

# Is hypertension common in hospitalized type 2 diabetic patients?

Daad H. Akbar, FRCP (UK), Arab Board.

---

## ABSTRACT

**Objective:** To report on the prevalence and implications of hypertension in hospitalized type 2 diabetic patients at King Abdulaziz University Hospital.

**Methods:** Relevant data was retrieved from the medical charts of type 2 diabetic patients admitted to the medical unit of King Abdulaziz University Hospital in the period between January 1998 and September 1999. Patients' age, sex, body mass index, presence of hypertension and hyperlipidemia, degree of glycemic control, reason for admission, duration of hospital stay and mortality were recorded.

**Results:** A total of 427 patients were studied, 46% of whom were hypertensive. Hypertensive diabetics tend to

be older, more likely to have a higher body mass index and hyperlipidemia, to develop cardiovascular complications and renal failure, to stay longer in hospital and to have higher mortality compared to normotensive diabetics.

**Conclusion:** Hypertension is common in diabetics, early treatment of which is important to prevent cardiovascular complications, to minimize the progression of microvascular complications and to decrease mortality.

**Keywords:** Hypertension, diabetes mellitus, prevalence.

**Saudi Medical Journal 2001; Vol. 22 (2): 139-141**

---

Type 2 diabetes mellitus (DM) and hypertension have emerged as major health problems in Saudi Arabia. The prevalence of hypertension in Saudi Arabia has been reported by Ahmed et al<sup>1</sup> to be 15% while that reported for diabetes mellitus is 7%.<sup>2</sup> Recent studies have reported that impaired fasting blood glucose is an independent risk factor for hypertension<sup>3</sup> and high normal blood pressure and hypertension increases the risk of developing type 2 DM.<sup>4-6</sup> Hypertension is a common problem in diabetic patients.<sup>7,8</sup> It is a well-known risk factor for coronary heart disease in diabetics as well as non-diabetics.<sup>9</sup> Its prevalence in type 2 DM varies from 39%<sup>10</sup> to 42%.<sup>11</sup> The aim of this study is to report on the prevalence and implications of hypertension in hospitalized type 2 diabetics at King Abdulaziz University Hospital.

**Methods.** King Abdulaziz University Hospital (KAUH) is a teaching hospital in the western province of Saudi Arabia. The data for analysis was retrieved from the medical charts of diabetic patients admitted to the medical unit of KAUH in the period between January 1998 and September 1999. The criteria for inclusion in the study was type 2 DM according to the World Health Organization (WHO) criteria,<sup>12</sup> both hypertensive and normotensive (with no evidence of any other cause of secondary hypertension). Hypertension was defined as systolic blood pressure more than 140 mmHg and diastolic more than 90 mmHg. The following data was collected: patients' age, sex, body mass index (BMI) (weight in kilogram divided by square height in meters). Degree of glycemic control was measured by glycosylated hemoglobin (HbA1c). Poor glycemic

---

From King Abdulaziz University Hospital, Jeddah, Kingdom of Saudi Arabia.

Received 24th July 2000. Accepted for publication in final form 20th September 2000.

Address correspondence and reprint request to: Dr. Daad H. Akbar, Associate Professor/Consultant Physician, King Abdulaziz University Hospital, Jeddah 21415, PO Box 18298, Kingdom of Saudi Arabia. Tel. +966 (2) 6557043/6586516. Fax. +966 (2) 6541626. E-mail: daadakb@yahoo.com

control was defined as HbA1c >7%. The presence of hyperlipidemia {defined as total serum cholesterol >5.2 mmol/l, low density lipoprotein (LDL) > 2.6 mmol/l, triglyceride >1.7 mmol/l}, impaired renal function (raised serum creatinine after exclusion of other causes of renal failure), history of smoking, family history of hypertension, admissions due to ischemic heart disease (myocardial infarction, unstable angina), cerebrovascular accident (CVA), duration of hospital stay and outcome were recorded. Statistical analysis was performed using the SPSS 7.5 (Statistical Package for Social Science) software.

