Survival of Diabetic Hypertensive Patients

KRISTIAN THYGESEN, MICHAEL STRATE, LISE HANSEN, AND BENT HARVALD

SUMMARY Seventy-nine of 673 patients attending a hypertensive outpatient clinic were classified as diabetics at the first examination. These patients were age- and sex-matched to two control groups: nondiabetic hypertensives and the background population. Nondiabetic hypertensive patients had a significantly poorer survival than expected during a 10-year observation period; the survival of diabetic hypertensives was even poorer, although not significantly. No sex difference was observed in the survival rates of hypertensive diabetics, neither was a difference seen between insulin-dependent and non-insulin-dependent patients. Acute myocardial infarction was the most frequent cause of death in both diabetic (40%) and nondiabetic (42%) hypertensive persons.

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KEY WORDS • diabetes mellitus • hypertension • mortality • prognosis

THE association between diabetes mellitus and hypertension has been well established.1 Population studies indicate that hypertension occurs more frequently in diabetic than nondiabetic subjects,2 3 and the chances of a person with elevated blood pressure becoming diabetic are increased by 63% compared to those with normal blood pressure.4

Both hypertension and diabetes mellitus are known contributors to cardiovascular morbidity and mortality,5 6 and hypertension superimposed on diabetes seems to produce an additive risk.7 At present, however, there seems to be some doubt as to the actual effect of increased blood pressure on the prognosis of diabetic patients. Goodkin stated in a report of a 20-year survey that the mortality is much higher in diabetic than in nondiabetic patients with comparable degrees of hypertension, whereas Pell and D'Alonzo found no effect of elevated blood pressure on mortality.

Our study was concerned with the effect of diabetes on the prognosis of patients with arterial hypertension. The 10-year survival of diabetic persons with hypertension was compared to that of nondiabetic subjects with hypertension and the background population.

Methods

The study population was made up of patients with sustained arterial hypertension (World Health Organization criteria)8 who were referred to the hypertension outpatient clinic of the Odense University Hospital during the years 1970 to 1980. All had been hospitalized for assessment, during which blood pressure was measured three times per day using a cuff 12½ x 60 cm; the diastolic pressure was determined from the fifth Korotkoff sound. The majority of the patients had been referred to the hospital by their general practitioner after unsuccessful therapy; the remainder were admitted as hypertensive emergencies. Treatment was commenced after this assessment, and the patients attended the outpatient clinic at intervals of 2 to 3 months. The aim of antihypertensive therapy was to lower the diastolic blood pressure to less than 95 mm Hg, with due regard for clinical tolerance. A multipledrug regimen was employed on an individual basis, using a diuretic and a beta-adrenergic blocking agent, combined in some cases with a vasodilator. The diabetics were treated with diet and either insulin or oral antidiabetic drugs aimed at a postprandial plasma glucose level below 10 mmol/L.

Seventy-nine of a total of 673 hypertensive patients were classified as diabetic at their first examination based on the criteria laid down by the National Diabetes Data Group9 (Table 1). Seventeen patients had insulin-dependent diabetes mellitus (IDDM) and 62 non-insulin-dependent diabetes mellitus (NIDDM).10 The IDDM group of 11 men and 6 women had a mean age of 48.6 years ± 13.3 (SD). The NIDDM group of 28 men and 34 women had a mean age of 61.5 years ± 8.8 (SD). The mean age of the NIDDM group was significantly higher than that of the IDDM group (p < 0.001). The duration of diabetes ranged from 0 to 29 years (median 2 years), inasmuch as the median duration was 0 years for patients with NIDDM and 15 years for those with IDDM (Figure 1). Sixteen patients (5 NIDDM, 11 IDDM) had diabetic retinopathy and 7 (2

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TABLE 1. The Demographics of Diabetic Patients and Nondiabetic Controls at Entry to the Hypertension Outpatient Clinic

<table>
<thead>
<tr>
<th>Demographic data</th>
<th>Diabetics</th>
<th>Nondiabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>79</td>
<td>564</td>
</tr>
<tr>
<td>Age (mean ± SD) (yr)</td>
<td>58.7 ± 11.2</td>
<td>56.4 ± 11.4</td>
</tr>
<tr>
<td>Weight (mean ± SD) (kg)</td>
<td>79.2 ± 14.3*</td>
<td>74.6 ± 28.5†</td>
</tr>
<tr>
<td>Sex (M/F) (n)</td>
<td>39:40</td>
<td>281:283</td>
</tr>
<tr>
<td>Primary/secondary hypertension (n)</td>
<td>69:10</td>
<td>468:96</td>
</tr>
<tr>
<td>WHO stages 1/2/3 (n)</td>
<td>27:22:20</td>
<td>193:106:160‡</td>
</tr>
<tr>
<td>Risk factors§ (n)</td>
<td>49</td>
<td>288</td>
</tr>
</tbody>
</table>

*Calculated from 77 patients.
†Calculated from 560 patients.
‡Staging not available from nine patients.
§Chronic lung disease, hyperlipidemia, hyperuricemia, and previous myocardial infarction.

