

## Inadequate Screening for Microvascular Complications Amongst Diabetic Patients.

D.H Akbar, M.A Mushtaq and A.A Alghamdi

### Abstract

A study to determine how frequent microvascular complications of diabetes mellitus had been screened in diabetes admitted to the medical unit of King Abdulaziz University Hospital (KAUH), Jeddah, Saudi Arabia is reported. Medical charts of all diabetics admitted to the unit between January 1995 and November 1999 were studied, a total of 572 patients in all. On admission, 5% of them were asked about visual disturbances, and 45% were examined by an ophthalmologist. Glucose in filtration rate was measured in 36% of the patients with renal urea and creatinine. Forty-four per cent of the patients were asked about sensory disturbances, and 78% were examined neurologically. Hospitalised diabetics are poorly screened for microvascular complications. Quality of care may improve if screening for complications was shown with regularity in patients with diabetes. This is responsible for the patient's intercurrent illness.

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### Introduction

The prevalence of diabetes is increasing worldwide.<sup>1,2</sup> In Saudi Arabia it has increased from 4.9 in 1985<sup>3</sup> to 7.1 in 1995.<sup>4</sup> The central therapeutic problem in patients with diabetes is not so much management of acute metabolic derangements, but prevention and treatment of chronic complications. Screening, and early detection of complications is important; sensory intervention can possibly lead to prevention and delay in progression. Thus, screening for retinopathy and early treatment with photocoagulation has been shown to decrease the risk of blindness.<sup>5</sup> Also, screening for nephropathy by microalbuminuria and early treatment with angiotensin-converting enzyme (ACE) inhibitor can delay the progression of diabetic nephropathy.<sup>6</sup>

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Diabetes International, 2001; Volume 11 (1): 22 – 24

The aim of this study was to determine how frequent microvascular complications of diabetes had been screened for in diabetic patients admitted to the medical unit of KAUH, Saudi Arabia.

### Method

Medical charts of all diabetic patients admitted to the medical unit of KAUH in the period between January 1995 and November 1999 were studied. Diabetes was diagnosed according to WHO criteria, and patients were divided into Type 1 and Type 2 again following WHO guidelines.<sup>7</sup> Detailed information of patients' age, sex, nationality, body mass index (BMI), type of diabetes, duration, and mode of treatment (diet alone, oral hypoglycaemic agents, insulin, or combined) were recorded. Degree of control was assessed by patients' symptoms, symptoms of hypoglycaemia, and an HbA<sub>1c</sub> level >7%. A history of hypertension (defined as blood pressure defined as systolic blood pressure >160 mmHg, diastolic blood pressure >95 mmHg) and smoking were recorded. Diabetic eye involvement was assessed by history of visual disturbances, history of cataract, and fundus examination by an ophthalmologist. Diabetic nephropathy was assessed by proteinuria after exclusion of other causes (measurement of microalbuminuria is not available in our hospital), raised serum urea and creatinine, 24-hour urine protein, creatinine clearance, and renal ultrasound. Neuropathy was assessed by a history of numbness or decreased sensation, any evidence of decreased sensation or reflexes on neurological examination, and electrophysiological testing.

### Results

There were 305 admissions in 572 patients during the study period. The mean age was 54±16 years, and male:female ratio was 22:250 (1:3:1), and mean BMI 25±4. There were equal percentages of Saudi and non-Saudi nationalities. Fifty-eight patients (10%) were Type 1, 480 (84%) Type 2, and 17 (3%) were secondary. The mean duration of diabetes was 9.8±7.8 years. Most of the patients (60%) were using oral hypoglycaemic agents, 10% were using insulin, and 30% were using a combination of oral hypoglycaemic agents and insulin. Two hundred and thirty-six patients (41%) were hypertensive, 131 (21%) hyperlipidaemic, and 221 (39%) were smokers. Three hundred and forty patients (59%) were asked about visual disturbance on admission, and 260 (45%) were examined by an ophthalmologist either in the same admission or seen in the out-patient clinic. Eighty-nine of

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## Introduction

The prevalence of diabetes is increasing worldwide.<sup>1,2</sup> In Saudi Arabia it has increased from 4.9 in 1985<sup>3</sup> to 7.4 in 1995.<sup>4</sup> The central therapeutic problem in patients with diabetes is not so much management of acute metabolic derangements, but prevention and treatment of chronic complications. Screening and early detection of complications is important, as early intervention can possibly lead to prevention and delay in progression. Thus, screening for retinopathy and early treatment with photocoagulation has been shown to decrease the risk of blindness.<sup>5,6</sup> Also, screening for nephropathy by microalbuminuria, and early treatment with angiotensin-converting enzyme (ACE) inhibitors can delay the progression of diabetic nephropathy.<sup>7</sup>

