Hypertension and Blood Pressure Pattern Among Type 2 Diabetic Patients

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ABSTRACT

Background: Hypertension was reported to be approximately twice as common in persons with diabetes as in those without diabetes.

Objectives: To estimate the prevalence of hypertension and pattern of blood pressure among patients with type 2 diabetic patients in Basrah.

Methods: This cross-sectional study was conducted on a convenience sample of 185 type 2 diabetic patients attending the Diabetic Center in Al-Fahyaa General Hospital and Al-Sadr Teaching Hospital during the period from January to March 2015. Data were collected through an interview questionnaire and laboratory investigations.

Results: The prevalence of hypertension (BP ≥140/90 mmHg or on medication for high blood pressure) was 73% (50.8% old hypertensives and 22.2% newly diagnosed). Only 20.2% of the old hypertensive patients were with controlled blood pressure. Age, body mass index, and poor glycemic control were found to be significantly associated with hypertension.

Conclusion: Hypertension is a common co-morbid disease among diabetic patients in Basrah, and a large proportion of those with hypertension had uncontrolled blood pressure.

Keywords: Blood pressure, Basrah, Diabetes mellitus**,** Hypertension

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INTODUCTION

Hypertension and diabetes mellitus are main preventable risk factors for cardiovascular disease which is a leading cause of human morbidity and premature death in both developed and developing countries. [1,2] Hypertension is a common comorbid condition in type 2 diabetic patients. Many studies showed that the prevalence of hypertension among type 2 diabetic patients is more frequent than non diabetic with a rate of 29-89.6%. [3-5] The coexistence of hypertension with diabetes does not only increase the risk of cardiovascular disease, but also magnify the target organ damages such as cardiomyopathy, silent cerebral infarct, neuropathy, retinopathy and nephropathy. [6-8] Hyperglycemia and Insulin resistance combine to make hypertension more prevalent in the type 2 diabetic patient. [9]Data from death certificates showed that hypertension had been involved in 4.4% of deaths related to diabetes mellitus, while diabetes mellitus was involved in 10% of deaths related to hypertension. [10] Diabetes mellitus is a worldwide problem since it is still on the rise and the worldwide estimated prevalence of 285 million people (6.4%) in 2010 is expected to reach 438 million (7.4%) by 2030. [11] Uncontrolled hypertension in patients with type 2 DM is a major contributor to complications and thus increasing mortality, therefore, individual controlling of blood pressure is becoming more important. [12] Previous guidelines recommended the treatment goal of hypertension in diabetic patient of <130/80 mmHg. However, there is a lack of evidence to support the clinical benefit of this low value, so the goal of <140/90 mmHg was proposed. [13,14] Different studies [15,16] showed a great variation in prevalence of hypertension and pattern of blood pressure among diabetic patients from different populations. Therefore, this study was conducted with the aim of determining the prevalence of hypertension and pattern of blood pressure among type 2 diabetic patients in Basrah.

SUBJECTS & METHODS

This cross-sectional study was done during the period from January to March 2015. A convenience sample of one hundred eighty five (185) consecutive adult (aged > 18 years) type 2 diabetic patients attending the Diabetic Center in Al-Fayhaa General Hospital and Al-Sadr Teaching Hospital were included in the study. A questionnaire was used to collect data on socio-demographic characteristics including; age, sex, marital status, education, smoking, per capita monthly income, family history of hypertension. In addition, information regarding past and current medical history were obtained. Biochemical

investigations were done including; fasting plasma glucose, serum triglycerides, and glycosylated haemoglobin (HbA1c) in the laboratory of the same hospital. Height and weight were measured using a weight instrument with a height scale. Body mass index (BMI) was calculated by dividing the weight in kilograms by the height in square meters. BMI was categorized as normal if <25 kg/m^2, overweight if 25-29.9 kg/m^2 and obese if ≥30 kg/m^2. Blood pressure was measured on the right arm while the patient is in a sitting position after 5 minutes rest using a standardized mercury sphygmomanometer with a suitable cuff size. Two measurements 3-5 minutes apart were done and the average was considered as the final blood pressure. The patient was considered as hypertensive if the systolic blood pressure was ≥ 140 mmHg and/or diastolic blood pressure of ≥ 90 mmHg, [14] or if he/she was a known hypertensive patient on treatment. Controlled blood pressure was defined as <140/90 mmHg. [14] Unrecognized hypertensive patient was defined as someone who had systolic BP of ≥140 mmHg and/or diastolic BP of ≥ 90 mmHg on two occasions 1-2 weeks apart but he/she was unaware of having hypertension.An informed consent was obtained from all participants before enrollment in the study. The study was approved by the Research and Ethics Committee of College of Medicine, Basrah University.

STATISTICAL ANALYSIS

Statistical analysis was done using Social Package for the Social Sciences (SPSS) program Version 19. The Chi-square test was used to show the differences between categorical groups while t-test was used to show the differences between continuous groups. P- value < 0.05 was considered to be statistically significant.