Follow-up was carried out on January 1, 1981. At this time no patients in the diabetic group and six patients in the nondiabetic control group were lost from observation. Survival was assessed by the actuarial method, employing 95% confidence limits of the curves obtained by means of Greenwood’s estimate. The t distribution was used for comparison of the expected and observed survival rates, and the log rank test was employed for comparison of the observed survival rates. The relative survival rate, calculated as the observed survival rate divided by the expected survival rate, reflects survival of a population with the disease in question as the only cause of death. Differences were considered as significant when p was less than 0.05.

Results

The 10-year survival of diabetic and nondiabetic hypertensive patients as compared to the background population is shown in Figure 3. Survival of diabetic hypertensive patients was significantly reduced (p < 0.01), with a 5-year survival of 75% (expected 91%) and a 10-year observed survival of 49% (expected 81%). The survival of nondiabetic hypertensive patients was in between, with a 5-year observed survival of 81% and a 10-year survival of 61% (p < 0.001). The difference between the groups was not significant.

The relative survival rates for men and women with both hypertension and diabetes are shown in Figure 4. No significant difference was observed between the sexes.

Figure 5 depicts the relative survival rates for hypertensive patients with IDDM and NIDDM respectively. Only the 5-year survival rate of patients with IDDM
was calculated, due to the limited number of patients in this group. No difference in survival was demonstrated within the 5-year observation period between the types of diabetes.

Among 23 deaths in the diabetic hypertensives (5 IDDM, 18 NIDDM), 9 (40%) were due to acute myocardial infarction, 1 to stroke, 1 to renal failure (IDDM), and 12 to various other causes. These figures compared well with the causes of death in nondiabetic hypertensives, in whom 46 of 110 deaths (42%) occurred from myocardial infarction, 8 from stroke, 8 from renal failure, and 48 from other causes.

Discussion

This investigation demonstrated a steadily decreasing life expectancy in hypertensive patients compared to the background population during the 10 years of observation. A further reduction in life expectancy was observed in diabetic hypertensives; however, there was no significant difference in the survival of diabetic and nondiabetic hypertensive patients. The most obvious explanation of this is effective treatment and control of diabetes, thus delaying serious complications giving rise to increased mortality. Although other explanations are also possible, first, the duration of diabetes was too short to demonstrate an added risk, and second, there may have been too few patients in the study to reveal a significant effect. In this context it should be noted that there was no difference in the severity of hypertension or the aim of antihypertensive treatment in the diabetic and nondiabetic groups, inasmuch as the frequency of primary and secondary hypertension as well as of WHO stages did not differ. Furthermore, all patients were treated with the object of achieving normalization of blood pressure, as far as possible.

A recent Danish study of the mortality of insulin-treated diabetic patients showed that men have a higher mortality than comparable women, whereas our study, based on a cohort from the same region, was unable to demonstrate any sex difference in the survival of diabetic hypertensive persons.

Our material consisted of a major group of patients with newly diagnosed non-insulin-dependent diabetes and a smaller group of patients with long-standing insulin-dependent diabetes (median 15 years). When corrected for differences in age, the two types of patients had the same prognosis, at least during a 5-year observation period.

Elevated arterial blood pressure is frequently present in insulin-dependent diabetic patients with diabetic nephropathy, and renal failure due to diabetic nephropathy is a major cause of death in these patients. In the present series, only one insulin-dependent patient died from renal failure; this may have been due to the fact that antihypertensive treatment postponed the end stage of renal insufficiency.

The dominant cause of death in both diabetic and nondiabetic hypertensive patients was myocardial infarction, 40% and 42% respectively. These figures
correspond well to that reported by Goodkin, where 41.5% of the deaths of diabetics were due to arteriosclerotic heart disease. Thus diabetes mellitus associated with hypertension does not appear to change the mortality pattern seen in each of the disorders.

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