

Prevalence And Clinical Profile Of Diabetes Mellitus In Pediatric Age Group : A Hospital Based Study

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Date of Submission: 10-03-2018

Date of acceptance: 28-03-2018

I. Introduction -

The term diabetes mellitus describes a complex metabolic disorder characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action or both. Inadequate insulin secretion and or diminished tissue responses to insulin in the complex pathways of hormone action results in deficient insulin action on target tissues, which leads to abnormalities of carbohydrate, fat, and protein metabolism. Impaired insulin secretion and or action may coexist in the same patient (1, 2).

Most cases of diabetes can be classified into two broad etiopathogenetic categories : type 1 diabetes, which is characterized by an absolute deficiency of insulin secretion; or type 2 diabetes, which results from a combination of resistance to insulin action and an inadequate compensatory insulin secretory response. While type 1 diabetes remains the most common form of diabetes in young people in many populations, especially those of Caucasian background, type 2 diabetes has become an increasingly important public health concern globally.

Diagnostic criteria for diabetes in childhood and adolescence.

Diagnostic criteria for diabetes are based on blood glucose measurements and the presence or absence of symptoms (1, 4).

Diabetes in young people usually presents with characteristic symptoms such as polyuria, polydipsia, nocturia, enuresis, weight loss – which may be accompanied by polyphagia, and blurred vision. Impairment of growth and susceptibility to certain infections may also accompany chronic hyperglycemia.

In its most severe form, ketoacidosis or less commonly non-ketotic hyperosmolar Syndrome may develop and lead to stupor, coma and in the absence of effective treatment, death. If symptoms are present, urinary 'dipstick' testing for glycosuria and ketonuria, or measurement of glucose and ketones using a bedside glucometer, provides a simple and sensitive screening tool.

Criteria for the diagnosis of diabetes mellitus (1, 2).

i) Classic symptoms of diabetes or hyperglycemic crisis, with RBS ≥ 11.1 mmol/L (200 mg/dL) or

ii) Fasting plasma glucose ≥ 7.0 mmol/L (≥ 126 mg/dL). Fasting is defined as no caloric intake for at least 8 h* or

iii) Two hour postload glucose ≥ 11.1 mmol/L (≥ 200 mg/dL) during an OGTT*.

The test should be performed using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water or 1.75 g/kg of body weight to a maximum of 75 g or

iv) HbA1c $> 6.5\%$.

A value of less than 6.5% of HbA1c does not exclude diabetes diagnosed using glucose tests. The role of HbA1c alone in diagnosing type 1 diabetes in children is unclear.

- A formal plasma glucose measurement is required to confirm the diagnosis; this should be based on laboratory glucose oxidase estimation rather than a capillary blood glucose monitor.
- HbA1c can be used as a diagnostic test for diabetes providing that stringent quality assurance tests are in place and assays are standardized to criteria aligned to the international reference values, and there are no conditions present which preclude its accurate measurement (2, 5). However, in rapidly evolving diabetes, such as the development of type 1 diabetes in some children, HbA1c may not be significantly elevated despite classic symptoms of diabetes.

II. Materials And Methods

Hospital records of all children admitted with DKA to Rajendra Institute of Medical Sciences, Ranchi , PICU over a 9 months period from May 2017 to January 2018 were reviewed. Clinical, laboratory and other data at the time of admission and during stay in PICU were collected and analyzed.

III. Results

The number of admitted children to our Pediatric Department, during the 9 months of the study, was 2540. The number of all children admitted to our PICU in the study period was 540, 80 of whom were admitted with DKA (Type 1 Diabetes). The age of children in the study ranged between 8 months and 14 years, with a mean of 10.7 years. Those older than 10 years were 34 (42.5%) and only 3(3.75%) were infants \leq 1 year of age. Those aged >1 year up to 10 years were 43(53.75%). Female to male ratio was 1.22:1 (55% were females and 45% were males). A family history of diabetes was positive in 59(74%) of children with DKA. Among these 31(52.5%) were from 1st degree relatives, whereas siblings accounted for 25.4%, fathers 24% and only 3.1% from mothers. Grandfathers and grandmothers each accounted for 35% of this positive family history of diabetes. Many of our admitted children (40.6%) had more than one diabetic relative. Childhood infections were the commonest and leading precipitating factor for the development of ketoacidosis (82.1%). Poor compliance with omission of insulin was the second factor (17.9%). Reported infections included upper respiratory infections, bronchopneumonia and tonsillitis. Urinary tract infection and vaginal candidiasis were rare causes vomiting and abdominal pain were the commonest presenting symptoms [12].

All patients were dehydrated with 43.4% having severe degree. In our study almost 31.3% of cases had altered level of consciousness with two (2.5%) being comatose.

