

Blood pressure control among type 2 diabetics

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ABSTRACT

الأهداف: تقييم السيطرة على ضغط الدم لدى مرضى السكر النوع الثاني وتحديد المضاعفات التي يواجهها مرضى السكر الذين يعانون من فرط إرتفاع ضغط الدم.

الطريقة: أجريت الدراسة على عينة عرضية في الرعاية الصحية الأولية بمستشفى مجمع الملك فهد العسكري بالظهران، وذلك خلال الفترة من أغسطس 2003م وحتى فبراير 2004م، تم مراجعة 403 ملف طبي للنوع الثاني من مرضى السكر وذلك باستخدام نظام الانتقاء العشوائي. تم جمع البيانات والمعلومات من خلال قائمة استبيان تمت صياغتها وفقاً لإرشادات وتوجيهات التقرير السابع للجنة الوطنية الأمريكية لارتفاع ضغط الدم (JNC7).

النتائج: تبين أن 57.8% من مرضى السكر يعانون من فرط ارتفاع ضغط الدم بدون وجود تباين واضح بين الذكور والإناث. متوسط العمر لمرضى السكر كان أعلى بنسبة واضحة عند الأفراد الذين يعانون من فرط ارتفاع ضغط الدم عنه في الأصحاء ($p=0.001$). نسبة 14.2% فقط من مرضى السكر والذين يعانون من فرط ارتفاع ضغط الدم هم الذين تمت السيطرة على ضغط الدم لديهم، أما السيطرة الضعيفة فكانت مصاحبة ومرتبطة وبشكل واضح بالسمنة والمعدل المرتفع للمضاعفات. السيطرة على ضغط الدم كانت مرتبطة إيجابياً وبوضوح مع عمر المرضى وسلبياً مع مدة الإصابة بالسكري وفرط ارتفاع ضغط الدم. وقد كانت المضادات لفرط ارتفاع ضغط الدم الأكثر استخداماً هي مثبطات الـ ACE بنسبة 29.3%، تلاها الـ ARBS بنسبة 24.1% والعقار الأقل وصفاً كان الثيازيد المدر للبول.

خاتمة: يحتاج ضغط الدم لدى مرضى السكري إلى عناية دقيقة من كل أخصائيي الرعاية الصحية، خاصة أطباء الأسرة. كما يجب على أطباء الأسرة أن يسيروا على التعليمات والإرشادات الجديدة من أجل سيطرة أفضل على ضغط الدم وتقليل المضاعفات، إضافة إلى زيادة الوعي لدى المرضى وذلك من خلال التثقيف الصحي المستمر وبأساليب متطورة ومختلفة.

Objective: To assess blood pressure (BP) control in patients with diabetes mellitus type 2 (DM type 2) treated in primary health care.

Methods: A cross-sectional study was conducted in primary health care at King Fahad Military Complex Hospital in Dhahran, Kingdom of Saudi Arabia, between August 2003 and February 2004, to assess blood pressure control in type 2 diabetics. A sample of 403 medical records of type 2 diabetic patients was selected using systematic random sampling after ordering the medical record numbers. The data were collected through a pre-coded checklist.

Results: Hypertension was found in 57.8% of diabetic patients with no statistically significant difference between males and females. The mean age of diabetic patients was significantly higher in hypertensives than non-hypertensives ($p=0.001$). The mean duration of hypertension was significantly higher in females ($p=0.02$). There were only 14.2% of hypertensive diabetic patients in whom blood pressure was controlled. Poor control was significantly associated with obesity, and a higher rate of complications. Blood pressure control correlated positively and significantly with the age of patients, and negatively with duration of diabetes and hypertension. The most commonly prescribed antihypertensive were angiotensin converting enzyme inhibitors in 29.3%, followed by angiotensin receptors blockers in 24.1%, and the least prescribed drug was thiazide diuretic.

Conclusion: Blood pressure in diabetic patients needs to be given particular attention from all health care professionals, especially primary care family physicians, who should follow the new guidelines for better control of blood pressure, and fewer complications. Patient's awareness should be increased, through continuous health education with different modalities.

