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Original Article

Clinical presentation of childhood type 1 diabetes mellitus in the Al-Madina region of Saudi Arabia

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Aim: To describe the clinical pattern and the laboratory characteristics at presentation of childhood type 1 diabetes mellitus in the Al-Madina region of the north-west province of Saudi Arabia.
Methods: The clinical and laboratory data of a total of 230 children who presented with diabetes during a 10-year period (1992–2001) were retrospectively analyzed based on hospital records.
Results: Polyuria and polydipsia were by far the most frequent symptoms at presentation (96%); three quarters of the children (76.6%) had weight loss at presentation. One hundred and twenty-seven children (55.2%) of 230 presented with ketoacidosis. The mean age at diagnosis was 6.9 yr. The average duration of presenting symptoms before the hospital encounter was 17.1 d ranging from 3.0 to 45.0 d, with an average of 16.2 d in boys and 17.7 d in girls, a difference which was not significant.
Conclusion: Polyuria, polydipsia, and weight loss are the most common symptoms at presentation of childhood diabetes mellitus in our region. The frequency of diabetic ketoacidosis was relatively high. The commonly recognized symptoms of diabetes were present in most of the children for a relatively long duration before the diagnosis. This calls for a collaboration of efforts for the early recognition of symptoms by patients and physicians to avoid the more severe types of presentation.

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The majority of diabetic children worldwide presents with the classical symptoms of polyuria, polydipsia, and weight loss. When suspected, a simple finger prick test can put the diagnosis beyond reasonable doubt. However, there is a significant variation in the presentation of childhood type 1 diabetes mellitus in different countries worldwide, particularly in the incidence of diabetic ketoacidosis, which carries a significant risk of mortality. This wide variation in the clinical presentation of type 1 diabetes mellitus may reflect a possible heterogeneity in the pathogenesis of the disease (1–4). The rate of β-cell destruction is reflected clinically by different preclinical duration, age of onset, and the severity of presentation (5, 6).

Methods

A retrospective study was undertaken in the Maternity and Children's Hospital in Al-Madina, a north-west province of Saudi Arabia. The hospital records of children who presented with diabetes between January 1992 and December 2001 were reviewed. The clinical and laboratory data of a total of 230 children under the age of 15 with childhood type 1 diabetes mellitus at the time of presentation were collected and analyzed.

Patients were registered according to the World Health Organization (WHO) multinational project for childhood diabetes (WHO DIAMOND) criteria for the diagnosis of diabetes (7). Subjects were included only if

insulin treatment had been started before the 15th birthday and never discontinued. There were only two cases of secondary diabetes and they were excluded; no case of type 2 diabetes was diagnosed in our hospital during this period. Ketoacidosis was defined as hyperglycemia above 14 mmol/L and pH < 7.3 or bicarbonate < 15 mmol/L in the presence of ketonuria (8, 9).

Data for the common symptoms of type 1 diabetes at presentation (polyuria, polydipsia, weight loss, abdominal pain, vomiting, fever, and altered consciousness) were collected and analyzed for severity and duration. Data about biochemical values, known to be disturbed at presentation of type 1 diabetes mellitus (blood glucose, urea, creatinine, pH value, and base excess), were also collected. Unfortunately, not all of the clinical data were complete. The missing data are summarized in Table 1. In the statistical analysis, age and the duration of symptoms achieved normal distribution, and thus, calculation of the geometric mean and its 95% CI was possible. The biochemical values did not produce normal distribution; thus, the median and its 95% CI were calculated according to Campbell and Gardner (10).

The differences in the mean values between gender, age groups, and the duration of symptoms were calculated using the Kruskal–Wallis Chi-square test. The degree of association of two variables was calculated by Pearson's correlation coefficient (r). The level of significance was defined as p-value less than 0.05. The data base was divided into three age groups: 0–4, 5–9, and 10–14 yr, referred to hereafter as the young, middle, and older age groups.

Results

In the 10-yr study period from January 1992 to December 2001, we were able to review a total of 230 patients under the age of 15 yr who were diagnosed as diabetic and started on insulin treatment in our hospital. One hundred and eleven (48%) were boys, 119 (52%) girls, 194 were Saudi nationals, 36 were of other, different nationalities. The overall mean age at diagnosis was 6.9 yr, (4 months to 14 yr); the mean age at diagnosis for boys was 6.7 yr while the mean age for girls was 6.9 yr, and the difference was not significant. Sixty-five (28.3%) children were in the young age group, 93 (40.4%) were in the middle age group, and 72 (31.3%) were in the older age group, with a significant higher relative incidence in the middle age group.

Polyuria and polydipsia were by far the most frequent symptoms observed in 96% of the children. Three quarters of the children (76.6%) were observed by their parents to have weight loss by the time of diagnosis. Abdominal pain, vomiting, and altered level of consciousness were also often reported, as summarized in Table 1.

The average duration of presenting symptoms before the hospital encounter was 17.1 d, ranging from 3.0 to 45.0 d, with an average of 16.2 d for the boys and 17.7 d for the girls, a difference which was not significant. In only 87 (38%) of the children was the duration of symptoms less than 2 wk.

