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Mode of presentation of juvenile diabetes

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Summary

In a study of 66 children with juvenile diabetes symptoms had often been present for over a month before diagnosis. Though polyuria, polydipsia, and weight loss were the commonest features, other important symptoms included tiredness, lethargy, and malaise. A gradual onset of diabetes was commoner than is generally realised.

Introduction

Although juvenile diabetes is uncommon it is important for all doctors treating children to be alert to the different ways in which it may present. We performed a study, reported here, to determine the mode of onset of diabetes in children and to estimate delays in diagnosis.

Patients and methods

Sixty-six children (35 boys and 31 girls) below the age of 17 years (the youngest being 21 months of age) who presented with juvenile diabetes in two district hospitals over nearly three years (January 1972 to November 1975) were studied. Nine other children presenting with diabetes over this period were excluded because details of their admission were inadequate or we had difficulty in tracing them for follow-up.

Most of the information about symptoms and delay in diagnosis was obtained from an interview with the parents and, in the case of the older children, with the children themselves. All the hospital notes, including the general practitioner's initial referral letter, were also carefully examined.

Results

SYMPTOMS

The classical symptoms of juvenile diabetes—namely, polyuria, polydipsia, lethargy, and weight loss—were, not surprisingly, the four

commonest presenting symptoms in this series (see table). Sixty-four children had polydipsia; 61 had polyuria; 59 had lethargy, malaise, and tiredness; and 48 had weight loss. One interesting finding was a high incidence of secondary enuresis (25 children). Irritability was noted in 17 children. Seven children had blurring of vision before diabetes was diagnosed, while six presented in severe diabetic keto-acidosis. Two children were found to be diabetic on routine urine analysis when attending hospital for other conditions.

Duration of symptoms before diabetes was diagnosed in 66 children

Duration (weeks):	<1	1-	2-	4-	≥8	Unknown	Total No of children with each symptom
Polydipsia ..	20	16	9	13	5	1	64
Polyuria ..	21	13	9	12	5	1	61
Lethargy ..	14	12	9	11	9	4	59
Weight loss ..	11	6	5	12	5	9	48
Abdominal pain ..	15	4	1	7	1	2	30
Enuresis ..	7	1	4	4	5	4	25
Nausea and vomiting ..	14	2	1	2	1	2	22
Irritability ..	4	4	2	3		4	17
Visual symptoms ..	2	1	1			3	7
Coma ..	6						6

DURATION OF SYMPTOMS

The estimated duration of the individual symptoms is shown in the table. The exact duration of some symptoms could not be given by some parents. Six of the children had symptoms for under a week, 13 had symptoms for more than one but less than two weeks, and 18 had symptoms for over two weeks but less than a month. The remaining 29 had symptoms for one month or more: one child had polyuria and polydipsia for over a year before diabetes was diagnosed. No correlation was found between the duration of symptoms and the severity of the diabetes on presentation.

The classical symptoms of juvenile diabetes were often present for many days, and, in many of the children, for more than a month. Those symptoms associated with ketoacidosis—notably, nausea, vomiting, and abdominal pain—occurred predominantly in the few days before the diagnosis, but several children complained of abdominal pain some weeks before the diagnosis was made.

Twenty children had an upper respiratory tract infection within a month of diagnosis of diabetes. Mumps, however, was only reported in one child three weeks before diabetes was diagnosed; there was no history of abdominal pain at that time to suggest the presence of mumps pancreatitis.

MODE OF DIAGNOSIS

In 22 of the children the diagnosis of diabetes was either suspected or made by the parents or, in one case, a brother. There was a history of diabetes in a first-degree relative in nine of the 65 children (excluding one adopted child). This incidence of 14% is comparable

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with that in other studies.^{1,2} In half the children diabetes was diagnosed by their general practitioners before admission to hospital. The general practitioner also confirmed the diagnosis in the 22 children in whom it had been diagnosed by a member of the family. There were, however, 11 children in whom the diagnosis was not made until they were admitted to hospital or attended an outpatient clinic. Of these 11 children two did not need insulin, but six of the remainder were admitted in diabetic precoma or coma. In two of these cases meningitis was suspected, lumbar puncture was performed, and the glucose concentration in the cerebrospinal fluid was over 22.2 mmol/l (400 mg/100 ml).

Delay in diagnosing diabetes was relatively common: 31 children were taken to their general practitioners more than once before the diagnosis was made or before admission to hospital was arranged. Indeed, 16 children visited the general practitioner more than twice. Of the 66 children admitted for treatment 17 had serum bicarbonate levels below 15 mmol (mEq)/l before insulin treatment. Of these 17 children 11 had been taken to their general practitioners more than once before admission.

