Childhood onset Fibrocalculous Pancreatic diabetes

V. Mohan , A. Ramachandran , M. Viswanathan

ABSTRACT

Fibrocalculous Pancreatic Diabetes (FCPD) is a form of diabetes secondary to tropical chronic pancreatitis . While majority of patients have onset of diabetes in youth childhood onset FCPD is less common. We found that 10.8% of diabetic with onset below 20 years of age had FCPD. The clinical features of childhood onset FCPD were similar to older age group patients. FCPD must be kept in mind in the differential diagnosis of childhood onset diabetes in geographical areas where this entity is common.

KEY WORDS

Fibrocalculous Pancreatic Diabetes, Childhood Onset Diabetes.

INTRODUCTION

In most developed countries of the west, the commonest form of diabetes seen in childhood is insulin dependent diabetes mellitus (IDDM) (1). Rarely, non insulin dependent diabetes mellitus (NIDDM) may also present in youth and one of these special forms of NIDDM is known as Maturity Onset Diabetes of Youth (MODY) (2) In tropical countries, a variety of forms of diabetes present at younger age groups (3). Fibrocalculous Pancreatic Diabetes (FCPD) is a form of diabetes secondary to choric, calcific, non-alcoholic pancreatitis (4). FCPD is predominantly a disease of youth and the usual age at onset is between 20-40 years of age (5). Onset in childhood is less common but has been reported by Geevarghese (6). In this paper we report on our experience with childhood onset FCPD.

MATERIAL AND METHODS

A computer analysis was made of 17, 360 consecutive diabetic patients registered at the Diabetes Research Centre, Madras. Patients with age at diagnosis of diabetes below 20 years of age were picked out. There were 258 patients with onset below 20 years of age (1.5%) of total cases. Of these 258 patients, those who satisfied the following criteria (7) were diagnosed as having FCPD :

1. Diabetes mellitus as defined by WHO study group criteria (4).
2. History of recurrent abdominal pain suggestive of pancreatitis
3. Unequivocal evidence of pancreatic calculi on plain X-ray of abdomen.
4. Ductal dilatation and other features of chronic pancreatitis on ultrasound.
5. Absence of other known causes of chronic pancreatitis , e.g. alcoholism.

All patients classified as having childhood onset FCPD underwent a thorough clinical examination. The weight and height were recorded and body mass index was calculated using the formula weight in kg/Height in sq. meters x 100. The pupils were dilated and a detailed fundus examination was made by direct and indirect opthalmoscopy. Diabetic retinopathy was classified according to the classification of Kohner et al (8). Neuropathy and nephropathy were diagnosed as described elsewhere (7).

Biochemical investigations included fasting and postprandial plasma glucose estimations (glucose oxidase method, Boehringer Mannheim), glycosylated hemoglobin measurements (9), and plasma C-peptide estimations by radioimmnoassay, both in fasting and post-prandial state by the method of Heading (10). Faecal chymotrypsin assay was done to assess pancreatic exocrine function as described elsewhere (11).

RESULTS

Table 1 shows the distribution of the 258 childhood onset diabetics in this series. It can be seen that while FCPD comprises 10.8% of diabetics with onset below 20 years of age, IDDM constitutes 63.9% and MODY 21.7% of childhood onset diabetics seen at our center.

Figure 1 shows the break-up of the age at diagnosis of all FCPD patients seen at our center. It can be seen that 11 FCPD patients had onset at or below 16 years of age . There was a male predominance (sex ratio M:F = 17:11) . Most patients were lean (mean BMI 18.2 ± 4.1 kg/m^2).

From: Diabetes Research Centre and M.V. Hospital for Diabetes Royapuram, Madras-13

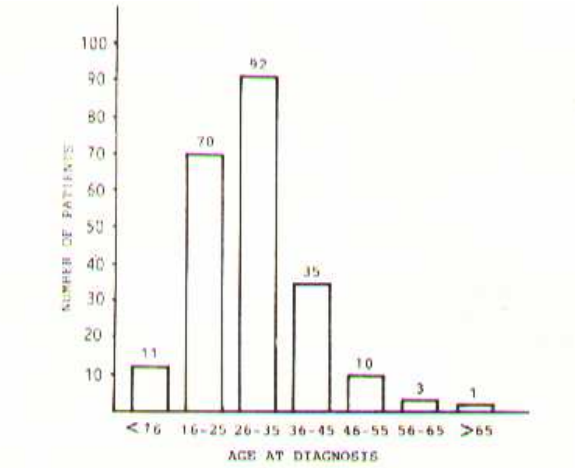

Figure 1 shows the distribution of age at diagnosis of the first 222 FCPD patients seen at DRC, Madras

The mean duration of diabetes in this group was 7 ± 5 years. The majority of patients (n=24) required insulin for control of diabetes. However, 4 patients could be controlled with oral hypoglycaemic agents probably because they had some residual beta cell function.

Three patients had background diabetic retinopathy and 1 patient had evidence of nephropathy. Five patients had clinical evidence of neuropathy. Macrovascular complications like ischaemic heart disease and peripheral vascular disease were not seen in this group of patients.

Table 2 shows the biochemical characteristics of childhood onset FCPD patients. It can be seen that most patients had fairly severe diabetes. However they did have some residual pancreatic beta cell function as shown by the C-peptide levels and this could explain the lack of ketosis in the majority of patients. Four patients in this series did exhibit evidence of ketonuria but overt ketoacidosis occurred only in 1 patient in this series.

