Original Article

The Correlation between Type 2 Diabetes Mellitus and Hypertension in Iraqi Patients

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ABSTRACT

Type 2 diabetes (T2DM) is a long-term situation. It is indicated by the elevated blood glucose levels. Hypertension is a common comorbidity in people with some chronic diseases that may be very harmful. The goal of the study is to find if there is a link between T2DM, hypertension, and the other some biochemical parameters. This study included that 135 participants in this study, with 100 of them being patients with T2DM (35), hypertension (30), patients with T2DM and hypertension (35), and the remaining (35) being healthy controls who met the inclusion criteria. T2DM, hypertension, and type 2 diabetic hypertensive patients, as well as healthy controls had the blood collected under the aseptic conditions. For statistical evaluation, the necessary investigations were carried out and values were tabulated separately for cases and controls. The result of this study was showed the majority of having T2DM was females more than males and for hypertension group. It was in females more than males and for hypertension with T2DM group; it was in females more than males. The overweight patients were in T2DM group (71.4%) and the majority of obese patients were in hypertension group (46.7%). The most common smoker patients were in hypertension group (26.7%). In this study, it was concluded that the mean± Std. The glucose value of in hypertension higher compared with the other study groups. The majority of abnormal total cholesterol was in hypertension group compared with the other study groups. There was a higher percentage of abnormal TG in hypertensive group and hypertensive diabetic type 2 patients' group.

GRAPHICAL ABSTRACT

Introduction

Diabetes mellitus and hypertension are common co-morbidities that increase the risk of atherosclerosis and associated consequences, such as heart attacks and strokes [1]. The increased body fat levels are linked to an increased risk of metabolic disorders such as type 2 diabetes, hypertension, and dyslipidemia [2]. The obesity treatment guidelines are presently centered on body mass index (BMI) criteria, with variable treatment cut-off points dependent on the presence or absence of obesity-related comorbid illness. Furthermore, many of these metabolic illness patients are overweight or obese [3]. Type 2 diabetes and hypertension are linked to a slew of lipid and lipoprotein abnormalities in the blood, including low HDL cholesterol, a high prevalence of tiny dense LDL particles, and high triglycerides. Despite normal LDL cholesterol levels, many people have these problems. These alterations are also a part of the insulin resistance syndrome (also known as the metabolic syndrome), which is linked to type 2 diabetes in many people [4, 5]. Hypertension and T2DM together are a dangerous combination, increasing the risk of cardiovascular morbidity and death. There is no question that hypertension is more frequent in diabetes patients and that it increases the complications risk, thus it should be treated as seriously as glycemic control when developing treatment option [6]. Hyperlipidemia can develop as a result of poorly managed diabetes or as a risk factor for macro-vascular disease on its own. A diabetic clinic will see about 25% of patients with the increased lipid values [7].

In hypertension and diabetes mellitus, smoking is a risk factor for mortality and coronary heart disease. However, the risk of stroke is less consistent in hypertension and appears to be lower than that of CHD in diabetes mellitus [8]. The premenopausal women have lower rates of hypertension than males of the same age, but beyond age 50, women had a greater prevalence of hypertension than men [9].

When T2DM and hypertension coexist, the risk of cardiovascular disease, end-stage renal disease, and mortality is considerably raised (2 to 4-fold)

compared with normotensive and non-diabetic persons [10]. As a result, knowing the bidirectional relationships between T2DM and hypertension is critical for disease prevention and consequences management [10].

A cross-sectional study was conducted involving 525 type 2 diabetes. Information on socio-demographic factors, history of hypertension, usage of anti-hypertensive drugs, and length of diabetes was gathered by using the structured questionnaire. Sphygmomanometers with established standards were used to measure the blood pressure.

The results included 70.4% of people had hypertension. The logistic regression showed a positive correlation between hypertension, age ($p=10^{-4}$), BMI ($p=0.0002$), and the diabetes duration. From another study, we discovered that 17.2% of 227 type 2 diabetic individuals who were aware of having hypertension lacked properly managed blood pressure.

In addition, our study demonstrated an increased risk of hypertension in obese and overweight patients compared with those with the normal BMI. Diabetes and hypertension frequently co-exist [10]. Compared with the general population of non-diabetics, the rate of hypertension is about twice as high in the diabetic community.

