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Investigation of the Correlation between Diabetes Mellitus and Blood Pressure in Tripoli Central Hospital

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Abstract: ***One of the most widespread diseases related to diabetes is hypertension.This is why it is essential to investigate the correlation between these two diseases which are very common among the people at the global or regional level. Patients suffering from high blood pressure are diabetes-prone, and those suffering from diabetes are also exposed to hypertension at any time.This study was performed on 200 (57%) of the 350 total patients, who had both hypertension and diabetes. Of these 200 patients, 117 were women, and 83 were men.***

1. Introduction

Hypertension (HT) is the most critical risk factor for cardiovascular diseases in the world;it is a complex disease with a significant heritability. However, the majority of related genes and molecular mechanisms are unknown. New candidate-gene studies and initial genome-wide association screenings (GWAS) have shown that at least some of the genes associated with HT match with the cardiovascular regulation cascades functionally or clinically. This suggests that the discovery of the HT-gene can be facilitated by large-scale systematic analyses of variants in the pathways of cardiovascular regulation (Viberti and Wheeldon, 2002).

In many controlled studies, non-pharmacological lifestyle interventions including dietary changes, low-salt diet, weight loss, regularly increased physical activity, and alcohol restriction has been shown to reduce blood pressure (BP). Lifestyle changes, including individualized counseling, which aim to lower total and saturated fat intake, increase fiber intake and physical activity, lead to significant improvement in HT and a reduction in the incidence of diabetes.

Glucagon-like peptide 1 (GLP-1) and glucose-dependent insulinotropic peptide (GIP) has been studied intensively. It is known that incretin, as a response to intestinal contents, improves insulin secretion in a glucose-dependent way. The effect of incretin typically decreases in the presence of diabetes mellitus (DM).

Chronic therapy with GLP-1 analogs in type 2 diabetic patients results in improvements in both systolic and diastolic BP, without affecting the heart rate. Finally, the effect of incretin-based therapy on BP appears to be related to the activation of GLP-1R in the kidney tissue.

Hypertension is twice as common in diabetic patients compared to non-diabetics. However, the definition of blood pressure in diabetic patients is generally similar to that of the general population, and the treatment threshold is constant. Since both HT and DM are highly related to obesity, it is not surprising that their coexistence is particularly frequent in obese individuals. Both blood pressure and DM significantly increase with age and coexistence is highest amongthe elderly (Ravid et al., 1998).

Microvascular complications are more common in the coexistence of hypertension and DM, and both retinopathy and nephropathy are more common in patients with DM and hypertension. Lowering BP is particularly useful in diabetic patients. However, how low BP should be is controversial (Vijan and Hayward, 2003).

Diabetes mellitus and arterial hypertension are common chronic disorders that frequently occur together. Epidemiological studies have shown that diabetes is associated with increased cardiovascular mortality. This situation causes significant morbidity in these patients. Also, cardiovascular events are 2-fold higher in patients having both diabetes and hypertension than the patients having only one of these two diseases (Wuffele et al., 2004).

The prevalence of hypertension in diabetic patients is approximately twice that of the non-diabetic population. The incidence of diabetes mellitus is increasing rapidly and will affect 300 million people worldwide in a short time; more than half of them will have hypertension.

Besides, DM is the most common cause of end-stage renal disease in the Western world. Many attempts have been made to explain the coexistence of diabetes and HT. Genetic susceptibility has been proposed as a possible mechanism in insulin resistance, gene changes, membrane cation transport abnormalities, altered adrenoreceptor response, increased sodium sensitivity in the vasculature, and even in neurohumoral changes. Unfortunately, so far, no hypotheses have been found to explain the exact mechanism underlying hypertension in patients with diabetes (Bangalore et al., 2011; Sturrock et al., 2000).

The prevalence of hypertension among patients with type 1 diabetes mellitus is similar to the general population, but it becomes more frequent when nephropathy occurs. Although early hemodynamic changes are alike in both types of diabetes, it is seen that these changes precede in type 2 diabetes.