Common mistakes in diagnosis were made when the symptoms of diabetes were misinterpreted. Five children were given tonics or iron preparations by their general practitioners for malaise, lethargy, or tiredness. In seven children polyuria was misdiagnosed as increased frequency of micturition and treatment prescribed or investigation instituted for a presumed urinary tract infection. In two children Kussmaul respiration was interpreted as being due to bronchitis and pneumonia. The most extraordinary misdiagnosis of diabetes was made in a boy aged 4 years who was referred to a paediatrician because of a one-year history of a supposed speech defect. This was found to be due to a dry mouth, secondary to polyuria; the speech defect disappeared on treatment of his diabetes.

MATURITY ONSET TYPE OF DIABETES IN YOUNG PEOPLE

Two children in the study were found to have a condition that resembled maturity onset diabetes. Both children were observed for over a year and both remained well controlled on a restricted carbohydrate diet alone.

Case 1—A 3-year-old boy was found to have glycosuria on routine urine analysis when admitted for the treatment of croup. An abnormal glucose tolerance test result was obtained when he had recovered from the croup. A repeat glucose tolerance test 10 months later gave a normal result.

Case 2—A 16-year-old girl was found to have glycosuria on routine urine analysis at a family planning clinic. Two abnormal glucose tolerance test results were obtained 16 months apart. Her paternal grandmother suffered from maturity onset diabetes. Her brother was found to have a maturity onset type of diabetes in 1960 at the age of 7 years, and he remained symptom free on a restricted carbohydrate diet.³ Her sister was found to have glycosuria at the age of 15 years in 1967. Her condition resembled maturity onset diabetes, and she also remained free of symptoms on a restricted carbohydrate diet.

Discussion

It is well known that polyuria, polydipsia, and weight loss are the commonest symptoms of juvenile diabetes, but the non-specific symptoms of tiredness, lethargy, and malaise, which are often misinterpreted, were present in 59 children. There was a high incidence of nocturnal enuresis (38%). The incidence of this symptom in the normal child is difficult to determine. Miller⁴ gives the following percentages of children with primary enuresis at any particular age: 17.5% at 5 years, 11% at 11 years, 6% at 13 years, and 2% at 15 years. The figure of 38% of children enuretic before diabetes was diagnosed relates to secondary enuresis, which is less common than primary enuresis.

Infection preceded the onset of diabetes in 10% of one large series⁵ and 42% of another series.⁶ Although 30% of the children in this study were found to have suffered an upper respiratory tract infection within one month of diagnosis of diabetes, this is probably a normal incidence for respiratory tract infections among children.⁷

Gradual onset of juvenile diabetes is commoner than is often realised: nearly half (49%) of the children had symptoms for more than a month. No mother could be as precise as Jolly⁸ claims is possible in being able to "state not only the day of onset, but even the actual hour." Nevertheless, 19 (29%)

children did have an acute onset with symptoms lasting less than two weeks. Drash⁹ gives a figure of 20% with symptoms of less than two weeks duration.

Doctors treating children should be alert to the various ways in which juvenile diabetes may present. That diagnosis is often delayed or missed is apparent from the fact that 31 of the children were taken to their general practitioners with symptoms suggestive of diabetes more than once before the diagnosis was made or before admission to hospital was arranged. Moreover, 11 of the children were not diagnosed as diabetics until admission to hospital.

Symptoms of lethargy, tiredness, and malaise should not be lightly dismissed with reassurance and tonics without urine analysis. Testing urine for glycosuria (preferably on post-prandial rather than random specimens) is a simple procedure.

Before treatment few diabetics have difficulty in providing a specimen of urine, but in our experience there is often a delay in requesting a specimen even in cases with suggestive symptoms. If urine testing for glycosuria were more routinely performed and repeated tests carried out in those with suggestive symptoms but with initially negative test results for glycosuria delay in the diagnosis would be less common and perhaps the morbidity and mortality of diabetic ketoacidosis, precoma, and coma might be avoided. Six of the children in the present study were found to have glycosuria, but their admission to hospital was delayed, on average for three days, before a convenient outpatient clinic appointment could be arranged. In our view any child presenting for the first time with glycosuria and diabetic symptoms should be seen urgently for blood glucose estimation.

MATURITY ONSET TYPE OF DIABETES IN YOUNG PEOPLE

Although most juvenile diabetics are dependent on insulin it has been increasingly recognised that there is a group of children who develop a mild form of diabetes similar to maturity onset diabetes in adults.¹⁰ These children usually have no symptoms and do not develop ketonuria, as was the case in the two examples in the present study. Many features of this type of diabetes suggest that it is at a different end of the spectrum of diabetes. Children with this type of diabetes more often have a strong family history of diabetes,¹¹ and it has been suggested that this condition may be inherited as a Mendelian dominant.¹² The family history of diabetes in case 2 is interesting. The prognosis of a maturity onset type of diabetes in young people seems to be better than that for the normal juvenile diabetic: fewer of the late complications of diabetes occur in the former group.¹²

It is important, therefore, to recognise that the syndrome of diabetes presents a broad spectrum of clinical features and biochemical changes in children as in adults, and prospective studies of groups of diabetic children might add much to the understanding of this important condition.

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