RESULTS

Table 1 shows the socio-demographic and clinical characteristics of the study population. The mean age was 51.8 ± 11.6 years. Females constituted more than half of the studied subjects (56.2%). Most of the patients (66.5%) were with low educational level (≤ 6 years) and about one half of them had positive family history of hypertension.

Table 1 Socio-demographic and clinical characteristics of the study population (n=185)

Character	
Age (years), Mean ± SD	51.8 ± 11.6
Sex, Female, No. (%)	104 (56.2)
Marital status, Married, No. (%)	172 (93.0)
Education, ≤ 6 years, No. (%)	123 (66.5)
Current smokers, No. (%)	21 (11.4)
Positive family history of hypertension, No. (%)	91 (49.2)
BMI (Kg/m^2), Mean ± SD	28.8± 4.9
Duration of DM (years), Mean ± SD	7.9 ± 6.6
HbA1c < 7%, No. (%)	20 (10.8)

SD= Standard deviation, BMI= Body mass index, DM=Diabetes mellitus

HbA1c= Glycosylated haemoglobin

Table 2 presents the pattern of blood pressure among the studied diabetic patients. Of the studied subjects, 73% were found to be hypertensives (50.8% were known hypertensives, and 22.2% were newly recognized hypertensives). Only one fifth (20.2%) of the old hypertensive patients were with controlled blood pressure. Isolated systolic hypertension was the most common subtype of hypertension among patients with uncontrolled hypertension and the newly diagnosed patients.

Table 2: Pattern of blood pressure among the study population

Bp pattern	No. (%)
Normal blood pressure	50/185 (27)
Old hypertension	94/185 (50.8)
Newly recognized hypertension	41/185 (22.2)
Controlled hypertension [a]	19/94 (20.2)
Uncontrolled hypertension [a]	75/94 (79.8)
ISH [b]	43/116 (37.1)
IDH [b]	33/116 (28.4)
Both systolic & diastolic hypertension [b]	40/116 (34.5)

[a] Out of only old hypertensive patients

[b] Out of only uncontrolled and newly recognized hypertension

ISH= Isolated systolic hypertension, IDH= Isolated diastolic hypertension

As shown in Table 3, the mean age of the hypertensive patients was significantly higher than normotensive patients. The mean of glycosylated haemoglobin (HbA1c) was significantly higher among hypertensive patients compared with those who were normotensives. The mean of fasting plasma glucose and body mass index were significantly higher among hypertensive than non-hypertensive diabetic patients.

Although the proportions of other variables including low educational level, low income, smoking, and family history of hypertension were higher among hypertensive patients, they were not significantly associated with hypertension. No significant association was found between hypertension and level of serum triglycerides and duration of diabetes.

Table 3 Association of certain socio-demographic and clinical characteristics with hypertension

Characteristics	Hypertensive	Normotensive	p-value
Age (years), Mean ± SD	53.0 ± 11.2	48.4 ± 12.2	0.016
Male/Female ratio	0.85:1	0.61:1	0.335
BMI (Kg/m2), Mean ± SD	29.3 ± 5.2	27.4± 3.5	0.018
Duration of DM (years), Mean ± SD	8.3 ± 7.0	7.2 ± 5.4	0.317
HbA1c (%), Mean ± SD	10.4 ± 2.5	9.4 ± 2.2	0.011
Serum Triglycerides (mg/100ml), Mean ± SD	203.5 ± 75.3	172.9 ± 120.1	0.104
Fasting plasma glucose (mg/100ml),Mean ± SD	263.4±95.7	233.4±87.8	0.048
≤ 6 years level of education, No. (%)	91/135 (67.4)	32/50 (64.0)	0.720
Per capita monthly income (<250,000 ID), No. (%)	59/135 (43.7)	20/50 (40.0)	0.604
Current smokers, No. (%)	16/135 (11.9)	5/50 (10.0)	0.626
Family history of hypertension, No. (%)	68/135 (50.4)	23/50 (46.0)	0.597

BMI= Body mass index, HbA1c= Glycosylated haemoglobin, SD= Standard deviation, ID= Iraqi Dinar

The logistic regression analysis (Table 4) showed that the independent predictors of hypertension were age, body mass index and glycosylated haemoglobin (Hb A1c).

Table 4: Logistic regression analysis

Variable	B-Coefficient	P- value	OR	95% CI	
				Lower	Upper
Age	0.131	0.040	1.25	1.18	1.65
Body mass index	0.096	0.017	1.45	1.30	2.25
HbA1c	0.162	0.036	1.36	1.25	2.12

DISCUSSION

Hypertension is a common finding in patients with type 2 diabetes mellitus, when present is a warning sign to double the potential risk of future cardiovascular events. [17] The mean age of the participants was 51.8 ± 11.6 years. It was significantly higher among hypertensive patients compared with non-hypertensives, a result which is in agreement with what was reported in Yemen. [18] The prevalence of hypertension among diabetic patients is age related, this represents the effect of increased arterial resistance due to thickening of arteries that comes with age or due to aggregation of other risk factors which tend to increase with age advancement. In the current study, 135 out of 185 patients (73%) were found to be hypertensive, using the definition of systolic blood pressure of 140 mmHg or above and or diastolic blood pressure of 90 mmHg or above.

