International Journal of Diabetes Mellitus 2 (2010) 61–63

Contents lists available at ScienceDirect

International Journal of Diabetes Mellitus

journal homepage: ees.elsevier.com/locate/ijdm

Brief Communication

Chronic complications of diabetes mellitus in newly diagnosed patients

Iraj Heydari [a,1], Vida Radi [a,2], Sara Razmjou [a,*,3], Afsaneh Amiri [b,3]

[a] Institute of Endocrinology and metabolism, Iran University of Medical Sciences, Tehran, Iran
[b] Gastrointestinal and Liver Disease Research Centre, Firouzgar hospital, Tehran, Iran

ARTICLE INFO

Article history:
Received 12 July 2009
Accepted 31 August 2009

Keywords:
Diabetes mellitus
Retinopathy
Nephropathy
Neuropathy

ABSTRACT

The prevalence of Diabetes Mellitus (DM) has increased in recent decades. This study was designed to determine retinopathy, neuropathy, nephropathy, hypertension and hyperlipidemia and their interdependence in newly diagnosed diabetic patients. In this study, 200 consecutive newly diagnosed patients were evaluated and screening tests for retinopathy, neuropathy, nephropathy, hypertension and hyperlipidemia were undertaken.

The frequency of positive screening tests for hyperlipidemia, hypertension, neuropathy, nephropathy and retinopathy was found to be 73.5%, 58.5%, 52%, 10%, and 6% respectively.

A significant proportion of newly diagnosed diabetic patients have signs of these chronic complications.

1. Introduction

Diabetes mellitus (DM) is a metabolic disorder resulting from a defect in insulin secretion and/or insulin action, which results in hyperglycemia with disturbances of carbohydrate, fat and protein metabolism [1]. The incidence of DM has increased dramatically in recent decades, predominantly because of changes in life style, an increase in the prevalence of obesity and longevity. Current projections estimate that the number of people with DM will increase by 50.0% by 2010, and will nearly double by 2025 [2,3].

Type 2 diabetes is a very common disease, characterized by an asymptomatic phase between the actual onset of diabetic hyperglycemia and clinical diagnosis. This phase has been estimated to last at least 4–7 years, and 30–50% cases of type 2 diabetic patients remained undiagnosed. This leads to the development of chronic complications of diabetes, which remain the chief problems in diabetic care, and which cause a lack of fitness to work, disability, and premature death [4,5].

The literature traditionally divides the diverse spectrum of vasculopathy associated with diabetes into two main subtypes: firstly, the diabetes-specific microvascular complications of retinopathy, nephropathy and neuropathy; and secondly, the atherothrombotic macrovascular complications of myocardial infarction, hypertension and peripheral arterial disease [6].

Many studies [6–8] stress the strong link between the various complications of diabetes. Andrew J et al. [6] have found a close association between microvascular and macrovascular complications of diabetes.

The aim of this study is to determine the prevalence and relationship between different complications of diabetes in newly diagnosed Iranian patients.

2. Materials and method

In this cross sectional study, 200 consecutive newly diagnosed patients referred to the Institute of Endocrinology and Metabolism affiliated to Iran University of Medical Sciences (IUMS) from October to March 2006, were enrolled. The study was approved by the ethics committee of IUMS. The patients were informed about the study, and written consent was obtained from them.

The frequency of nephropathy, retinopathy, neuropathy, hyperlipidemia and hypertension were evaluated in these patients. The diagnosis of diabetes is confirmed by fasting plasma glucose, measured from a venus sample after an overnight fast. Patients having ketonuria upon presentation were excluded.

2.1. Nephropathy

In this study both urine albumin and creatinine were measured. Albumiuria is defined as urinary albumin–creatinine ratio > or = 30 mg/g. (microalbuminuria with albumin of 30 to 300 mg/g and macroalbuminuria with albumin > 300 mg/g) [9]. Renal failure is defined according to the cut of value of laboratory; creatinine of (?) more than 1 for women and more than 1.2 for men.