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## Method

Medical charts of all diabetic patients admitted to the medical unit of KAUH in the period between January 1995 and November 1999 were studied. Diabetes was diagnosed according to WHO criteria, and patients were divided into Type 1 and Type 2, again following WHO guidelines.<sup>8</sup> Detailed information of patients' age, sex, nationality, body mass index (BMI), type of diabetes, duration, and mode of treatment (diet alone, oral hypoglycaemic agents, insulin, or combined) were recorded. Degree of control was assessed by patients' compliance, symptoms of hyperglycaemia, and an HbA<sub>1c</sub> level >7%. A history of hypertension (defined as blood pressure >140/90 mmol/L), hyperlipidaemia (defined as fasting cholesterol >5.2 mmol/L, LDL >2.8 mmol/L), and smoking were recorded. Diabetic eye involvement was assessed by history of visual disturbance, history of cataract, and fundus examination by an ophthalmologist. Diabetic nephropathy was assessed by proteinuria after exclusion of other causes (measurement of microalbuminuria is not available in our hospital), raised serum urea and creatinine, 24-hour urine protein, creatinine clearance, and renal ultrasound. Neuropathy was assessed by a history of numbness or decreased sensation, any evidence of decreased sensation or reflexes on neurological examination, and electrophysiological testing.

## Results

There were 1029 admissions in 572 patients during the study period. The mean age was 54±16 years, and male : female ratio was 321 : 251 (1.3 : 1), and mean BMI 25±4. There were equal percentages of Saudi and non-Saudi nationalities. Fifty-eight patients (10%) were Type 1, 480 (84%) Type 2, and 17 (3%) were secondary. The mean duration of diabetes was 9.8±7.8 years. Most of the patients (60%) were using oral hypoglycaemic agents, while 30% were on insulin, on diet, and on combination therapy. Most patients (69%) were poorly controlled. Two hundred and thirty-six patients (41%) were hypertensive, 131 (23%) hyperlipidaemic, and 221 (39%) were smokers. Three hundred and forty patients (59%) were asked about visual disturbance on admission, and 260 (45%) were examined by an ophthalmologist either in the same admission or seen in the out-patient clinic. Eighty-nine of

260 patients (34%) had cataract, 61 (23%) had background retinopathy, 38 (15%) had proliferative retinopathy (PDR), and 161 (62%) had a normal eye examination. One hundred and seventy-four (30%) patients had proteinuria, of whom 81 (47%) had associated raised serum urea and creatinine levels, and 22 (13%) had a 24-hour urine protein level >3.4 g. Ninety-eight of 572 (17%) patients had raised serum urea and creatinine. Creatinine clearance was assessed in 36/98 (37%) – 2 (6%) had a level >70 mL/min. Renal ultrasound was done for 64/98 (65%) patients, and 23 (36%) of these had small kidneys. Two hundred and fifty-three patients were asked about sensory disturbances and 96 (38%) had altered sensation. Four hundred and forty-seven (78%) were examined neurologically: 112 (25%) had loss of ankle reflexes, and 130 (29%) had decreased pain and touch sensation in both upper and lower limbs. An EMG was done in 16 patients with decreased sensation on examination (either on the same admission or as out-patients). In one patient (6%) it was normal, and in 15/16 (93%) it was abnormal.

## Discussion

Our study showed that most of our patients are Type 2 and are poorly controlled. Many studies clearly demonstrate that strict glycaemic control is important in delaying the onset and slowing the progression of microvascular complications.<sup>9-13</sup> Thus, patients' education about the role of tight blood-glucose control is of great importance, if chronic microvascular complications are to be reduced.

Diabetic retinopathy poses a serious threat to vision. It is estimated to be the most frequent cause of new cases of blindness amongst adults aged 20–74 years.<sup>14</sup> It has been shown by Broadbent et al<sup>15</sup> that the prevalence of diabetic eye disease remains high for Type 2 diabetic patients. Dogru et al<sup>5</sup> found that panretinal photocoagulation for proliferative retinopathy provides good anatomical and visual outcome for 10 years or longer. Glycaemic control, and lowering of blood lipids as well as diastolic blood pressure (in hypertensive patients) have also been reported to be effective in reducing the incidence of retinopathy.<sup>16</sup> It is therefore of great importance to have tight glycaemic, lipid, and blood-pressure control, in addition to a screening programme to decrease the incidence of diabetic retinopathy. Patients with Type 2 diabetes should have an initial dilated and comprehensive eye examination shortly after diagnosis, and subsequent examinations for both Type 1 and 2 diabetic patients should be repeated annually.<sup>14</sup> We found that only 59% of admitted patients were asked about history of visual disturbance, and only 45% were examined ophthalmologically either during their admission or in the out-patient clinic. A similar low screening rate for retinopathy has been reported by Xu et al.<sup>17</sup>