Worldwide, the prevalence of hypertension among diabetic patients is variable. A review study showed that hypertension rates typically were high in all regions of the world; most studies presented rates above 50%, and many presented rates above 75%. [19] The prevalence of hypertension in this study is higher than that found in a study in Babil Governorate (Iraq) 54%, [20] also it is higher than what was reported in some Arab, neighboring, and other countries e.g. in Libya (33.4%) [21], United Arab Emirates (35%) [22], India (42.7%) [23], Iran (67%) [24] but it is comparable to that reported in some countries; Jordan (72.4%) [25], Morocco (70.4%) [26], and Saudi Arabia (78.1%). [27] However, it is lower than that reported in Basrah (89.6%.) [28] This variation may be due to socio-cultural factors, ethnic variation, differences in prevalence of hypertension determinants, or definition of

hypertension among diabetic patients using different cutoff points (≥140/90, 130/85, or 130/80 mmHg). [19, 29] In the current study, the prevalence of hypertension was slightly more among males than females, a finding which is similar to what was reported in Saudi Arabia. [27] Such sex difference may suggest estrogen protection among women but such difference attenuates with age. [30] The majority of patients with previously diagnosed hypertension in this study were still had uncontrolled hypertension. Only 20.2% of the previously detected hypertensive patients were with controlled blood pressure. This is nearly similar to what was reported in United States where less than one-third of the studied diabetic patients had controlled blood pressure. [31] In Spain only 6.3% is the rate of controlled hypertensive patients. [32] It is also in agreement with the results of other studies [33,34]. This may be due to the patient's poor awareness of the potential complications of hypertension, noncompliance, absence of effective health education programs, low educational and socioeconomic levels. [26] This study showed that the prevalence of isolated systolic hypertension was more than isolated diastolic hypertension (37.1% and 28.4% respectively). Age related arterial stiffness among diabetics may explain the prevalence of isolated systolic hypertension being approximately twice that in the people without diabetes. [35] In the current study, only 10.8% achieved target HbA1c less than 7%, a proportion which is much lower than that reported in Spain (25.6%). [32] Such difference probably due to socio-cultural differences where most of the patients in this study were with low educational level and may be unaware about the control of diabetes and underestimate the risk of uncontrolled diabetes mellitus or they were with low compliance to treatment. Poor glycemic control reflected by higher level of fasting plasma glucose and HbA1c was found to be significantly associated with hypertension (OR, 1.36; 95% CI, 1.25-2.12; P=0.036). Poor diabetes control was reported to be a risk factor for abnormal blood pressure. [36] Body was index was also fund to be significantly associated with hypertension (OR,1.45; 95% CI, 1.30-2.25, P=0.017), a result which is consistent with that of others. [26,28],

CONCLUSIONS

1. The prevalence of hypertension among diabetic patients was high but it did not differ greatly from that reported in literature.

2. A substantial number of diabetic patients with hypertension were unrecognized.

3. A high proportion of patients with recognized hypertension were uncontrolled.

4. Certain risk factors were found to be associated with hypertension in diabetic patients such as age, body mass index, and poor glycemic control.

RECOMMENDATIONS

Health education of diabetic patients about early detection and treatment of hypertension as well as adopting healthy lifestyle are recommended.

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ارتفاع ونمط ضغط الدم عند مرضى السكري نوع 2

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المقدمة: تشير كثير من البحوث الى أن ارتفاع ضغط الدم عند مرضى السكري نوع 2 يعادل الضعف تقريبا عما هو في الاشخاص الذين لا يعانون من داء السكري.

الاهداف: لتقييم مدى انتشار ارتفاع وبيان نمط ضغط الدم عند مرضى السكري نوع 2 في البصرة.

طرق البحث: اجريت هذه الدراسة المقطعية - العرضية على عينة ملائمة شملت 185 مريضا بداء السكري نوع 2 من المراجعين لمركز داء السكري في مستشفى الفيحاء العام ومستشفى الصدر التعليمي للفترة من كانون الثاني الى أذار 2015. تم جمع البيانات من خلال استبيان المقابلة والفحوص المختبرية.

النتائج: أظهرت النتائج أن مدى انتشار ارتفاع ضغط الدم عند العينة المدروسة كان 73٪ (ارتفاع ضغط الدم المشخص سابقا 50.8٪ و 22.2٪ غير مشخص سابقا), كما أن نسبة السيطرة على ضغد الدم (≥90 / 140 ملم زئبق) بلغت 20.2٪ فقط من المرضى المشخصين سابقا. وجدت علاقة معتدة احصائيا بين العمر, معدل كتلة الجسم, ضعف السيطرة على سكر الدم وارتفاع ضغط الدم.

الاستنتاجات: ان ارتفاع ضغط الدم مرض مصاحب شائع لمرض السكري وأن نسبة كبيرة من المرضى المصابين بارتفاع ضغط الدم يعانون من ضعف السيطرة على ارتفاع ضغط الدم.

كلمات المفتاح: ضغط الدم, البصرة, داء السكري, ارتفاع ضغط الدم