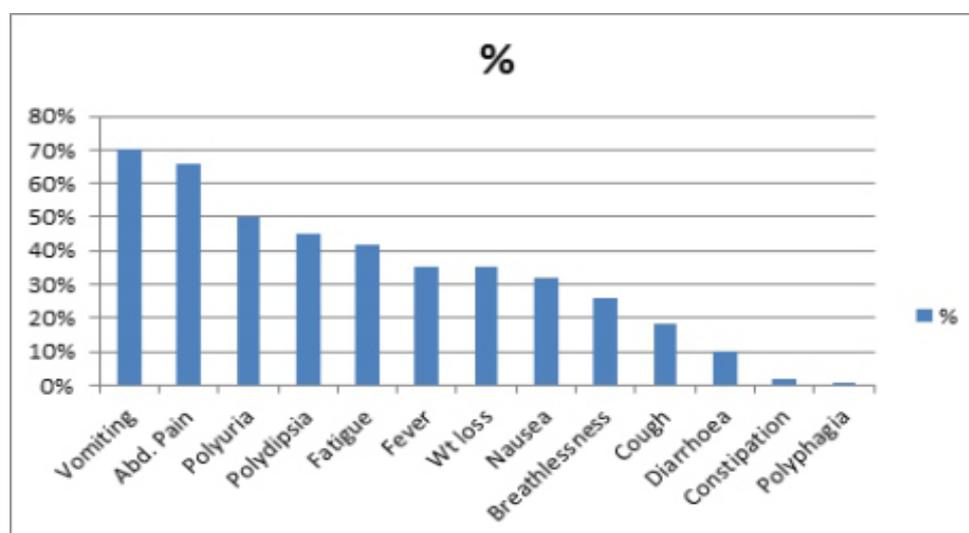
Three of our children were initially diagnosed as “Acute Appendicitis” but fortunately the correct diagnosis was made before surgical intervention. We therefore concur with the recommendation that diabetes should be ruled out in all cases of acute abdomen. In their study in Paris, Blanc et al [30] found that misdiagnosis was more frequently observed in children with DKA than in children without DKA [30-32]. In our results, 88.7% of admitted children with DKA recovered at a time between 12 and 24 hours following management. We had only one case of clinical cerebral edema, who fortunately recovered completely. Our figure is similar to reports from UK and USA where less than 1% of cases developed cerebral edema . Cerebral edema accounts for 20% of diabetes-related deaths. No deaths occurred in our admitted children.

1.Prevalance of DM in different age group of children.

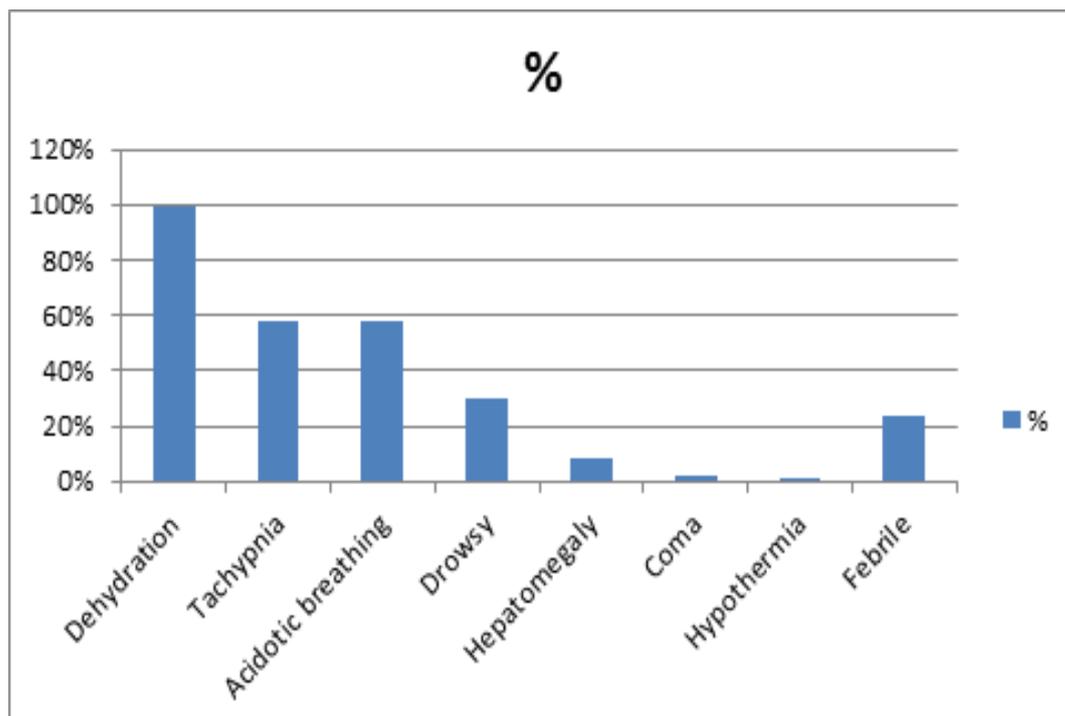
Age group	No. of cases
<1 year	3 (3.75%)
1-10 years	43 (53.75%)
>10 years	34 (42.5%)

2.Prevalance of DM in different sex group of children.

Sex group	% of cases
Male	45%
Female	55%



3.Symptoms at the time of admission to PICU



4.Profile of signs of our admitted patients.

IV. Conclusion

Diabetic ketoacidosis (DKA) is an important cause of hospital admissions in our study and 65% of newly diagnosed cases presented with DKA. Girls were facing more risk. Positive family history of diabetes was significant in as many as 3/4 of our children and consanguinity was reported among 40% of children's parents. Infections are the most common precipitating factor; therefore, preventive measures aiming at childhood infections can help in reducing significantly the incidence of DKA. Vomiting and abdominal

pain are the commonest presenting symptoms, with only 2.5% presenting with coma. Current availability of intensive care facilities, as well as standardized guidelines for management, has resulted in management outcome and complications similar to the experience in Developed Countries. We had no mortalities, and almost all cases recovered within 12-24 hours. More efforts should be put to prevent and reduce the incidence of DKA at initial presentation and later on. We also recommend that diabetes should be ruled out in all cases of acute abdomen.

TAKE HOME MESSAGE

1. Type-1 DM is more common in 1 to 10 years age group and more in female sex.
2. Vomiting with pain abdomen with sign of dehydration was the main clinical presentation of DM Type 1.

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1Dr. Neelotpal "Prevalence And Clinical Profile Of Diabetes Mellitus In Pediatric Age Group : A Hospital Based Study." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, vol. 17, no. 3, 2018, pp 57-60.