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Hypertension is a major public health problem worldwide, it is the most important risk factor for stroke, and one of the major risk factor for coronary heart disease.¹ It is also a contributory factor in over 90% of patients who develop heart failure.² It is a common problem in the Kingdom of Saudi Arabia (KSA). The prevalence among the adult population, using a cut off blood pressure (BP) measurement of 140/90 mm Hg was estimated as 20.4% systolic and 25.9% diastolic. If 160/95 cut off measurement is used, it will be 5.3% systolic and 7.3% diastolic hypertension.^{3,4} If hypertension is associated with other major risk factors such as diabetes mellitus (DM) type 2, these will lead to an increase of both micro-vascular and macro-vascular complications.⁵ Hypertension occurs in as many as two-thirds of DM type 2, and part of insulin resistance syndrome.⁶ The prevalence of DM type 2 in KSA is 26.2% in males, and 21.5% in females.⁷ The prevalence of hypertension in diabetics in KSA is ranging from 22.2-54.9%.^{8,9} Several large, long term clinical trials have examined the effect of blood pressure control in preventing micro-vascular and macro-vascular complications in diabetic patients, such as the United Kingdom Prospective Diabetes Study (UKPDS).⁵ Recently the 7th Report of the Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure (JNC-7),¹ concluded that BP measurement in diabetic patients should be 130/80 mm Hg or less. Primary health care physicians play a very important role in treating hypertensive patients, as most of them are being followed up at primary health care clinics.¹⁰ However, despite advanced improvement in treatment, the control of BP is still sub-optimal. For this reason, this study was conducted to assess the control of BP in diabetic patients at primary health care setting according to the new guidelines (JNC7 report).

Methods. This study was conducted at the Primary Health Care Clinics of King Fahad Military Complex Hospital (KFMC), Dhahran, Kingdom of Saudi Arabia, following approval of the Hospital Ethics Committee with no patients consent. The diabetic clinic is specialized in the management and follow up of diabetic patients. An audit study of medical records of type 2 diabetic patients seen in the clinic during the period from August 2003 to February 2004 was carried out. There were 900 medical records for both males and females. A systematic random sample was selected from the medical records of DM type 2, where every second file was chosen after ordering according to the date of the visit, with exclusion of type 1 diabetics or non-diabetics' files. The data were collected through a checklist formulated according to the JNC7 Guidelines for the Management of Hypertension.¹ Medical records

were reviewed for demographic data (age, gender, marital status, nationality, occupation, and education). Relevant history such as duration of DM type 2, presence of hypertension, duration of hypertension, stage of hypertension, and smoking were recorded. It also included a number of follow up visits in the last year from the last visit, types of antihypertensive drugs, treatment appropriateness, presence of other diseases, and total medications. Data also included complications such as nephropathy, ischemic heart diseases (IHD) (angina and myocardial infarction [MI]), heart failure, left ventricular hypertrophy (LVH), retinopathy, and stroke. Data also included the last 3 readings of BP (current, before 3 months and before 6 months) and blood pressure was considered to be controlled if the current reading is less than 130/80 mm Hg. Body mass index, cholesterol (low-density lipoprotein [LDL], high-density lipoprotein [HDL], triglycerides), and glycosylated hemoglobin (HBA1C) was also included.

All the data were checked during the study for accuracy, completion, and was coded. Data were entered into a personal computer, and the Statistical Package for Social Sciences (SPSS version 10) was used for appropriate statistical analysis. Chi-square test, and

Table 1 - Comparison between hypertensive and non-hypertensive diabetic patients according to socio-demographic characteristics (N=403).

Sociodemographic variables	Hypertensive		Non-hypertensive		p-value
	n (%)				
Gender					
Male	124	(53.2)	101	(59.4)	0.216
Female	109	(46.8)	69	(40.6)	
Age					
29-44years	24	(33.3)	48	(66.7)	0.001
45-60 years	91	(51.7)	85	(48.3)	
>60 years	118	(76.1)	37	(23.9)	
Nationality					
Saudi	230	(98.7)	168	(98.8)	0.921
Non Saudi	3	(1.3)	2	(1.2)	
Marital status					
Single	-	-	4	(2.4)	0.004
Married	189	(81.1)	151	(88.8)	
Divorce	1	(0.4)	-	-	
Widow	43	(18.5)	15	(8.8)	
Occupation					
Soldier	41	(17.6)	54	(31.8)	0.001
Officer	1	(0.4)	2	(1.2)	
Civilian	6	(2.6)	8	(4.7)	
Housewife	76	(32.6)	61	(35.9)	
Retired	76	(32.6)	37	(21.8)	
Not working	33	(14.2)	8	(4.7)	
Smoking (males)					
Smoker	47	(37.9)	44	(43.6)	0.551
Ex-smoker	10	(8.1)	5	(5.0)	
Non smoker	67	(54.0)	52	(51.5)	