There is convincing evidence that the pathogenesis of hypertension is multifactorial in people with diabetes mellitus, and that this pathogenesis cannot be explained by a simple hypothesis. The development of arterial HT in type 1 diabetes mellitus patients is clearly associated with microalbuminuria. Recent studies using ambulatory blood pressure monitoring have shown that individuals with type 1 diabetes and microalbuminuria have higher nocturnal blood pressure than patients with type 1 diabetes and normal urinary albumin excretion or age-matched controls (Grossman et al., 2000; Arguedas et al., 2013).

Hypertension plays an essential role in the development and progression of nephropathy in both type 1 and type 2 DM. Although hypertension often develops after the onset of nephropathy, 50% of patients with type 2 diabetes have hypertension at the time of the diagnosis. The prevalence of hypertension is high in type 2 diabetes. The problemlays in thesatisfactoryreflection of the progress in understanding the mechanisms involved in the formation of nephropathy in patients with diabetes and hypertension to clinical practice.

Cardiovascular disease is the most important cause of death in both types of diabetes, and mortality in these patients increased by two or three times compared to the non-diabetic population. The importance of systolic blood pressure control is emphasized in many studies. These studies have provided convincing evidence that systolic blood pressure after the age of 50 assumes a more significant measure of cardiovascular risk, and its importance increases with higher systolic blood pressure, even by correlating with cardiovascular morbidity and mortality. In conclusion, many clinical studies have focused on determining optimal blood pressure levels as well as the class and dose of the drug needed to achieve this goal (Schrier et al., 2002; Snow et al., 2003; Brunström and Carlberg, 2016).

In addition, elderly patients with diabetes often have vascular disease. Therefore, these patients should be carefully examined to rule out the presence of stenotic lesions. In these patients, blood pressure should be reduced slowly, because of the reduced brain and kidney autoregulation capabilities.

2. Methods

This study was conducted at Tripoli Central Hospital. Two hundred diabetic patients having hypertension were included in this study, and the required analyses were performed. Glucose measurement was done first from the urine and then from the blood. Blood pressures were measured and recordedin each patient.Blood glucose measurement is the only criteria for the diagnosis of diabetes, and it is useful during treatment, especially in the monitoring of insulin-dependent diabetic patients, who may experience high blood sugar.

The method used to measure glucose concentration in the blood depends on the events of a colored carbohydrate reaction with reagent outside the dehydrate.

3. Results

Table 1: Shows the Distribution of the samples according to Age, FBG, DP, SP, VN

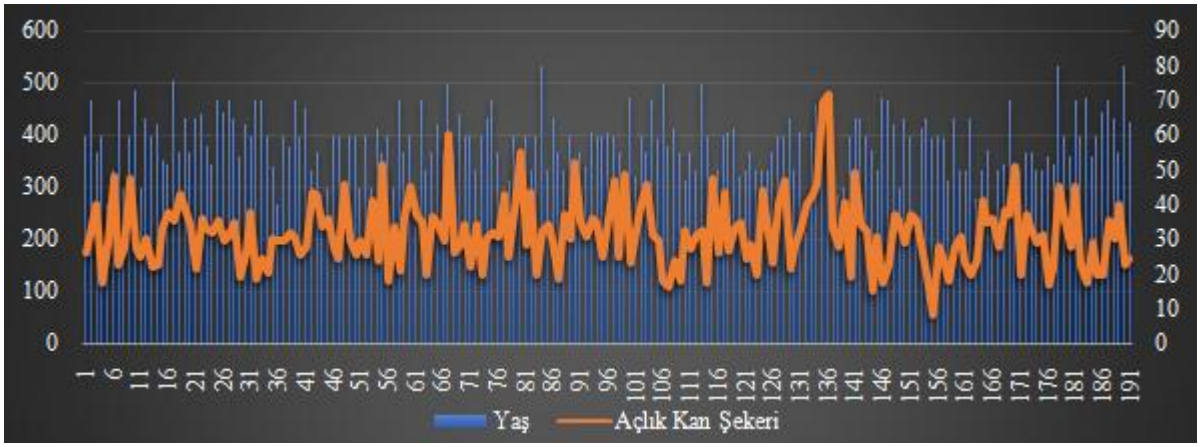
	N	Minimum	Maximum	Mean	SD
Age	190	32	80	57.53	9.361
Fasting blood glucose	191	57	478	211.26	65.277
Diastolic pressure	191	70	190	89.40	9.405
Systolic pressure	190	110	190	150.22	10.778
Valid N (Listwise)	189				