A record of the laboratory data at presentation is summarized in Table 2. Almost all patients (98.1%) had blood glucose above 10 mmol/L at presentation. The median blood glucose value was 27.0 mmol/L; the highest value reported was 72.2 mmol/L (Fig. 1).

Blood gas analyses revealed metabolic acidosis in 55.2% of all patients. The median pH value was 7.28; the lowest value was 6.89. Acidosis was metabolic in type in all patients with a median value of base excess of −11.0; the lowest value was −27.3. Ketonemia was diagnosed in 181 children. According to our criteria, only 127 (70%) of them had ketoacidosis. A total of 127 of 230 children (55.2%) presented with ketoacidosis.

Blood urea nitrogen was elevated at presentation in 9.3% of the patients with the median value within the normal range (4.4 mmol/L). The abnormalities in electrolytes at presentation were hypokalemia in 18.8% and hyponatremia in 39%.

Discussion

The typical presentation of childhood type 1 diabetes is easily recognized, and confirmation of such a diagnosis can be simple and inexpensive.

The wide variation of the incidence and clinical presentation worldwide may be due to racial variation but

Table 1. Clinical symptoms at presentation

Symptoms	Number of patients with available data	Number of patients with the symptoms	Percentage(%)
Polyuria	224	215	96.0
Polydipsia	224	215	96.0
Weight loss	192	147	76.6
Abdominal pain	186	118	63.4
Vomiting	119	42	35.3
Fever	138	39	28.3
Altered consciousness	218	41	18.8
Glucosuria	216	204	94.4
Ketonuria	216	181	83.8

Table 2. Laboratory data at presentation

	Median	Maximum	Minimum
Blood glucose (mmol/L)	27.0	72	9.4
Arterial pH	7.28	7.49	6.89
Base excess (mmol/L)	−11.0	−27.3	−1.0
Serum Na (mmol/L)	134.0	143	120
Serum K (mmol/L)	4.0	5.9	2.5
Blood urea nitrogen (mmol/L)	4.4	9.6	1.2
Serum creatinine (μmol/L)	70.0	180	34

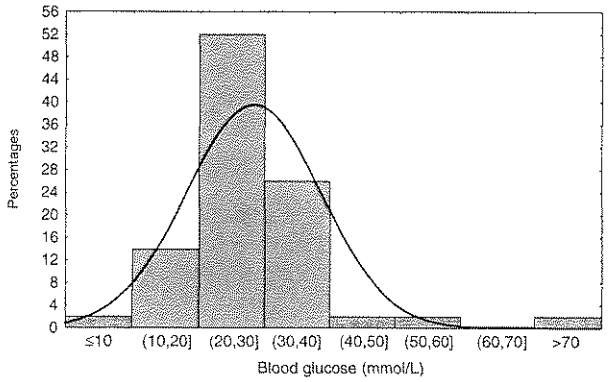

Fig. 1. Distribution of blood glucose at presentation.

still offers many possibilities for identifying environmental factors.

There are few reports about the clinical pattern of childhood type 1 diabetes in Saudi populations which showed that ketoacidosis is the most common presentation (11, 12). It is also suggested that the presentation of type 1 diabetes in children from Saudi Arabia seems to be more severe than reports from developed countries.

To our knowledge, this is the first report about clinical patterns of childhood diabetes mellitus in the Al-Madina region of Saudi Arabia. It was conducted in a government hospital where free medical services are provided.

Polyuria, polydipsia, and weight loss were the most commonly reported symptoms at the time of presentation, as reported in many other studies (13–16). The mean duration of symptoms prior to diagnosis was 17 d, which is longer than a series reported from another region in Saudi Arabia which was 12.5 d (12). But it was comparable to data from Europe with a mean duration of symptoms of 15.2 d (1).

Looking at the age groups, the middle age group had the higher incidence of diabetes as compared with the young and older age groups, but there were no other differences in clinical presentation.

We observed that families with previous experience with childhood diabetes are able to recognize the symptoms and to report earlier to the hospital. Some of the ketoacidotic children were diagnosed elsewhere as diabetics, but they were reluctant to go to the hospital, avoiding being started on insulin.

Ketoacidosis was the most common presentation (55.2%). This was much less than a series from other regions in Saudi Arabia which was 77% (12), while in 11 different centers in Europe, the overall proportion of ketoacidosis was 40% (range from 26 to 67%) (13).

These variations in the worldwide incidence of ketoacidosis at presentation raise the question whether this difference is due to racial and environmental influences or it is simply describing a different clinical subtype of childhood diabetes.

Conclusion

The commonly recognized symptoms of diabetes were present in most of the children for a relatively long duration before the diagnosis. The frequency of diabetic ketoacidosis was relatively high.

This calls for a collaboration of efforts to avoid the more severe types of presentation. Early recognition of symptoms by parents by way of a more broad public knowledge and awareness of the significance of early symptoms is needed, as well as a better diagnostic approach by physicians, followed by immediate referral to a diabetes service.

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