DISCUSSION

This paper shows that Fibrocalculous Pancreatic Diabetes (FCPD) can occur in childhood. In our country an interesting spectrum of diabetes is seen in childhood (3,12) . In those diabetics with onset below the age of 20 years, IDDM is still the commonest type of diabetes seen at our center;

Table 1
Break-up of Childhood-Onset Diabetes seen at DRC, Madras

	No.	Percentage
Insulin Dependent Diabetes Mellitus	165	63.9
Maturity Onset Diabetes of Youth	56	21.7
Fibrocalculous Pancreatic Diabetes	28	10.8
Protein Deficient Diabetes Mellitus	3	1.2
Gestational Diabetes	2	0.8
Impaired Glucose Tolerance	4	1.6
Total	258	100.0

Table 2
Biochemical Characteristics of Childhood Onset FCPD

Fasting Plasma glucose (mg/dl)	231 ± 80
Post-prandial Plasma glucose (mg/dl)	332 ± 92
HbA1 (%)	12.1 ± 2.6
Fasting C-Peptide(μU/ml)	0.15 ± 0.11
Stimulated C-Peptide (μU/ml)	0.66 ± 0.42
Faecal Chymotrypsin (units/gm)	3.2 ± 1.1

Maturity Onset Diabetes of Youth (MODY) forms the second largest group, and third comes FCPD. As the age at diagnosis of diabetes is extended to 30 or 35 years, MODY becomes much more common (12,13) . Being clinic based data, the actual percentage of different diabetics may reflect referral bias. Difference in frequency of different forms of diabetes in childhood may thus exist at different centres even across southern India. There would also be differences in prevalence of different forms of diabetes at clinics in southern India compared to northern India where FCPD is less common.

If we look at the age distribution of FCPD patients, of the first 165 patients with FCPD registered at our centre, 24 (14.7%) had onset below 20 years of age (14). In Geevarghese's series (6), out of his first 400 patients , 91 (23.7%) had onset of diabetes below 20 years of age. In both our series as well as Geevarghese (6), the age at onset of pancreatitis (abdominal pain) is of course much earlier than the diabetes because in the natural history of this disease , pain in the abdomen usually (but not always) precedes the diabetes by almost a decade.

Routine X-rays of the abdomen and elicitation of history of abdominal pain helped to pick up the cases of FCPD reported in this paper, some of whom had in fact been wrongly diagnosed as IDDM by other physicians. Diagnosis of FCPD must be kept in mind in the differential diagnosis of childhood onset diabetics, particularly in southern India.

ACKNOWLEDGEMENTS

The study was supported in part by a grant from the Wellcome Trust, U.K. We thank M/S. Boehringer Mannheim, W. Germany for the gift of the faecal chymotrypsin kits.

REFERENCES

1. Laporte RE, Tajima N. Akerblom HK et al. Geographic differences in the risk of insulin dependent diabetes mellitus: the importance of registries. Diabetes Care 1985; 8 (suppl. 1): 101-107.

2. Fajans SS. Maturity onset diabetes of the young. Diabetes/Metabolism Reviews. 1983;5:579-606.

3. Ahuja MMS, Umashankar P, Garg VK. Different clinical types of Indian diabetics , characterization based on response of immunoreactive plasma insulin responses to glucose and tolbutamide load. Ind J Med Res 1972; 60:123-131.

4. WHO study group report on diabetes mellitus: WHO Technical Report Series, No. 27, WHO, Geneva, 1985.

5. Viswanathan M. Pancreatic Diabetes in India: an overview. In Podolsky S, Viswanathan M, eds. Secondary Diabetes: the spectrum of the diabetic syndromes, New York: Raven Press, 1980:105-116.

6. Geevarghese PJ: Pancreatic Diabetes. Bombay: Popular Prakashan, 1968:p-93.

7. Mohan V, Mohan R, Susheela L et al. Tropical Pancreatic Diabetes in south India: heterogeneity in clinical and biochemical profile . Diabetologia 1985;28: 229-232.

8. Kohner EM, Mchoed D, Marshall J. Diabetic eye disease. In keen H, Jarrett RJ, eds. Complications of diabetes, 2nd edition. London: Edward Arnold , 19-108.

9. Eross J, Kreutzmann D, Jiminez M et al. Colorimetric measurement of glycosylated protein in whole blood, red blood cells, plasma and dried blood. Ann Clin Biochem 1984;21: 519-522.

10. Heding LG. Radioimmunological determination of human C-Peptide in serum. Diabetologia 1975;11:541-548.

11. Mohan V, Snehalatha C, Ahmed MR et al. Exocrine pancreatic function in tropical fibrocalculous pancreatic diabetes . Diabetes Care 1989;12:145-147.

12. Ramachandran A, Mohan V, Snehalatha C et al. Clinical features of diabetes in the young as seen at a diabetes centre in south India. Diab Res. Clin Pract 1988; 4; 117-125.

13. Mohan V, Ramachandran A, Snehalatha C, Mohan R, Bharani G, Viswanathan M. High prevalence of maturity onset diabetes of the young (MODY) among Indians. Diabetes care 1985;8:371-374.

14. Mohan V, Chari ST, Viswanathan M, Madanagopalan N. Tropical Calcific Pancreatitis in southern India. Proceedings of the Royal college Physicians of Edlinburgh 1989 (In Press).