Mean standard deviations (SD) for age, fasting blood glucose, diastolic pressure, and systolic blood pressure values are given in the table above. The mean age of the participants was 80 (± 9.36) years. The mean fasting blood glucose was 211.26 (± 65.27), the mean diastolic pressure was 89.40 (± 9.40), and the mean systolic pressure was 150.22 (± 10.77).

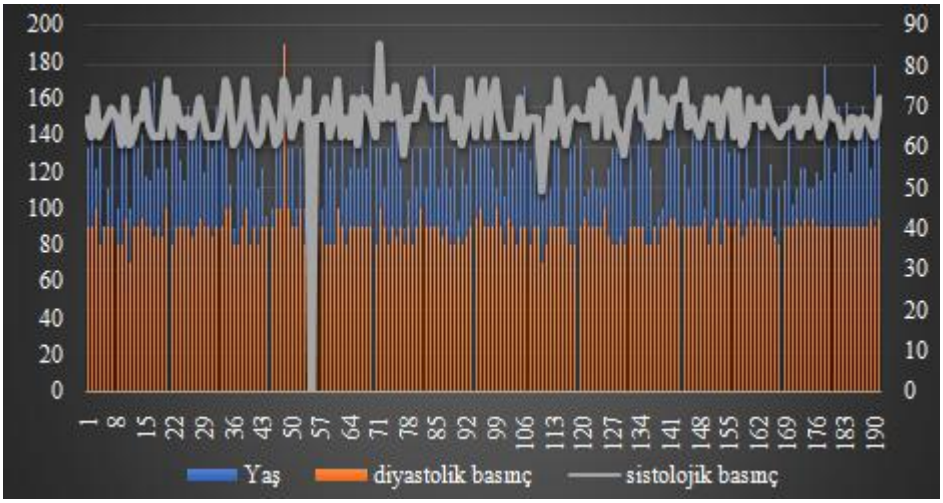
Table 1: Shows theCorrelationsbetweenAge, FBG, DP, SP, VN.

		Age	Fasting blood glucose	Diastolic BP	Systolic BP
Age	Pearson Correlation	1	-0.134	-0.034	-0.027
	P		0.065	0.646	0.709
	N	190	190	190	189
Fasting blood glucose	Pearson Correlation	-0.134	1	0.016	-0.035
	P	0.065		0.826	0.628
	N	190	191	191	190
Diastolic BP	Pearson Correlation	-0.034	0.016	1	0.410**
	P	0.646	0.826		<0.001
	N	190	191	191	190
Systolic BP	Pearson Correlation	-0.027	-0.035	0.410**	1
	P	0.709	0.628	<0.001	
	N	189	190	190	190