Materials and Methods

A case control study that included (100) patients and (35) healthy controls were all included in this study. Patients (43 males, 57 females) were separated into three groups: (35) type 2 diabetes mellitus (14 males, 21 females), (30) hypertension (12 males, 18 females), and (35) type 2 diabetes mellitus with hypertension (17 males, 18 females). Participants in the control group (20 males, 15 females) were matched by the age, weight, and had no disease. The patients with T2DM and/or hypertension have been sampled in the beginning of December 2020 to the end of May 2021 who met the inclusion criteria. All patients were diagnosed by specialist physicians and confirm by the clinical examinations and laboratory investigations. The blood sample was collected from each participant, centrifuged to get serum, and then

stored at -20 °C untill the day of laboratory investigation. To determine the total cholesterol, triglycerides, uric acid urea, and glucose were estimated by using enzymatic techniques on a fully automated biochemistry analyzer (Spin120, Spinreact product). The Fridwald equation (triglyceride/5) was used to compute the VLDL cholesterol concentration.

Statistical analyses

Statistical analyses were performed by using statistical package for social sciences (SPSS), version 26. Data were expressed as mean and standard deviations (SD). *P* < 0.05 was considered statistically significant.

Results and Discussion

The majority persons with T2DM were 21 (60.0%) females more than males 14(40.0%), while for hypertension group, it was in males 12 (40.0%) less than females 18 (60.0%) and for hypertension and T2DM group 17 (48.6%) in males with 18 (51.4%) in females with no significant differences have been observed (p<0.05) between healthy control and the three patient groups regarding gender, as presented in Table 1. Likewise, this Table showed that the majority of having T2DM 14 (40.0%) in (≥50-60) years old more than in the age range of (40-49) years old, it was 11 (31.4%) and in the age range of (30-39) years old, it was 10 (28.6%), while for hypertension group, the majority was 13 (43.3%) in (≥50-60) years old more than in the age range of (40-49) years old, it was 11 (37.6%) and in the age range of (30-39) years old, it was 6 (20.0%), and the majority of having T2DM and hypertension group was18 (51.4%%) in (≥50-60) years old more than in the age range of (40-49) years old, it was 10 (28.6%) and in the age range of (30-39) years old, it was 7(20.0%) with the significant differences (p<0.05) among healthy control group and the three patients groups in three age categories, as listed in Table 1. The majority of both patients and control participants were overweight, according to the BMI analysis, there was no normal BMI patients in both T2DM patients' group and T2DM and hypertension patients' group, while there was only 2(6.7%) in

hypertension patients' group. The majority of overweight patients was in T2DM patient group 25 (71.4%) more than in hypertension group which was 14 (46.7%) and more than T2DM and hypertension group which was 20 (57.1%), while the majority of obese was in hypertension and T2DM group which was 15 (42.9%) more than hypertension group 14 (46.7%) and T2DM group 10 (28.6%) with highly statistically significant (MCP<0.01) between healthy control group and the three patients group according to the BMI level. Accordingly, for smoking, Table 1 showed that among patients with T2DM 8(22.9%) had all been smokers compared with 27 (77.1%) of non-smokers. In contrast, among patients with hypertension 22 (73.3%) were non-smokers compared with 8 (22.9%) of smokers and among patients with T2DM and hypertension, 26 (74.3%) were non-smokers compared with 9(25.7%) of smokers, whereas the healthy control persons all are non-smokers.

Table 2 represents the mean±Std. value of systolic blood pressure (SBP) for type II diabetic patients was 121.71±3.82, while the mean±Std. The value of systolic blood pressure for hypertension patients was 167.67±8.98 mmHg, and the mean±Std. value for T2DM and hypertension patients was 156.00±12.41 compared with the mean±Std. value of systolic blood pressure of healthy control which was 120.00±0.00. According to these findings, the means value in all patients' groups were significantly higher than the means of healthy control participants (p=0.000).

The mean±Std. value of the diastolic blood pressure for T2DM was 80.00±0.00, while the mean± Std. value diastolic blood pressure for hypertension patients was 86.67±6.07 mmHg, and the mean± Std. value for T2DM and hypertension patients was 86.29±5.47 compared with the mean±Std. value of diastolic pressure of healthy control which was 80.00±0.00. These findings clearly showed that the mean value in the T2DM, hypertension patient groups, and among patients with hypertension was significantly higher than the mean Std. value of healthy control subjects (p=0.000), while the mean Std. value of diastolic blood pressure was

similar in both T2DM and control groups, as summarized in Table 3.

