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 glyemic 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.

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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. to be 15% while that reported for diabetes mellitus is 7%. Recent studies have reported that impaired fasting blood glucose is an independent risk factor for hypertension and high normal blood pressure and hypertension increases the risk of developing type 2 DM. Hypertension is a common problem in diabetics. It is a well-known risk factor for coronary heart disease in diabetics as well as non-diabetics. Its prevalence in type 2 DM varies from 39% to 42%. 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, 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 glyemic control was measured by glycosylated hemoglobin (HbA1c). Poor glycemic
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/m2. 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.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hypertensive diabetics N = 195 (%)</th>
<th>Normotensive diabetics N = 232 (%)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>59.3</td>
<td>56.7</td>
<td>0.04</td>
</tr>
<tr>
<td>Sex ratio (M:F)</td>
<td>1.3:1</td>
<td>1.5:1</td>
<td>0.35</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>26.2</td>
<td>24.8</td>
<td>0.002</td>
</tr>
<tr>
<td>FH of HBP</td>
<td>49 (25)</td>
<td>21 (9)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Poor glycemic control</td>
<td>129 (66)</td>
<td>149 (64)</td>
<td>0.67</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>61 (31)</td>
<td>38 (16)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Smoking</td>
<td>92 (47)</td>
<td>89 (38)</td>
<td>0.06</td>
</tr>
<tr>
<td>Ischemic heart disease</td>
<td>54 (28)</td>
<td>46 (20)</td>
<td>0.04</td>
</tr>
<tr>
<td>Heart failure</td>
<td>63 (32)</td>
<td>22 (10)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Cerebrovascular accident</td>
<td>22 (11)</td>
<td>17 (7)</td>
<td>0.15</td>
</tr>
<tr>
<td>Renal failure</td>
<td>54 (28)</td>
<td>26 (11)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hospital stay (days)</td>
<td>29.8</td>
<td>22.4</td>
<td>0.01</td>
</tr>
<tr>
<td>Mortality</td>
<td>38 (19)</td>
<td>24 (10)</td>
<td>0.008</td>
</tr>
</tbody>
</table>

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. 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 diabetics: hyperinsulinemia and extracellular fluid volume expansion. The prevalence of hypertension in type 2 DM was 46%, which is more than had been previously reported. 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. Various aspects of this syndrome have been called syndrome X and the insulin resistance syndrome. Both insulin resistance and possibly, hyperinsulinemia have been suggested as risk factors for the development of cardiovascular complications in diabetics and approximately 75% will eventually die from complications of coronary heart disease. Hypertension itself is a risk factor for coronary heart disease in diabetics as well as non-diabetics. Recent evidence suggests that cardiovascular complication rates associated with DM can be considerably reduced through intensified treatment of hypertension. 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, 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 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**

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