* Corresponding author. Present Address: Institute of Endocrinology and metabolism, Iran University of Medical Sciences, Firouzgar, hospital, Valadi street, Valiasr Square, Tehran, Iran. Tel.: +0098 91 26606701; fax: +0098 21 88942622.
E-mail address: sara_razmjou@yahoo.com (S. Razmjou).
[1] Professor assistant of endocrinology and metabolism.
[2] General practitioner, Iran University of Medical Sciences.
[3] Research fellow, medical student at Iran University of Medical Sciences.

1877-5934
doi:10.1016/j.ijdm.2009.08.001

2.2. Retinopathy

To assess the presence of diabetic retinopathy, fundus examination was performed by an ophthalmologist following mydriasis of both eyes with tropicamide and phenylephrine eye drops. Retinopathy was grouped into proliferative and non-proliferative.

2.3. Neuropathy

Patients fulfilled a questionnaire about their symptoms such as a feeling of pins and needles, abnormal cold or warm sensations in their feet, sharp pain, aching pain, or irritation to feet or legs by bedclothes at night. A modified neuropathy disability score (NDS) was used to diagnose and quantify the severity of diabetic neuropathy on clinical examination [10].

2.4. Lipids

Blood sampling after a 12-hour fasting in patients was performed. Total cholesterol and triglyceride were measured and dislipidemia was defined as cholesterol > 200 or TG > 150.

2.5. Hypertension

Blood pressure was measured in the right arm supported on a table at heart level with an appropriate cuff to the patient's arm girth. We measured BP three times within a one –week interval and the average of these recordings was considered as their blood pressure. Those with systolic BP of more than 139 or diastolic BP of more than 89, or those who were taking antihypertensive medication, were considered to have hypertension.

2.6. Statistical analyses

Data are presented as a mean, using SPSS software version 15. p Values of less than 0.05 were considered to be statistically significant.

3. Result

Of 200 newly diagnosed diabetic patients, 52% were men and 48% women. The Mean ± SD age at presentation was 52.39 ± 10.03 years. The prevalence of nephropathy was 10%, including 13 patients (65%) with microalbuminuria, 4 patients (20%) with macroalbuminuria, and 3 patients (15%) with renal failure. Retinopathy was recorded in 12 patients (6%); 7 patients (58.3%) had proliferative, 5 patients (41.6%) had non-proliferative. Symptomatic neuropathy was found in 104 patients (52%). Among the patients with cardiovascular problems, 147 patients (73.5%) had hyperlipidemia, 37 (25.2%) showed hypercholesterolaemia, 49 (33.3%) revealed hypertriglyceridaemia and 61 patients (41/5%) had both hypercholesterolaemia and hypertriglyceridaemia. The prevalence of hypertension was 58.50%.

There was a statistically significant relationship between the following variables:

(1) Age and hypertension ($p < 0.001$): The average age of hypertensive patients was 6.2 years higher than non-hypertensive patients.
(2) Age and the form of nephropathy ($p < 0.01$): There was no statistically significant difference between age and the prevalence of nephropathy, but renal failure was more common in older patients, so that the mean age of patients with renal failure was 71.33 ± 14.43 years, whereas the mean age of patients with macro and microalbuminuria was 55.5 ± 10.5 and 42 ± 11.1 years respectively.
(3) Retinopathy and hypertension ($p < 0.003$): The prevalence of retinopathy increased statistically with the presence of hypertension, so that 33.3% of patients with retinopathy were also hypertensive.
(4) Retinopathy and neuropathy ($p < 0.01$): 77.7% of patients with proliferative retinopathy had neuropathy.
(5) Retinopathy and nephropathy ($p < 0.01$): The prevalence of nephropathy was 86% among patients with retinopathy and its probability increased with the severity of retinopathy.