Table 1: Distribution the study groups depending on Gender, Age groups (year), BMI and smoking

			Study groups				Total (n=135)	Sig. Test
			Control (n=35)	Hypertension and T2DM (n=35)	Hypertension (n=30)	T2DM (n=35)		
Gender	Male	No.	20	17	12	14	63	X^2= 2.755 P> 0.05 (NS)
		%	57.1%	48.6%	40.0%	40.0%	46.7%	
	Female	No.	15	18	18	21	72	
		%	42.9%	51.4%	60.0%	60.0%	53.3%	
Age groups (year)	(30-39)	No.	14	7	6	10	37	X^2=5.992 P> 0.05 (NS)
		%	40.0%	20.0%	20.0%	28.6%	27.4%	
	(40-49)	No.	11	10	11	11	43	
		%	31.4%	28.6%	36.7%	31.4%	31.9%	
	(50-≥60)	No.	10	18	13	14	55	
		%	28.6%	51.4%	43.3%	40.0%	40.7%	
BMI	Normal	No.	3	0	2	0	5	MCP<0.01 (HS)
		%	8.6%	0.0%	6.7%	0.0%	3.7%	
	Over weight	No.	32	20	14	25	91	
		%	91.4%	57.1%	46.7%	71.4%	67.4%	
	Obese	No.	0	15	14	10	39	
		%	0.0%	42.9%	46.7%	28.6%	28.9%	
Smoking	Yes	No.	0	9	8	8	25	MCP<0.01 (HS)
		%	0.0%	25.7%	26.7%	22.9%	18.5%	
	NO	No.	35	26	22	27	110	
		%	100.0%	74.3%	73.3%	77.1%	81.5%	

Table 2: Comparison between control and others groups with Systolic blood pressure

Parameter	Study groups	Mean± Std.	F-Test	P-Value
Systolic blood pressure (mmHg)	Control (n=35)	120.00±0.00		
	Hypertension and T2DM (n=35)	156.00±12.41	57.971	P=0.000, P<0.01 (HS)
	Hypertension (n=30)	167.67±8.98	74.203	P=0.000, P<0.01 (HS)
	T2DM (n=35)	121.71±3.82	44.733	P=0.000, P<0.01 (HS)

Table 3: Comparison between control and others groups with diastolic blood pressure

Parameter	Study groups	Mean± Std.	F-Test	P-Value
Diastolic blood pressure (mmHg)	Control (n=35)	80.00±0.00		
	Hypertension and T2DM (n=35)	86.29±5.47	227.765	P=0.000, P<0.01(HS)
	Hypertension (n=30)	86.67±6.07	135.692	P=0.000, P<0.01(HS)
	T2DM (n=35)	80.00±0.00	-	-

The mean±Std. value of BMI for T2DM was 28.39±3.07, while the mean± Std. value of BMI for hypertension patients was 28.99±3.45mmHg, and the mean±Std. value for T2DM and hypertension patients was 29.28±2.50 compared with the mean±Std. value of BMI of healthy control which was 25.11±1.35. The average Std. value in the T2DM group and among hypertensive patients was considerably greater than the mean±Std. The mean±Std. value of healthy control participants was considerably greater than the mean Std. value of healthy control subjects (p=0.002), as was the case in patients with T2DM and hypertension, as indicated in Table 4.

The mean± Std. of uric acid result for control group and hypertension were 3.52±0.73 and 3.59±0.73 mg/dl, respectively. These results indicated that the mean± Std. of uric acid for both control and hypertension patients' groups have a higher significance (P=0.000, P<0.01) and the mean± Std. of uric acid result for both control group and T2DM group were 3.52±0.73 mg/dl, respectively. These results indicated that the mean± Std of uric acid was similar for both these groups, while the mean±Std. of uric acid result for control group and T2DM and hypertension patients' group were 3.52±0.73 and 4.36±1.10 mg/dl. These results indicated that the mean±Std. of uric acid of T2DM and hypertension patients' group was significantly higher than the mean±Std. value of healthy control subjects (P=0.01, P<0.01), as demonstrated in Table 5. This Table also represents the mean± Std. of urea result for control group and hypertension group were 24.29±7.08 and 37.57±13.91 mg/dl. These results indicated that the mean±Std. of urea for hypertension group was significantly different than the mean±Std. value of healthy control subjects (P=0.038, P<0.5) and the mean±Std. of urea result for control group and T2DM group were 24.29±7.08 and 46.46±17.91mg/dl. These results indicated that the mean±Std of urea for T2DM group was significantly higher than the mean±Std. value of healthy control subjects (P=0.000, P<0.01), while the mean±Std. of urea result for control group and T2DM and hypertension group were 24.29±7.08 and 46.71±26.34 mg/dl. These results indicated that the mean±Std. of urea for T2DM and hypertension group was significantly higher than the mean±Std. value of healthy control subjects (P=0.01, P<0.01).

