Evaluation of Blood Glucose and Magnesium in Hypertensive Patient

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Abstract: Objective: The Purpose Of This Study Was To Evaluate The Level Of Blood Glucose And Magnesium In Hypertensive Patients And To Find Out The Significance Of Their Correlation, If Any. **Subjects And Methods**: 50 Cases Of Hypertensive Patients And 50 Healthy Controls Of Age And Sex Match Were Included. **Results:** This Study Reported Fasting Blood Glucose Of Hypertension Patients (103.41±35.81) Was Higher Than That Of Healthy Controls (83.16±9.3 Mg/Dl). This Elevated Level Is Statistically Significant (P<0.005). Anyhow This Build May Be Because Of The Vicinity 22% Of Hypertensive Cases Showed Impaired Glucose Intolerance Test. There Was No Association Of Blood Magnesium In Hypertension Patients And In Healthy Controls. Although It Has Been Reported That Serum Magnesium Of Hypertensive Cases Was Slightly Decreased Than That Of Healthy Subjects But It Was Statistically Insignificant. **Conclusion:** There Is A Predisposition Of Impaired Glucose Intolerance In Case Of Hypertension. The Systolic And Diastolic Blood Pressures Were Recorded Independently. With Increasing Age, The Higher Systolic Blood Pressures Were More Important Than Raise In Diastolic Blood Pressures.

1. Introduction

Hypertension is characterized as an attribute rather than a particular illness and shows to a quantitative instead of a qualitative variation from the normal range of blood pressure. [1] Blood pressure is the compel that drives blood through vascular bed to deliver nutrients and oxygen to the body's tissues and organs also helps in execration of waste materials and metabolites. If the systolic pulse is less than 120mmhg and diastolic pulse is lower than 80mm Hg, the blood pressure to be normal. Hypertension is characterized by "systolic blood pressure level more than 140mmhg and diastolic blood pressure more than 90mmhg". A raised blood pressure is a typical a widely prevalent health issue overall and with continuous worldwide build in the occurrence. Pretty nearly 28% of the individuals are suffering. In spite of the fact that truly characterized as "increased blood pressure", [2, 3] hypertension is described by arterial compliance, peripheral resistance and variations from the norm of heart yield. According to the WHO (2002) regarding trouble of sickness, it is stranded on 2nd rank out of 10 main risk factors.[4,5] It contributes to more than one third of mortality rate globally. Studies reported that hypertension is prevalent in 26% urban and 9% rural population in Pakistan. 72% of these population was Stage-I hypertension. [6]

The relationship between the risks of chronic heart diseases and stroke are well unknown. Thus, there are likewise solid relationship between serum cholesterol and chronic heart diseases. Another study in same population, reported higher serum lipid profile in urban and rural population of Sindh indicated the existing risk cardiovascular diseases [7, 8]. Hypertension is under diagnosed and undertreated among Pakistani population, and they usually suffer from tragic cardiovascular difficulties such as angina, heart attack, stroke and heart failure. Controlling this existing risk factor can significantly decrease the rate of strokes and cardiovascular problems. [9]

Substantial studies have reported that hypertensive patients have a significantly higher in the predominance of diabetes, hypercholesterolemia, hypertriglyceridemia hypomagnesaemia and so on. Other studies, inspected hazard in females over a wide range of pattern BMI, observed that higher BMI, even inside the "optimal", is related with increased risk of hypertension. In hypertension cases, blood glucose levels are likewise included to figure out the relationship of hypertension with hyperglycemia. The further explanations behind expanded rate of hypertension incorporate, sugar rich eating regimen, high lipid diet, sedentary physical acidities and life style progressions [10, 11]

The studies included of the evaluation of magnesium (Mg), suspecting the crucial role of Mg in different biochemical reactions particularly those ATP energy production. Mg is higher in concentration in intracellular fluid (13mmol/L) than interstitial fluid (0.5 mmol/L) and extracellular fluid (1 mmol/L).