t-test was used in assessing the association between variables. Logistic regression was used in assessing the correlations between variables. A *p*-value of 0.05 or less was considered as indication of statistical significance.

Results. In this study, 57.8% of diabetic patients were hypertensive with 53.2% males, and 46.8% females. The mean duration of hypertension was 10.07±7 years for males, and 11.79±7.12 years for females, and the difference was statistically significant (*p*=0.02). The mean age of hypertensive patients were 59.65±12.14 years compared to 51.46±11.74 years in non-hypertensive (*p*=0.001). Table 1 shows

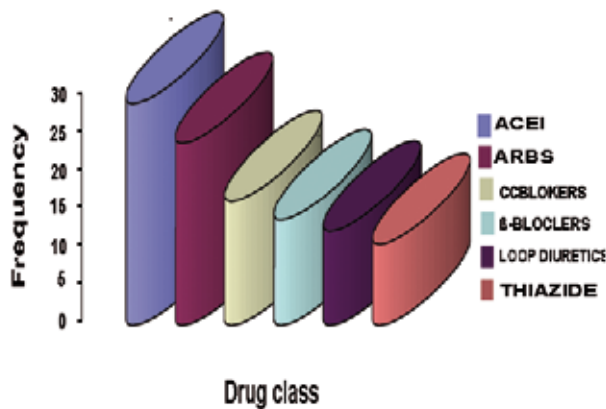


Figure 1 - Antihypertensive prescribed for diabetic hypertensive patients.

Table 2 - Mean systolic and diastolic blood pressure in relation to gender, presence of hypertension, treatment appropriateness, and BMI among diabetic patients. (N=403).

Variable	Systolic blood pressure Mean±SD	<i>p</i> -value	Diastolic blood pressure Mean±SD	<i>p</i> -value
Gender				
Male	135.09	19.27	78.63	10.48
Female	143.7	21.9	75.91	12.16
Hypertension				
Yes	147.9	20.27	80.74	11.66
No	126.54	14.44	72.89	9.06
Treatment				
Appropriate	133.31	20.31	75.79	11.88
Non appropriate	146.17	19.4	79.57	10.18
BMI				
Normal	132.91	21.15	75.22	11.08
Overweight	132.02	20.82	76.74	10.52
Obese	140.19	19.95	78.11	11.55

BMI - body mass index

sociodemographic characteristics of hypertensive and non-hypertensive diabetic patients. The most commonly prescribed antihypertensive were angiotensin converting enzyme (ACE) inhibitors as shown in Figure 1. Blood pressure was found to be controlled in 33 subjects (14.2%) only, of them 20 (60.6%) were males, and 13 (39.4%) were females. Table 2 shows the comparison between controlled and uncontrolled BP in presence or absence of different variables. Blood pressure control was affected by the presence or absence of complications. It was controlled in 19.7% in the presence of retinopathy (*p*=0.03), 18.3% nephropathy (*p*=0.001), 16.8% IHD (*p*=0.001), and 11.7% LVH (*p*=0.001). Blood pressure control was found not to be affected by the presence of heart failure (*p*=0.28), or by stroke (*p*=0.28).

Discussion. Diabetes mellitus and hypertension are both multifactorial disorders, which occur at a high prevalence in the older age group, and result from both genetic and environmental factors.^{11,12} Hypertension is twice as common in persons with diabetes as it is in others.¹³ Hypertension is known to contribute to diabetic micro- and macro-vascular complications.¹⁴⁻¹⁶ To reduce the risk, hypertension must be diagnosed accurately and promptly, and the patient must receive adequate treatment. However, new guidelines are published to stress on the importance of aggressive blood pressure control in diabetes.¹ Therefore, study of BP control in KSA will help to identify how far we are in our practice from these new guidelines. This study tried to assess the blood pressure control in diabetic patients at primary health care, and to determine the complications of both diabetes and hypertension.