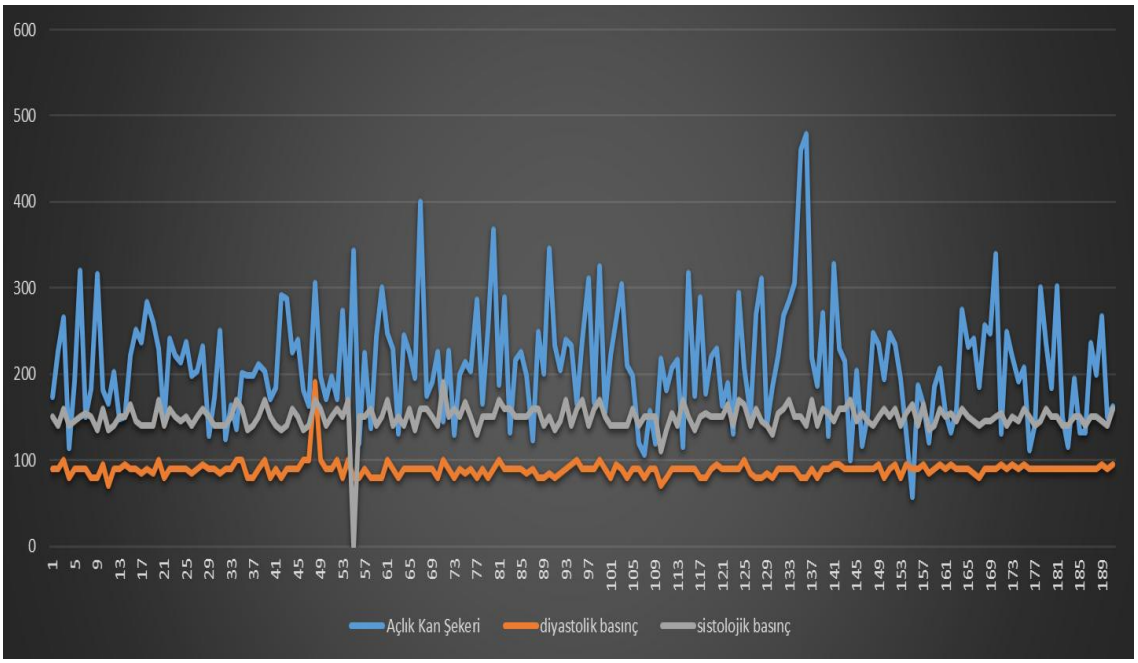
Correlationsbetweenage, fasting blood glucose, diastolic blood pressure, and systolic blood pressure values are given in the table above. According to this analysis, a positive correlation was found between diastolic blood pressure and systolic blood pressure.



Graphic 1: Shows The relationship between age and fasting blood glucose is given in the graphic above. According to the density graph, fasting blood sugar rate increases with age.



Graphic 2: Shows the age, diastolic pressure and systolic pressure values are given. A positive relationship between the three variables was determined according to this graph.



Graphic 3: Shows Fasting blood glucose, diastolic pressure and systolic pressure values are given in the graphic above. According to this graph, there is a positive relationship between the three variables

4. Discussion

Hypertension was found in 200 out of 350 diabetic patients in Tripoli Central Hospital. At the same time, the rate of patients having coexisting hypertension with diabetes was 57%.

According to the results of the statistics obtained from Tripoli Central Hospital, the proportion of women with high blood pressure complicated with diabetes (4-5) within two monthsis higher than that of men (57.9% in women and 42.1% in men). In the aforementioned period, the total number of hypertension-related diabetes cases collected from diabetic patients with high blood pressure was 117 in women and 83 in men.

The prevalence of blood pressure in adults with diabetes is 20-60%. This is 1.5-3 times higher than in non-diabetic individuals. People with diabetes usually develop high blood pressure due to diabetic nephropathy. Conversely, when diabetes is diagnosed, HT may be present or may precede the onset of hyperglycemia. Diabetes and obesity both present in a form that increases the risk of blood pressure. Therefore, it can be said that high BP is associated with obesity, which makes the conditions difficult for diabetic patients.

The presence of hypertension in people with diabetes increases the risk of cardiovascular disease (CVD). There is a consistent positive relationship between uncontrolled blood pressure and increased risk for micro- and macrovascular diseases. Accordingly, a leadingcause of death in diabetic patients is CVD. In addition, diabetic women are at higher risk of death from CVD than diabetic men. The cause of the higher risk of diabetic women is still unclear.

As a conclusion, the optimal BP goal for diabetic patients should be personalized. However, the current literature shows that the maximum benefit of BP control in diabetic patients is achieved with systolic BP levels between 80 and 85 mmHg, except for stroke prevention.

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