Diabetes is the most common single cause of end-stage renal disease (ESRD) in the United States and Europe. Recent studies have demonstrated that the onset and course of diabetic nephropathy can be ameliorated to a very significant degree by several interventions, if instituted early. These interventions include tight gly-

caemic control, aggressive anti-hypertensive treatment, and the use of ACE-inhibitors.<sup>18-20</sup> Screening for microalbuminuria should be done at the time of diagnosis of diabetes, and in the absence of microalbuminuria, it should be performed annually.<sup>19</sup> Although micro-albuminuria measurement is not available at our hospital, we found that a creatinine clearance (which is possible to ascertain) was measured in only 37% of patients with raised serum urea and creatinine. It has been recommended that referral to a physician experienced in the care of diabetic renal disease should be considered when the creatinine clearance has fallen to less than 70 mL/min.<sup>7</sup>

Diabetic neuropathy is encountered in more than one-third of diabetic patients.<sup>21</sup> It leads to substantial morbidity.<sup>22,23</sup> Neuropathic damage (painful sensory symptoms and anaesthetic foot) contribute significantly to morbid foot problems.<sup>24-27</sup> Simple screening procedures have been shown to produce a great reduction in amputation rates.<sup>28,29</sup> We found in our study that only 44% of admitted patients were asked about sensory disturbances and 78% were examined neurologically on admission. In a questionnaire survey of 1517 diabetic patients to evaluate screening for major complications among Tasmanians with insulin-treated diabetes, most indicated that the doctors treating their diabetes did not routinely examine their feet.<sup>30</sup> Although as yet a satisfactory and fundamental therapy is not available for neuropathy, it is of great importance to educate our treating physicians to give diabetic patients a neurological examination. All patients with evidence of sensory neuropathy must be educated about the risk and prevention of foot problems, and this education must be regularly reinforced.<sup>7</sup>

It is shown in our study that in diabetic patients who are admitted with concurrent illnesses, the treating physicians usually concentrate on the admission illness without screening for chronic diabetic complications. The Canadian Cree Board of Health and Social Services of James Bay (CBHSSJB) Diabetes Registry provided a comprehensive programme to track the progression of diabetic complications. Standardised clinical flow sheets were used to identify patients not receiving appropriate clinical and laboratory screening for diabetic complications. Information from these sheets is entered into a computer database annually. This registry system can provide a clinical tool for the management of diabetic patients.<sup>31</sup>

## Conclusion

Diabetes is a chronic illness that requires continuing medical care and education to prevent acute complications and to reduce the risk of long-term complications. The hospitalisation of a person with diabetes for a concurrent illness mandates ongoing evaluation and treatment of the diabetic state. Quality care for the hospitalised patient with diabetes is improved and hospital length of stay may be shortened, by care by health workers with expertise in diabetes.

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## New findings in brief

- A Finnish study followed babies who had a close relative with Type 1 diabetes. Some were given cow's milk formula feed, others a combination of breastmilk and non-bovine formula. At 3 months of age the former had high levels of antibodies to bovine insulin. The researchers, from the University of Helsinki, think this reaction to a foreign insulin might be the beginning of an autoimmune process leading to Type 1 diabetes.

BBC Online

- Could rotavirus trigger the appearance of Type 1 diabetes? Researchers at the Institute of Medical Research, Melbourne, Australia, noticed a similarity between rotavirus proteins and proteins from  $\beta$ -cells. Subsequently, in children showing early signs of diabetes, they found an increase in the level of antibodies active against  $\beta$ -cells each time the children acquired a rotavirus infection.

New Scientist 12th August 2000

- People with diabetes might be at greater risk of Alzheimer's disease. Researchers at the Mayo Clinic, USA tested 10 000 people aged 47–70 for their cognitive abilities, and repeated the tests after 6 years. Those who had both diabetes and hypertension were mentally slower and less able to 'think on their feet' than other subjects. (There was no association between the two conditions and memory loss.) Dr David Knopman said, 'We feel the cognitive loss might make a person more susceptible to developing Alzheimer's disease'.

BBC Online

- Laboratory studies have suggested that cinnamon restores the ability of adipose tissue from people with Type 2 diabetes to recognise and respond to insulin. The US Agricultural Research Service is trying to develop a cinnamon extract for use as an oral antihypoglycaemic agent. In the meantime, they recommend people with the condition to take a teaspoonful of cinnamon a day.

New Scientist 12th August 2000