In this study, the prevalence of hypertension in diabetic patients was found to be high (57.8%) with no statistically significant difference between males and females, this prevalence was near to that reported in Makkah City (54.8%),⁸ and another reported higher result,¹⁷ however, it was higher than found in the Qatif region (22.2%),⁷ and Spain (22.1%).¹⁸ This difference was due to different methods, different populations, and increasing prevalence of hypertension. The prevalence of hypertension was found to be higher in the over 60 years age group, and a similar result was cited in other different studies.¹⁹⁻²⁴ The majority of hypertensive patients were retired males and housewives.

A review of 1137 hypertensive diabetics showed that only 21% of them met the currently recommended BP for diabetics <130/80 mm Hg.²⁵ A lower frequency was noticed in this study, where only 14.2% had BP <130/80 mm Hg, which was also lower than that found in France (23%)²⁶ and Spain (25.7%),²⁷ and higher than that found in Jeddah (12%),²⁸ and in Japan (11.4%).²⁹

In this study, the difference between controlled and

uncontrolled BP was noticed to be statistically significant in the older age group. Treatment inappropriateness, presence of nephropathy, IHD, LVH, and retinopathy were all associated with poorly controlled BP. Different studies reported similar results, except treatment inappropriateness was not found to be reported in other studies,^{24,29,30} this study supported the importance of appropriateness of treatment, and following the new guidelines of hypertension. Blood pressure control was positively correlated with the age of hypertensive diabetic patients, and this significant correlation was cited in the literature, however, for diastolic BP only, which was noticed to be decreased with increasing age.³¹ This difference was caused by our patients being diabetics, and the study involved different age groups. In addition to that, we used both systolic and diastolic BP (<130/80 mm Hg) as an indicator of optimal control. In this study, BP control was negatively correlated with duration of diabetes and duration of hypertension, a similar result was reported in the literature,^{5,30} and this correlation signifies the importance of preventive measures and early detection, and treatment of both diabetes and hypertension. In this study, the most commonly prescribed antihypertensive was ACE inhibitor (29.3%), followed by angiotensin receptors blockers (ARBs) (24.1%), and the least prescribed antihypertensive was thiazide diuretics (10.7%). Recently in the Antihypertensive and Lipid Lowering Treatment to prevent Heart Attack Trial (ALLHAT),⁶ that compared traditional medicines with newer types of antihypertensive drugs, the results show that the diuretic chlorthalidone was better in preventing cardiovascular events compared to each of the other drugs studied. Due to their superiority in preventing one or more major forms of cardiovascular complications, together with its lower cost, the thiazide diuretics should be the drugs of choice for initial treatment of hypertension in most patients requiring drug therapy, even in diabetic patients the incidence of hyperglycemia will be minimal at a low dose. A similar result, cited in the literature, showed the predomination of the ACE inhibitors in the treatment of hypertension in diabetes,²⁷⁻²⁹ however, the rate of prescribing was higher than found in this study.

In conclusion, hypertension in diabetic patients seems to have been increasing in the Saudi society, where more than half of diabetic patients in this study were hypertensive. Both hypertension and diabetes significantly increased with increasing age, and this will increase morbidity and mortality in this age group. In spite of adequate facilities in primary health care clinics at the KFMCH, BP control among diabetic patients was sub optimal. Blood pressure control was inversely correlated with duration of hypertension and duration of diabetes, which signifies the importance of screening and

preventive measures for both diabetes and hypertension. In spite of cost effectiveness, availability, and tolerability of thiazide diuretics it still under-prescribed by family physicians in primary health care at KFMCH. However, clinical trials showed the significant renoprotective effect of both ACE inhibitors and ARBs. They remain under prescribed in this study, where less than one third was on ACE inhibitors. Primary care physicians should follow the new guidelines for better control of blood pressure and fewer complications. Patient's awareness should be increased through continuous health education with different modalities.

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