**Results.** A total of 427 patients were included in the study with a mean age of 57.93±13.51 years, male:female ratio of 249:178 (1.4:1) and mean BMI of 25.46±4.56 Kg/m<sup>2</sup>. One hundred and ninety five patients (46%) were hypertensive. As shown in Table 1 there is a significant difference between hypertensive and normotensive diabetics for age, BMI, family history of hypertension, presence of hyperlipidemia, development of cardiovascular complications and renal failure, duration of hospital stay and mortality while no significant difference was found for sex, poor glycemic control or the development of cerebrovascular accident.

**Table 1** - Illustrate comparison between hypertensive and normotensive diabetics according to some variables.

Variable	Hypertensive diabetics N = 195 (%)	Normotensive diabetics N = 232 (%)	P-Value
Age (years)	59.3	56.7	0.04
Sex ratio (M:F)	1.3:1	1.5:1	0.35
BMI (kg/m <sup>2</sup> )	26.2	24.8	0.002
FH of HBP	49 (25)	21 (9)	<0.001
Poor glycemic control	129 (66)	149 (64)	0.67
Hyperlipidemia	61 (31)	38 (16)	<0.001
Smoking	92 (47)	89 (38)	0.06
Ischemic heart disease	54 (28)	46 (20)	0.04
Heart failure	63 (32)	22 (10)	<0.001
Cerebrovascular accident	22 (11)	17 (7)	0.15
Renal failure	54 (28)	26 (11)	<0.001
Hospital stay (days)	29.8	22.4	0.01
Mortality	38 (19)	24 (10)	0.008
M:F - male:female; BMI - body mass index; FH of HBP - family history of hypertension; N - number			

**Discussion.** Hypertension is a multifactorial disorder and results from contributions from both genetic and environmental causes. It concentrates in families but does not follow any clear-cut Mendelian Pedigree pattern of inheritance.<sup>13</sup> This is also applied for hypertensive diabetics in whom we found a strong family history of hypertension. In addition to the development of diabetic nephropathy, at least 2 other factors have been proposed to contribute to hypertension in diabetes: hyperinsulinemia and extracellular fluid volume expansion.<sup>7,8</sup> The prevalence of hypertension in type 2 DM was 46%, which is more than had been previously reported.<sup>10,11</sup> Our study showed that hypertensive diabetics were older, have a higher prevalence of hyperlipidemia, and tend to have a higher BMI compared to normotensive diabetics. An association between hypertension, impaired glucose tolerance, hypertriglyceridemia, obesity, hyperinsulinemia, and insulin resistance has been appreciated since the early 1960s.<sup>14-17</sup> Various aspects of this syndrome have been called syndrome X<sup>18</sup> and the insulin resistance syndrome.<sup>19</sup> Both insulin resistance and possibly, hyperinsulinemia have been suggested as risk factors for the development of cardiovascular complications in diabetics<sup>20</sup> and approximately 75% will eventually die from complications of coronary heart disease.<sup>21</sup> Hypertension itself is a risk factor for coronary heart disease in diabetics as well as non-diabetics.<sup>9</sup> Recent evidence suggests that cardiovascular complication rates associated with DM can be considerably reduced through intensified treatment of hypertension.<sup>22</sup> We found that hypertensive diabetics tend to have a longer hospital stay and a higher mortality, which could be explained by the higher prevalence of cardiovascular complications and nephropathy reported in them. In the United Kingdom Prospective Diabetes Study Group (UKPDS) blood pressure trial,<sup>22</sup> intensive blood pressure treatment i.e. diastolic of 80 mmHg had led to a 32% decrease in diabetes-related deaths, and a 37% decrease in microvascular complications. Similar observations had been noted by the Hypertension Optimal Treatment (HOT) trial<sup>23</sup> where a target of 80 mmHg diastolic pressure has been found to have a cardioprotective effect in diabetics.

Early treatment of hypertension is particularly important in diabetic patients to prevent cardiovascular complications, to minimize the progression of microvascular complications and to decrease mortality. Among type 2 DM the benefit of tight blood pressure control may be as great as the benefit of strict glycemic control.