Table 4: Comparison between control and others groups with BMI (Mean± Std. value)

Parameter	Study groups	Mean±Std.	F-Test	P-Value
BMI	Control (n=35)	25.11±1.35		
	Hypertension and T2DM (n=35)	29.28±2.50	11.540	P=0.002 P<0.01 (HS)
	Hypertension (n=30)	28.99±3.45	13.227	P=0.001 P<0.01(HS)
	T2DM (n=35)	28.39±3.07	8.202	P=0.01 P<0.01(HS)

Table 5: Comparison between control and others groups with uric acid and urea (Mean± Std. value)

Parameters	Study groups	Mean± Std.	F-Test	P-Value
Uric acid mg/dl	Control (n=35)	3.52±0.73		
	Hypertension and T2DM (n=35)	4.36±1.10	6.938	P=0.01, P<0.01 (HS)
	Hypertension(n=30)	3.59±0.73	0.103	P=0.000, P<0.01 (HS)
	T2DM(n=35)	3.52±0.73	14.804	P=0.750, P>0.5 (NS)
Urea mg/dl	Control (n=35)	24.29±7.08		
	Hypertension and T2DM (n=35)	46.71±26.34	12.591	P=0.01, P<0.01 (HS)
	Hypertension (n=30)	37.57±13.91	4.508	P=0.038, P<0.5 (S)
	T2DM (n=35)	46.46±17.91	23.092	P=0.000, P<0.01(HS)

Table 6 showed the mean±Std. of V-LDL result for control group was 18.89±5.76 mg/dl and the mean± Std. of V-LDL result for hypertension group, T2DM group and T2DM and hypertension group were 62.67±26.06, 34.75±19.63, and 52.49±34.17 mg/dl, respectively. These results indicated the mean± Std. of V-LDL for three patients' groups was significantly higher than the mean±Std. value of healthy control subjects (P=0.000, P<0.01). This Table represents also the mean±Std of glucose results for control group and T2DM group were 94.03±7.77 and 193.00±92.21 mg/dl. These results indicated that the mean± Std. of glucose for T2DM group was significantly higher than the mean±Std. value of healthy control subjects (P=0.000, P≤0.01) and the mean±Std. of glucose result for control group and T2DM and hypertension group were 94.03±7.77 and 214.26±100.00 mg/dl. These results indicated that the mean± Std. of glucose for T2DM and hypertension group was significantly higher than the mean±Std. value of healthy control subjects (P=0.000, P<0.01), while than the mean±Std. value of glucose for hypertension group was 92.60±7.45 and there was no significance compared to control healthy group (P=0.942, P>0.5).

Table 6: Comparison between control and others groups with V-LDL and glucose (Mean± Std. value)

parameters	Study groups	Mean± Std.	F-Test	P-Value	
VLDL-C mg/dl	Control (n=35)	18.89±5.76			
	Hypertension and T2DM (n=35)	52.49±34.17	17.031	P=0.000	P<0.01 (HS)
	Hypertension (n=30)	62.67±26.06	16.587	P=0.000	P<0.01 (HS)
	T2DM (n=35)	34.75±19.63	28.193	P=0.000	P≤0.01(HS)
Glucose mg/dl	Control (n=35)	94.03±7.77			
	Hypertension and T2DM (n=35)	214.26±100.00	45.819	P=0.000	P<0.01 (HS)
	Hypertension (n=30)	92.60±7.45	0.005	P=0.942	P>0.5 (NS)
	T2DM (n=35)	193.00±92.21	34.628	P=0.000	P≤0.01(HS)

Table 7 showed that among patients who had T2DM 25(30.1%) were normal of the total cholesterol compared with 10 (19.2%) of abnormal total cholesterol, on the contrary, among patients who had hypertension 7 (8.4%) were normal of total cholesterol compared with 23 (44.2%) of the abnormal total cholesterol and among patients with T2DM and hypertension 16 (19.3%) were normal of total cholesterol compared with 19 (36.5%) abnormal total cholesterol, while the healthy control all had normal total cholesterol.