Magnesium is the 2nd most common intracellular cation and 4th most common cation in the body. [12] The average range of Mg in a healthy individual is around 2,000 meq, 70% of this roughly is in bones, 1% in Extracellular fluid while intracellular it is chiefly packed in the mitochondria. Hyperglycemia has patho-physiologic and metabolic association with hypomagnesaemia. [12] Polyuria produced by hyperglycemia leads to hypomagnesaemia. Hypomagnesaemia may produce as a consequence of diabetic ketoacidosis. Hypomagnesaemia also contribute towards hypotension and ECG changes. Post operative cardiac arrhythmias are usually associated with hypomagnesaemia. In case of hypertension, Mg level were related to report association Mg level changes with hypertension. [13]

2. Material and Methods

This study was conducted at LUMHS, Jamshoro. In this case-control study, 50 case of hypertension (29 males and 21 females) were compared with 50 control subjects (21 males and 19 females) of similar sex and average age years (Table.1). Subjects with secondary hypertension, diabetes, cardiovascular or renal diseases were excluded. Blood pressures of all subjects were recorded according to the Joint National committee 8th report, 2014. [14] The fasting blood samples were collected from all subjects and without using any anticoagulant were centrifuged at 1500 revolutions per minute for 5 minutes and serum is separated in new vials for biochemical investigation by utilizing standard techniques. The all the statistical data was interpreted by using statistical package for social sciences (SPSS) version.17.

3. Results

Table 1: Showing age wise distribution of sample population.

No	Age (Years)	Patients	Controls
1	30-39yr	08	50
2	40-49	22	26
3	50-59	26	14
4	60-69	40	10
5	70-79	04	-

Sample size of 100 subjects was including 50 cases of hypertension and 50 controls of matched sex and average age were present in the study. Blood pressures, fasting blood glucose levels and serum magnesium levels were recorded in both cases and controls. The hypertension cases were in the age range of 31- 70 years and the average age was 56±11.51 years whereas the controls were in age range of 30-71 years and the mean age was 49.23±10.28 years. The

epidemiological data of sample presented in table.1 and table.2.

Table 2: Showing Gender wise distribution of sample population

Groups	Male	Female
Hypertensive patients	29	21
Controls	31	19

The mean FBS of hypertension cases was 103.41±35.81 mg/dl. The mean FBS of controls was 83.16±9.3 mg/dl. The mean FBS of hypertension cases was significantly more than controls (p<0.05). It may be due to the fact that 22% of hypertensive patients were present with impaired glucose intolerance test (Table.3).

Table 3: Showing mean Fasting Blood Glucose and Magnesium level in Sample population

Groups Mean± SD	FBS (mg/dl)	Mg (mEq/L)
Patients	103.41±35.81	1.91±0.07
Controls	83.16±9.3	1.95 ±0.04

The mean Mg level in hypertension cases was 1.91±0.07 mg/dl and in case of controls it was 1.95±0.04 mg/dl. While, the mean of Mg level was less in hypertension cases than controls but it was statistically insignificant (p>0.05) (table-3).

4. Discussions

In this study we evaluated fasting blood glucose and magnesium level to find out that there is any significant relationship between FBS and Mg level in case of primary hypertension. The blood pressures of all subjects were measured. This study showed that FBS cases of hypertension (103.41md/dl±35.81) is significantly increased than controls (83.16mg/dl±9.3) (p<0.001). This may be due higher prevalence of impaired glucose tolerance test in hypertensive group. Regarding serum magnesium, this study reported that cases of hypertension (1.91±0.07 mEq/L) showed higher level of Mg than controls (1.95±0.04 mEq/L). Although it was not statistically significant (p>0.05) but it showed higher frequency of hypomagnesaemia in hypertensive's patients, most of them were females as compared to males. The subjects with controls showed higher intraerythrocytic magnesium fixations than the primary hypertension patients. Other studies showed that appropriate amount of intake of magnesium prevents from hypertension [15]. Some studies reported that by correcting the magnesium level, we can prevent from developing hypertension and risk of cardiovascular problems [16]. Further some studies reported that the magnesium supplement enhance the effect of anti hypertensive drugs on the

other hand some other studies showed that there is no relation between serum magnesium and the risks of hypertension and cardiovascular problems[17]. This study supports the evidences of lack of any significant association between hypertension magnesium level changes.

Conclusion

Fasting blood glucose was significantly raised in primary hypertension cases as compared to healthy controls although it may be because of the vicinity of 22% cases of impaired glucose intolerance among the hypertension cases. Although magnesium was slightly lower in hypertensive cases but it was statistically not significant. With increasing age, the rise in systolic blood pressure was more critical than the rise in diastolic blood pressure.

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