

Diabetes in the young – A Profile

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ABSTRACT

Among 16,800 diabetic subjects registered in the Diabetic Clinic of Madras Medical College from 1979-89, 160 subjects (0.9%) had the onset of disease below 20 years of age. In this group, among whom 40 subjects were females while the rest were males. The 160 subjects were further classified as insulin Dependent Diabetes Mellitus (IDDM) (126 subjects, 78.8%), Malnutrition Related Diabetes Mellitus (MRDM) (32 subjects, 20%) and Maturity Onset Diabetes in the Young (MODY) (2 subjects, 1.2%). The mean age of onset of diabetes in the younger age diabetic subjects was 12.5 ± 3.26 years, and the mean duration was 6.3 ± 2.94 years. BMI was less than 18 in all the subjects. The mean insulin requirement per day was 52 ± 6.3 units. Episodes of ambulant ketosis occurred at a mean frequency of 56.4 ± 9.2 per year among IDDM subjects. DKA was exceedingly rare and one subject had recurrent episodes of DKA and died of rhinocerebral mucormycosis. The dietary pattern of the subjects was as follows: Mean calorie intake 1554 ± 384.13 , mean carbohydrate intake 281 ± 79.32 gms, mean protein intake 40 ± 10.34 gms and mean fat intake was 30 ± 8.03 gms per day. Among the IDDM subjects, 5(4%) had clinical evidence of nephropathy (urine protein excretion more than 500 gms in 24 hours), 19 subjects (15.1%) had peripheral neuropathy, 7 subjects (5.6%) had retinopathy while 7 subjects (5.6%) had pulmonary tuberculosis. Malignant progression of microangiopathy was observed in two subjects and both of them died of end stage renal disease within 5 years after the one of diabetes mellitus. Among MRDM subjects, one (3.1%) had nephropathy and retinopathy. Hypertension was present in 3 IDDM subjects (2.4%) and two MRDM subjects (6.3%), while cardiomyopathy was present in one IDDM subject (0.8%) and one MRDM subject (3.3%).

INTRODUCTION

In our set up, diabetes mellitus in the younger age group, is characterised by a few distinct features, which are at marked variance with that observed in Western countries (1,2). Such features include the prevalence, the type, the

insulin requirement and episodes of metabolic decompensation. The low prevalence of IDDM and marked resistance towards development of ketosis and the frequent association of malnutrition have been adequately documented (3). Some of the younger age diabetic subjects with malnutrition have evidence of pancreatic lithiasis (4). While the prevalence of microvascular complications vary occasionally a malignant progression of angiopathy leading to death from ESRD is also encountered.

MATERIALS AND METHODS

In the present study out of a total of 16,800 diabetic subjects recruited over a ten year period in the Department of Diabetology, Madras Medical College and Govt. General Hospital, Madras, the prevalence, the clinical features, the dietary pattern and the prevalence of vascular complications among younger age subjects (onset of diabetes less than 20 years of age) were analysed.

The younger age subjects were classified as Insulin Dependent Diabetes Mellitus (IDDM), Malnutrition Related Diabetes Mellitus (MRDM), and maturity Onset Diabetes of the Young (MODY), as per the WHO criteria (5). The age of onset, the duration, BMI, mean insulin requirement and episodes of ketosis were analysed. Neuropathy was diagnosed by clinical examination while retinopathy and nephropathy were diagnosed by fundus examination and urinary protein excretion (more than 500 mg in 24 hours) respectively. Routine skiagram of chest with sputum examination for AFB were performed in all the younger age subjects.

RESULTS

The various features of younger age diabetics are :

Table – 1
PREVALENCE

Total Number of subjects registered	
In Diabetic Clinic	16,800
Number of Younger age subjects	160 (0.9%)

Table – 2
CLASSIFICATION

n=160

Type of Diabetes	Number	Percentage
IDDM	126	78.8
MRDM	32	20
MODY	2	1.2

Table – 3
CLINICAL PROFILE
OF YOUNGER AGE SUBJECTS

n=160

Male : Female Ratio	3:1
Mean age of onset	12.5 ± 3.26 years
Mean Duration	6.3 ± 2.94 years
BMI	< 18
Mean Insulin requirement	52 ± 6.3units/day
Episodes of ambulant Ketosis	56.4 ± 9.2/year

Table – 4
Dietary pattern per day

Mean caloric intake	1554 ± 384.13
Mean carbohydrate intake	281 ± 79.32g (73.8%)
Mean protein intake	40 ± 10.34g (8.2%)
Mean fat intake	30 ± 8.03g (18.0%)