Table 7: Association between study groups and total cholesterols mg/dl

Study groups		Total Cholesterols mg/dl		Total	OR	95% CI
		Normal	Abnormal			
Control® (n=35)	No.	35	0	35	1.000	
	%	42.2%	0.0%	25.9%		
Hypertension and T2DM (n=35)	No.	16	19	35	2.188**	(1.525 -3.139)
	%	19.3%	36.5%	25.9%		
Hypertension (n=30)	No.	7	23	30	4.286**	(2.241 -8.198)
	%	8.4%	44.2%	22.2%		
T2DM (n=35)	No.	25	10	35	1.400**	(1.135-1.726)
	%	30.1%	19.2%	25.9%		
Total (n=135)	No.	83	52	135		
	%	100.0%	100.0%	100.0%		

® = Reference category. **P<0.01 (HS).

Table 8 illustrated that among patients with T2DM 22 (33.8%) were normal of TG value compared with 13 (18.6%) of abnormal TG value. In contrast, among patients who had hypertension 4 (6.2%) were normal of TG value compared to 26 (37.1%) of the abnormal TG value and among patients with T2DM and hypertension 9 (13.8%) were normal of TG value compared with 26 (37.1%) abnormal TG value, while the healthy control 30 (46.2%) had normal TG value and 5 (7.1%) had the abnormal TG value

Table 8: Association between Study groups and Triglycerides (TG) mg/dl

Study groups		Triglycerides mg/dl		Total	OR	95% CI
		Normal	Abnormal			
Control® (n=35)	No.	30	5	35	1.000	
	%	46.2%	7.1%	25.9%		
Hypertension and T2DM (n=35)	No.	9	26	35	3.333**	(1.868-5.948)
	%	13.8%	37.1%	25.9%		
Hypertension (n=30)	No.	4	26	30	6.429**	(2.556-16.168)
	%	6.2%	37.1%	22.2%		
T2DM (n=35)	No.	22	13	35	1.364*	(1.022-1.814)
	%	33.8%	18.6%	25.9%		
Total (n=135)	No.	65	70	135		
	%	100.0%	100.0%	100.0%		

® = Reference category. **$P<0.01$ (HS), (S), and *$P<0.05$ (S).

The findings of this study revealed that females are more likely than males to have Type 2 diabetes mellitus (T2DM) (40 percent). This study agreed with a recent study that indicated females had a little greater prevalence rate of the condition than males [11], and is inconsistent with the other studies where was more prevalent in males [12]. In this investigation, there was no statistically significant association between hypertension and gender, which was verified by a previous study [13].

The majority of people with T2DM are in the age range of (≥50-60) years old, according to the study. This research's findings were consistent with those of a previous study [14], which revealed that diabetes prevalence was highest in the age range of 61-65 years old, with 65 percent, followed by the age group of 51-55 years old, with 30.4 percent [14]. The majority of hypertension patients were in the age range of (50-≥60) years old, according to the study. The findings of this research matched those of a previous study [15], which revealed that the prevalence of hypertension rose with age [15]. Because of the combined consequences of growing insulin resistance and reduced pancreatic islet function with age, older persons are at a higher risk of developing type 2 diabetes. Insulin resistance with age appears to be linked mostly to obesity, sarcopenia, and physical inactivity [16]. The blood pressure rises with age mostly because to structural changes in the arteries, particularly big artery stiffness. Increased cardiovascular risk is linked to the increasing blood pressure [17].

According to research literatures and other studies, people who are obese or overweight have a higher chance of developing hypertension than those with a normal Weight [18]. In addition, the risk of cardiovascular problems and other illnesses is increased when diabetes, hypertension, and obesity or overweight are present [19]. According to our statistics, diabetes duration and hypertension are related. The severity of macro- and micro-vascular problems, which both have a role in the emergence of kidney and/or arterial hypertension, is strongly correlated with the diabetes length.

In this investigation, there was a significant difference in smoking prevalence between the study groups of patients and healthy controls. In fact, smokers are 30–40 percent more likely than nonsmokers to acquire type 2 diabetes. Furthermore, smokers with diabetes are more

likely than nonsmokers to have difficulty with insulin administration and disease management [20]. The average SBP and DBP values in all patient groups were substantially higher than the average SBP and DBP values in the healthy control patients (p=0.000). This finding strongly suggests that hypertension and T2DM may have a reciprocal connection in which they evoke each other. Pre-diabetes is prevalent in non-diabetic hypertensive individuals, which is consistent with the earlier research [21].