4. Discussion

Diabetes Mellitus is a multifactorial disease, associated with a number of microvascular (retinopathy, neuropathy and nephropathy) and macrovascular (ischemic heart disease, cerebrovascular disease and peripheral vascular diseases) complications [11]. This metabolic disease is one of the most common endocrine disorders affecting almost 6% of the world's population [12]. The prevalence of DM in Iran was estimated at 5.5% in a population-based study conducted by Azimi-nezhad et al. [13].

Type 2 DM is likely to remain undiagnosed for (many?)years. The gap between the onset of the disease and clinical diagnosis of diabetes leads to the development of these chronic complications, which are the leading causes of premature mortality among diabetic patients [14].

In this study, which is one of the first studies in this regards in Iran, we assessed the prevalence of micro and macro vascular complications of DM in 200 newly diagnosed diabetic patients. Nephropathy was reported in 10%, neuropathy in 52%, retinopathy in 6%, hypertension in 58.5% and hyperlipidemia in 73.5% of the patients. There are further studies that assess the prevalence of these chronic complications; Harrzallah F et al. [15] found neuropathy in 24%, nephropathy in 13%, retinopathy 8% and hypertension in 22% of diabetic patients. In another study conducted by Weerasuriya [16] in Sri Lanakan diabetic patients, neuropathy was present in 25.1 %, nephropathy in 29%, retinopathy in 15% and hypertension in 23%. Considering the prevalence of these chronic complications at the time of diagnosis in different studies, appropriate screening procedures for diabetic patients is strongly recommended.

Microvascular and macrovascular complications frequently coexist. It is well recognized that vascular complications in a given tissue are often accompanied by evidence of pathology in other vascular territories [6]. There are several studies [7,8,17] that demonstrate a concordance between chronic complications of DM. This study found nephropathy in 86% of diabetic patients with retinopathy. Osterby et al. [17], also found a strong concordance between retinopathy and the structural parameters of diabetic nephropathy.

Our study also showed that the prevalence of retinopathy increased with hypertension, since hypertension coexisted in 33.5% of patients with retinopathy. This data is in agreement with the findings of Matthews et al. [18], which showed high blood pressure to be detrimental to each aspect of diabetic retinopathy, and that a rigid blood pressure control policy reduces the risk of clinical complications from diabetic eye disease.

Hideharu and Hidetoshi [19], similarly, concluded that hypertension is a risk factor for the progression of diabetic retinopathy, mostly because hyperglycaemia in diabetic patients impairs the regulation of retinal perfusion, leading to increased susceptibility to injury by systemic hypertension.

In this study, 77.7% of diabetic patients with proliferative retinopathy had neuropathy. Similarly, in Zander et al. study [20], proliferative retinopathy was found to be correlated with somatic and autonomic neuropathy in diabetic patients.

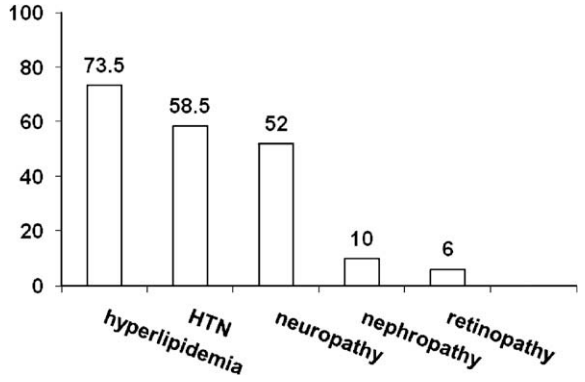

Fig. 1. The prevalence of chronic complication of type 2 Diabetes Mellitus in 200 newly diagnosed patients.

Furthermore, the prevalence of hypertension in diabetic individuals demonstrated a highly significant trend with age [21], as in this study, the average age of hypertensive patients was 6.2 years higher than for non-hypertensive ones.

In conclusion, there seems to be a strong concordance between chronic complications of diabetes mellitus. Thus, thorough screening of these complications in newly diagnosed diabetic patients is strongly recommended (see Fig. 1).

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