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TO STUDY THE CLINICAL PROFILE OF CHILDREN OF TYPE 1 DM, ADMITTED WITH DIABETIC KETOACIDOSIS (DKA) IN PICU.

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ABSTRACT

OBJECTIVE: To study the clinical profile of children of type 1 DM, admitted with diabetic ketoacidosis (DKA) in PICU. **METHODS:** We retrospectively analysed the case records of 40 children admitted with DKA to our intensive care unit, from 2010-2015. Information regarding personal details, chief complaints, clinical features, laboratory parameters, management and outcome was recorded using a predesigned proforma. **RESULTS:** The median age at presentation was 9 years (range 3 yr- 16yrs); 17 boys and 23 girls were enrolled. Diabetes was newly diagnosed in 25 cases and known cases of type1 diabetes were 15. Commonest presenting complaints were febrile illness (76%), rapid breathing (62%), vomiting (61%), and altered sensorium (24%). Average length of PICU stay was 72 hrs. All of the cases had elevated HbA1c, except two. Co-morbities found was UTI in 15 (37%), and Cerebral edema was seen in 5 cases. There was no mortality in our study. **CONCLUSION:** DKA in children if diagnosed early and managed timely has good outcome. Poor compliance is most important precipitating factor in known cases of T1DM.

KEYWORDS: Diabetic Ketoacidosis, Type I DM, Cerebral Edema.

INTRODUCTION

Diabetic ketoacidosis is a major known complication of type1diabetes mellitus (T1DM) in children and is associated with increased risk of morbidity and mortality. Though type 1DM accounts for most cases of diabetes in childhood, approximately 50% of individuals present in adulthood. Around 20-40% of children with newly diagnosed type 1 DM present in DKA.[1] Diabetic ketoacidosis accounts for nearly 0. 6 % of total PICU admissions.[2] Though clinical features and management guidelines for DKA are well known, a high index of clinical suspicion is necessary for early diagnosis and timely intervention. There is lack of published studies on DKA from India. This study was done to study the clinical profile and outcome of DKA.

MATERIALS AND METHODS

A retrospective study was done in PICU of tertiary level care hospital. Case records of children admitted with DKA from 2010 to 2015 were reviewed and data regarding personal details, presenting complaints, clinical features, family history of type1DM, laboratory parameters, management, duration of PICU stay and outcome was recorded using a predesigned pro forma.

DKA was diagnosed when blood sugar at admission was >200mg/dl with acidosis (pH <7. 35, bicarbonates <15), and positive urine ketones bodies. Severity was graded as mild, moderate and severe depending on blood gas and clinical features.[1] Monitoring of heart rate, respiratory rate, blood pressure, level of consciousness and fluid charting was done hourly. Capillary blood glucose was measured every 1 hourly. Urine ketones, serum electrolytes, and arterial/venous blood gas was measured 6 hrly.

Milwaukee protocol was followed depending upon the severity of DKA. Insulin infusion was stopped when child was alert, tolerating oral feeds with no emesis, metabolically stable. Initially rapid short acting regular insulin was given subcutaneously. Then it was replaced by mixed insulin (30/70) once blood sugar stabilized. All children were given i/v ceftriaxone until infection ruled out.

RESULTS

The median age at presentation was 8 years (range 3 yr-16yrs) with A F: M ratio of 1.3 : 1. 23 females and 17 males were affected (table 1). Mean duration of symptoms before hospitalization was 5 days. Family history of type 1 DM was present in 5 cases. Commonest presenting complaints were febrile illness (76%), rapid breathing (62%), vomiting (61%), and altered sensorium (24%). loose motions in 4 (10%), and seizures in 4 (10%). Classical h/o polyuria and polydipsia were seen only in 4 cases (10%). Among 40 cases, 25 were new cases and 15 were known cases of T1DM. Out of 15 known cases of T1DM incompliance

was the cause of DKA in 7 (48 %) and intercurrent illness in 4 cases (40%). 9, 13 and 18 were of mild, moderate and severe variety respectively (table 2). Average length of PICU stay was 72 hrs and for discharge from hospital was 7. 2ays. The median time for the arterial blood gases to become normal was 19 hrs and changing over to subcutaneous insulin was 1.7 days. In associated co morbidities, UTI was seen in 15 cases, hypothyroidism in 5 cases, viral hepatitis in 4 and acute renal failure in 4. Cerebral edema was seen in 5 cases.

