1].

Table 1. Characteristics of respondent

Characteristics		Frequency	Percentage
Sex	Male	50	31.1
	Female	116	70
Diabetes mellitus	Patient	128	78
	Non-patient	38	21.9

The obtained results show that the mean blood glucose value of the responders is 213.94 mg/dl which comes under the category of “hyperglycemia”. From the observations in Table 2 we can analyze that the average level of aged blood glucose is 213.94 mg/dl which comes under the category of “hyperglycemia”.

Table 2. The Depiction of respondent's blood glucose level

Minimal	Maximal	Mean	Standard deviation
88	452	213.94	89.20

From the observations in Table 3 we can analyze that the average level of aged blood pressure is 126.42/80.98 mmHg which comes under normal range category.

Table 3. The Depiction of Respondent's Blood Pressure

Blood pressure	Min	Max	Mean	Standard deviation
Systolic	101	156	126.42	14.033
Diastolic	61	121	81.98	9.261

From the observations in Table 4, we can understand that there is a notable relationship between the level of blood glucose and the level of blood pressure with positive association, which means that the level of Blood glucose is interrelated to the level of blood pressure in individuals with the condition of hypertension and hence high levels of the blood glucose has a great risk of blood pressure

Table 4. The Correlation between blood glucose level and blood pressure

Correlation	R counted	Value of P
Blood glucose – systolic blood pressure	0.915	0.126
Blood glucose – diastolic blood pressure	0.877	0.132

This study analyzed that there was a notable relationship (systolic value of $P = 0.126$, and diastolic value of $P = 0.132$) and a high association (systolic value of $R = 0.915$ and diastolic value of $R = 0.877$) between the level of blood glucose and the level of blood pressure with positive relation. Thus, patients with high levels of blood glucose have a greater risk of high blood pressure.

4. DISCUSSION.

The obtained values of measured blood pressure of the current study by the sphygmomanometer of the responders reveal that the mean of [50-70] years blood pressure in the systolic range is 126.42 mmHg and the mean of diastolic range is 81.98 mmHg. This mean value of blood pressure on aged responders with the condition of hypertension is characterized as normal hypertension. The results also suggest that men are more prone to the risk of hypertension than women; this may be due to differences in body structure and secretion of hormones. The responders of the study mostly included aged people as they grow older their risk of hypertension gets higher this may be because of the reason that there will be an alteration in the contractility of the blood vessels in old people and also, they experience natural kidney defects. Most of the responders selected in this study had Diabetes mellitus about 78%. This is because hypertension and Diabetes mellitus are interrelated with each other and are caused due to insulin resistance. Hyperglycemia is known to induce the angiotensin hormone secretion which in turn increases the illness and death rates of Diabetes mellitus patients associated with the risks of cardiovascular disease.

Carbohydrate metabolism in the body gives glucose as the product which acts as an essential energy source compared to any other amino acids and fats [16]. Blood glucose is generated from the food we eat which gets absorbed by the cells and flows through blood vessels in the body [17]. The reason for the condition of hyperglycemia can be due to an abnormal pancreas, an increase in glucose synthesis by the liver, and insulin resistance

which results in epinephrine and adrenaline secretion [18].

Individuals with Diabetes mellitus often experience high glucose production in the liver which is because of a lack of insulin-prohibited effect [19]. This study comprises [50-70] years aged subjects and around 25% of the responders suffer from Diabetes mellitus.

Blood pressure refers to the arterial pressure exerted by the left ventricle when in systole and the arterial pressure exerted in the ventricles when in diastole [20]. The normal value of blood pressure in a healthy individual is (systolic pressure 120 mmHg and diastolic pressure 80 mmHg) BP is considerably low in women by nearly 9-10 mmHg when compared to men [21-24].

5. CONCLUSION.

The mean value of [50-70] years patient's level of blood glucose was estimated to be 213.94 mg/dl and it comes under the category of hyperglycemia. The mean value [50-70] years aged patients' level of blood pressure was estimated to be 126.42/80.98 mmHg and it comes under the category of normal hypertension. This shows that there is a powerful relationship between the level of blood glucose and the level of blood pressure with a positive association hence high levels of blood glucose have a great risk of blood pressure and the level of blood glucose is interrelated to the level of blood pressure in individuals with the condition of hypertension.

6. LIMITATIONS.

The limitations of this study include a small sample population who were included in this study. The findings of this study cannot be generalized for a larger sample population. Furthermore, the lack of a comparison group also poses a limitation for this study's findings.

7. RECOMMENDATION.

It is recommended for aged people to always maintain their blood glucose level to lower their

risk of cardiovascular diseases including hypertension.

8. ACKNOWLEDGEMENT.

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9. LIST OF ABBREVIATIONS.

BP- Blood Pressure

10. SOURCE OF FUNDING.

The study had no funding.

11. CONFLICT OF INTEREST.

The authors report no conflicts of interest in this work.

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