## References

1. Ahmed AF, Mahmoud ME. Prevalence of hypertension in Saudi Arabia. Saudi Med J 1992; 13: 548-551.

2. El-Hazmi MAF, Al-Swailem A, Wasry AS, Sulimani R. Prevalence of diabetes mellitus in Saudi Arabia. *Saudi Med J* 1995; 6: 294-299.
3. Suematsu C, Hayashi T, Fujii S, Endo G, Tsumura K, Okada K et al. Impaired fasting glucose and the risk of hypertension in Japanese men between the 1980s and the 1990s: the Osaka Health Survey. *Diabetes Care* 1999; 22: 228-229.
4. Hayashi T, Tsumura K, Suematsu C, Endo G, Fujii S, Okada K. High normal blood pressure, hypertension, and the risk of type 2 diabetes in Japanese men. *Diabetes Care* 1999; 22: 1683-1687.
5. Manson JE, Nathan DM, Krolewski AS, Stampfer M, Willet WC, Hennekens CH. JA prospective study of exercise and incidence of diabetes among US male physicians. *JAMA* 1992; 268: 63-67.
6. Stolk RP, Van splunder IP, Schouten JS, Witterman JC, Hofman A, Grobbee DE. High blood pressure and the incidence of non-insulin dependent diabetes mellitus: findings in a 11.5 year follow up study in the Netherlands. *Eur J Epidemiol* 1993; 9: 134-139.
7. Epstein M, Sowers JR. Diabetes mellitus and hypertension. *Hypertension* 1992; 19: 403-418.
8. Weidmann P, Boehlen LM, De Courten M. Pathogenesis and treatment of hypertension associated with diabetes mellitus. *Am Heart J* 1993; 125: 1498-1513.
9. The National High Blood Pressure Education Program Working Group: National high blood pressure education program working group report on hypertension in diabetes. *Hypertension* 1994; 23: 145-158.
10. The Hypertension in Diabetes Study Group. Hypertension in Diabetes Study (HDS): 1. Prevalence of hypertension in newly presenting type 2 diabetic patients and the association with risk factors for cardiovascular and diabetic complications; II. Increased risk of cardiovascular complications in hypertensive type 2 diabetic patients. *J Hypertens* 1993; 11: 309-319.
11. Wokoma FS. Hypertension in non-insulin dependent diabetic Nigerians: a comparative analysis of normotensive and hypertensive subgroups. *Diabetes International* 1999; 9: 57-58.
12. Diabetes mellitus: report of a WHO Study Group. *World Health Organ Tech Rep Ser* 1985; 727: 1-113.
13. Rapp JP. Genetics of experimental and human hypertension. In: Genest J, Kuchel O, Hamet P, Cantin M, editors. *Hypertension, physiopathology and treatment*. 2nd ed. New York: McGraw Hill Book Company; 1983. p. 582-598.
14. Albrink MJ, Meigs JW. The relationship between serum triglyceride and skinfold thickness in obese subjects. *Ann N Y Acad Sci* 1965; 131: 673-683.
15. Davidson P, Albrink MJ. Abnormal plasma insulin response with high plasma triglycerides independent of clinical diabetes or obesity. *J Clin Invest* 1966; 45: 1000-1005.
16. Bagdade JD, Bierman EL, Porte D Jr. The significance of basal insulin levels in the evaluation of the insulin response to glucose in diabetic and non diabetic subjects. *J Clin Invest* 1967; 46: 1549-1557.
17. Reaven GM, Lener RL, Stern MP, Farquhar JW. Role of insulin in endogenous hypertriglyceridemia. *J Clin Invest* 1967; 46: 1756-1767.
18. Reaven GM. Role of insulin resistance in human disease. *Diabetes* 1988; 37: 1595-1607.
19. Haffner SM. The insulin resistance syndrome revisited. *Diabetes Care* 1996; 19: 275-277.
20. Despres JP, Lamarche B, Mauriege P, Cantin B, Dagenais GR, Moorjani S et al. Hyperinsulinemia as an independent risk factor for ischemic heart disease. *N Eng J Med* 1996; 334: 952-957.
21. Bierman Ell. Atherogenesis in diabetes. *Arterioscler Thromb* 1992; 12: 647-656.
22. UK Prospective Diabetes Study Group: Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes (UKPDS 38) *BMJ* 1998; 317: 703-713.
23. Hansson L, Zanchetti A, Carruthers SG, Dahlof B, Elmfedt D, Julius S et al for the HOT Study Group. Effects of intensive blood pressure lowering and low dose aspirin in patients with hypertension: principal results of the Hypertension Optimal Treatment (HOT) randomised trial. *Lancet* 1998; 351: 755-762.