Table 1: Age and Sex wise distribution of children

Age group (years)	Girls	Boys	Known case of T1DM	New Case
<5	5	4	3	7
5-10	10	5	7	8
>10	8	8	5	10
Total	23	17	15	25

Table 2: Severity of DKA among various age groups

Age group (in years)	Mild	Moderate	Severe
<5	3	-	6
5-10	3	10	7
>10	3	3	5
Total	**9**	**13**	**18**

DISCUSSION

Diagnosis of DKA is often missed, as classical history of polyuria and polydipsia is generally unavailable in children. The younger the child, the more difficult it is to diagnose DKA, especially with new-onset or previously undiagnosed diabetes mellitus (DM). In infants and young children symptoms may be nonspecific and this needs a high index of suspicion to diagnose DKA.

There exists difficulty in recognizing the symptoms of diabetes among parents and physicians. Studies have reported that unusual bed-wetting in a previously "dry" child occurred long before the diagnosis of T1DM; however, only in a few cases these parents were able to suspect the presence of hyperglycemia.[3] Vigilance of parents and caretakers play an important role in early identification of T1DM. In a developing country like India, many a times due to social and economic reasons also first visit to the physician is delayed. Previous studies have shown that lack of parental and physician's awareness and delay in referral to appropriate centre as the major high risk factors for delayed diagnosis and mortality in DKA.[4]

Ali et al[5] had reported in 2011 that 30% of newly diagnosed children have had at least one related medical visit prior to diagnosis, suggesting the condition is being missed by doctors. Literature reports that DKA has been misdiagnosed as surgical emergencies with acute abdomen.[6]

Lack of awareness about signs and symptoms of T1DM among general people and primary care physicians contributes to delay in diagnosis and more cases landing up in DKA.

The median age at presentation in our study was 9 years where as two earlier studies reported it to be 9.1 and 8.2 years.[7,8] Though literature suggests equal incidence in both genders, in our study the frequency of DKA was higher among girls similar to Neu etal[9] and Madoori etal.[7] Most common presenting complaints was febrile illness followed by vomiting and rapid breathing, in contrast to impaired level of consciousness as reported by jayshree etal.[10]

History of symptoms of polyuria and polydipsia were given in only 4 (10%) cases as opposed to other studies[3,7] which reported it to be 25% and 85% respectively. Most of our patients had new onset type 1DM. Major precipitating factors for DKA were infections (most commonly viral fever and UTI). Most common preventable cause of DKA among known cases of type1 DM was incompliance.

There was no mortality in our study group. Cerebral edema was seen in 5 cases. Previous studies have reported life threatening cerebral edema in. 5-1% of DKA episodes.[11,12] Symptomatic cerebral edema has a high mortality rate (21%–24%) with a substantial proportion of survivors (15%–26%) left with permanent neurologic sequelae.[13] Mild, asymptomatic cerebral edema probably is present in most children who have DKA at the time of presentation and during therapy.[14] Complications of DKA may extend beyond the acute period and may affect neurocognitive functions and quality of life in substantial number of children. Recent data suggest that DKA episodes without clinically overt cerebral edema have also been associated with permanent defects in memory function.[15,16] DKA children should be followed regularly and assessed regarding neurocognitive impairments along with other complications of prolonged hyperglycemia.

Our study has certain limitations, like being a retrospective analysis, follow up of the cases could not be done.

Long term prospective trials are required for definitive rehydration therapy during first 24-48hrs. Proper management during initial hours lead to favorable outcome without life threatening complications like cerebral edema. Counseling and education of parents during hospitalization and discharge is very necessary, so that parents understand the importance of insulin injections. Regular follow up regarding long term complications of type 1DM is important.

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