Table – 5
Prevalence of Complications
In IDDM subjects

n=126

Complication	No. of Subjects	Percentage
Neuropathy	19	4
Nephropathy	5	15.1
Retinopathy	7	5.6

Table – 6
Prevalence of Complications
In MRDM subjects

Complication	No. of Subjects	Percentage
Nephropathy	1	3.1
Retinopathy	1	3.1

DISCUSSION

The prevalence of IDDM in our country is very low, as the present study has established a prevalence of less than 1% among total diabetic subjects. While such a low prevalence among Indian and other Asian children has been well established, it has been suggested that among Asian children with the susceptible HLA association, the prevalence rates are comparable to that of the Western countries (6), signifying the dominant contribution of environmental factors. IDDM constitutes the major sub-type among the younger age diabetics in our study, although with certain unique features. As even IDDM subjects have a low BMI, subjects provisionally classified as MRDM, based on the twin features of absence of ketosis and a BMI less than 18 could well represent the clinical entity of the slow-onset variant of IDDM, ultimately manifesting as true IDDM. Preliminary studies on HLA pattern among the MRDM subjects being identical to that of IDDM (unpublished observation) lends credence to the notion that subjects diagnosed as MRDM might be just a clinical variant of IDDM, the clinical picture being modified presumably by the associated malnutrition. Even though the subjects were grossly underweight and malnourished, the mean insulin requirement was relatively higher, emphasising the role of insulin resistance in these younger age subjects. As has been observed by many workers, the prevalence of diabetic ketoacidosis among the younger age subjects is extremely rare. The lack of subcutaneous fat and probably preservation of some amount of beta cells mass, effectively countering lipolysis, could be the possible explanations for the rarity of diabetic ketoacidosis. On the other hand, IDDM subjects who are less compliant with the treatment regimen, seek medical advice and treatment for episodes of ambulant ketosis, associated with mild dehydration and with conventional treatment consisting of the intravenous saline infusion and

small doses of regular insulin at frequent intervals, metabolic stability is restored within a very short period. In our experience a solitary IDDM subject had recurrent episodes of DKA and died of rhinocerebral mucormycosis.

The dietary pattern of the subjects conforms to that established by other workers with a carbohydrate, protein and fat intake of 73.8%, 8.2%, 18% respectively. The prevalence of microvascular complications of diabetes mellitus was very low as revealed by Tables 5 and 6. Presumably the short duration of disease (mean 6.3 ± 2.94 years) could be a major factor accounting for this low prevalence (8). Even though the overall vascular complications were less, the clinical course in two subjects with IDDM and microangiopathy was one of rapid progression. Within five years after the onset of disease both the subjects had proliferative retinopathy with vitreous haemorrhage and died of end-stage renal disease, warranting a label of malignant angiopathy. Additionally, seven IDDM subjects had pulmonary tuberculosis.

CONCLUSION

The prevalence of diabetes mellitus in the young is very low. IDDM constitutes the bulk of younger age diabetics. The mean insulin requirement is relatively higher considering the body weight of the subjects. Episodes of ambulant ketosis are observed while DKA is rare. In spite of a low

prevalence of microangiopathy, malignant progression is occasionally observed.

REFERENCES

1. Fischbein HA, Faich GA, Ellis SE. Incidence and hospitalisation patterns of insulin dependent diabetes mellitus. *Diabetes Care* 1982; 5: 630.
2. Stewart-Brown S, Haslum M, Butler M. Evidence for increasing prevalence of diabetes mellitus in childhood. *Br. Med. J.* 1983; 286:1985.
3. Bodansky HJ, Bererley DW, Gelsthrope K. Insulin dependent diabetes in Asians. *Arch. Dis. Child* . 1987; 62:227.
4. Geevarghese. *Calcific pancreatitis* Verghese Publishing House, Bombay, 1985.
5. Diabetes Mellitus Report of a WHO Study Group Technical Report Series 727, WHO Geneva, 1985.
6. Samanta A, Burden AC, Jones GR et al. Prevalence of insulin dependent diabetes mellitus in Asian children ., *Diabetic Med.* 1987; 4: 65.
7. Hadden DR. Food and diabetes. The dietary treatment of insulin dependent and Non-insulin dependent diabetes. *Clin. Endocrinology metab* 1982; 11: 503.
8. Streky G, Wall S. Determinants of microangiopathy. With special reference to retinopathy and glycaemic control. *Acta Paediatr. Scand.* 1986; 75:5.