Our study represents that the mean±Std. of uric acid have a higher significance for both hypertension group and hypertension and T2DM group than the mean±Std. value of uric acid for the healthy control subjects (P<0.01). These findings backed with the previous research that indicated hyperuricemia is linked to classic cardiometabolic risk factors such glucose intolerance, dyslipidemia, central obesity, and abnormal blood pressure [22]. In this investigation, the mean standard deviation of uric acid for the T2DM group was not significant, contradicting a previous study [23] that indicated the prevalence of hyperuricemia among type 2 diabetes patients [23]. The results of this study showed that the mean standard deviation of urea for T2DM patients was significantly higher than the mean standard deviation of healthy control subjects (P<0.01). This finding was supported by a previous study [24] which found that urea was significantly higher in T2DM patients' group [24]. In this study, the mean value of urea for hypertensive patients and hypertensive diabetic patients indicated that it was significant when compared with healthy controls; this elevation may be related to the decrease in GFR as a result of hypertension's influence on renal function (decrease in renal blood flow as a sequence of increasing renal vascular resistance). The reduced renal blood flow causes a drop in GFR, which causes a decrease in distal tubular flow rate, which causes an increase in urea reabsorption and reduced secretion, which may be the cause of high serum urea concentration [25].

This study represents that the mean±Std. of glucose for T2DM group was significantly higher than the mean± Std. value of healthy control category (P=0.000). This finding was supported by a previous study [26] that found that the mean fasting glucose level of type II diabetic patients was significantly higher (p=0.001) than that of non-diabetic subjects [26]. The mean of glucose for the hypertension group was not significantly different from the control healthy group (P=0.942), which is consistent with [27] that found no statistically significant correlation between systolic blood pressure and fasting plasma glucose, but significant correlation between fasting plasma glucose and diastolic blood pressure [27]. Higher fasting blood glucose, on the other hand, is an independent risk factor for hypertension. More research is needed to see if treating increased blood glucose can prevent the hypertension development [28].

This study also represents that there was higher percentage of abnormal total cholesterol in hypertension group (44.2%), while also there was higher percentage of abnormal TG was in hypertensive T2DM patients' groups (37.1%) and this results in agreement with [29] that found serum levels of total cholesterol, triglyceride, and LDL-C in hypertensive subject were significantly (p<0.001) higher levels in hypertensive patients [29].

These findings suggest that patients in this group have hyperlipidemia, which is a risk factor for cardiovascular disease. In addition to hyperglycemia, an increase in the incidence of cardiovascular disease (CVD) among patients with T2DM has led to a greater recognition of hypertension and hyperlipidemia as important targets of therapy [30]. Clinical studies in T2DM patients have revealed that lowering cholesterol and maintaining tight blood pressure management lowers the risk of significant cardiovascular events [31, 32].

Conclusion

T2DM and hypertension occur in females more than males. The patients with T2DM, hypertension, and hypertension with T2DM patients were at aging. The overweight patients were in T2DM group and the majority of obese patients were in hypertension group. Smokers

are more likely to have a high blood pressure. Uric acid, urea, and glucose in hypertension and T2DM group were higher compared with other study groups, while V-LDL in hypertension group was higher compared with the other study groups, abnormal total cholesterol was in hypertension group compared with other study groups. There was higher percentage of abnormal TG was in hypertensive group and hypertensive diabetic type 2 patients' group.

Recommendations

From the pharmacologic therapeutic viewpoint, Beta-blockers and calcium channel blockers also have beneficial effects in managing hypertension in patients with diabetes. Many patients with diabetes require combination therapy with multiple antihypertensive agents. As far as diet and other cautions are concerned, patients are suggested to keep their body weight according to their BMI strictly and have their tests regularly to keep check of cholesterol and insulin, which are the major factors leading to the relationship between type 1 diabetes and hypertension. Various meditation, exercises, and regular walks are also suggested to maintain balance, and these factors are crucial for both diseases.

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Authors' contributions

All authors contributed to data analysis, drafting, and revising of the paper and agreed to be responsible for all the aspects of this work.

Conflict of Interest

The author declared that they have no conflict of interest.

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