Diabetic Ketoacidosis (DKA) is a true pediatric medical emergency. Diagnosis should be established and confirmed as early.

Introduction: Diabetic ketoacidosis (DKA) has significant morbidity and mortality. Frequency varies, approximately 15% to 75%, depending on the regional awareness in the community. Reductions in the frequency of DKA have been reported when efforts have been made to educate the medical community and school personnel.

Aims & Objectives: To identify & Describe the frequency and severity of DKA at diagnosis of type 1 diabetes mellitus in children in our hospital, & create awareness among community.

Materials & Methods: A retrospective study with Hospital records of diabetic children less than 16 yr of age, diagnosed during the period of January 2015–July 2017 were reviewed. DKA was defined as blood glucose > 11 mmol/L, pH < 7.3, and/or bicarbonate < 15 mmol/L with ketonuria. Mild defined as pH b/w 7.25-7.35, moderate b/w-7.15-7.25, severe as pH<7.15.

Results: Total newly diagnosed cases are 35. 46% of children had DKA at diagnosis of Diabetes mellitus-1. Of them Mild are 11.9%, moderate are 23.8%, severe DKA are 64.3%. Most common symptoms associated are polyuria, abdominal pain, hurried breathing.

Conclusion: The majority of the newly diagnosed patients with T1DM presented with DKA could be due to non specificity of symptoms & lack of awareness and indicates greater necessity of medical alertness for this diagnosis.

Keywords: Cerebral Edema, Diabetic Ketoacidosis, Diabetes Mellitus, DKA, Sick Day Guidelines, Sick Day Management, Type1 Diabetes Mellitus

*See End Note for complete author details

Introduction

- Diabetic Ketoacidosis (DKA) is a serious life threatening complication of type 1 diabetes mellitus (T1DM) and constitutes a medical emergency with significant morbidity and mortality. Worldwide, approximately 65,000 children aged under 15 years develop T1DM each year, and 13% to 80% of these children present with DKA at the time of diagnosis.
- The mortality rate for DKA in children in the developed countries has declined to 0.15% to 0.31%.
- However, in places with less developed medical facilities, the risk of death from DKA is greater, and children may die before receiving appropriate treatment.
- In order to improve existing management protocols for DKA in children, it is first important for physicians to be aware the clinical profile of T1DM in children and to be cognizant of the current trends in outcomes resulting from this condition.
- Sustained reductions in the frequency of DKA at onset of diabetes have been reported when efforts have been made to educate the medical community and school personnel concerning the classic symptoms of diabetes.

Definition

- Diabetic Ketoacidosis (DKA) is the end result of...
THE METABOLIC ABNORMALITIES RESULTING FROM A SEVERE DEFICIENCY OF INSULIN OR INSULIN EFFECTIVENESS.

- DKA may be arbitrarily classified as mild, moderate, or severe and the range of symptoms depends on the depth of ketoacidosis (Table 1).

- There is a large amount of ketonuria, an increased ion gap, a decreased serum bicarbonate (or total CO2) and pH, and an elevated effective serum osmolality, indicating hypertonic dehydration.

**Aims & Objectives**

To identify & describe the frequency and severity of DKA & clinical profile at diagnosis of type 1 diabetes mellitus in children in our hospital.

**Materials and Methods**

Study design: Hospital based retrospective study

Study duration: January 2015 to July 2017

Study population: children aged below 16yrs

Sample size: 35

**Inclusion Criteria:**

- Newly diagnosed DM-1 children
- Children below 16 years
- Satisfying criteria for DKA

**Exclusion Criteria:**

- Children previously diagnosed as DM1
- Children more than 16 years

**Methods of collection of data**

- Consent of the hospital authority.
- Set of questions & proforma for the study
- We abstracted the information from hospital records.
- Information such as demographics, presenting symptoms & signs at admission, investigations, serum electrolytes, and arterial blood gases was noted.
- Blood sugar as well as treatment given and outcome of patients during hospitalization.

**Statistical Analysis**

- Incidence of DKA was calculated as the percentage of newly diagnosed T1DM patients who presented with DKA in the period between 2015 and 2017.

**Results**

- A total of 35 children were admitted during the period of 31 months.
- All the patients received appropriate management using standard guidelines.
- It was observed that females were 22 (64%), 21 (60%) were <10 years of age and 28 (80%) were of rural background (Figure 1).
- 68% of children had DKA at diagnosis of Diabetes mellitus-1 (Table 2).
- Of them Mild are 12.5%, moderate are 25%, severe DKA are 62.5% (Table 3).
- Among the 35 admitted patients 33 (94%) improved and were Discharged.

**Figure 1. Age Wise Distribution of DKA Cases**

**Figure 2. Frequency of presenting features**
**Frequency of Presenting Features (Figure 2)**

- Vomiting 33%
- Dehydration 48%
- Abdominal pain 39%
- Respiratory distress 28%
- Loss of weight 79%
- Polydipsia 87%
- Polyuria 92%
- Altered sensorium 55%
- Fever 45%

**Discussion**

- In this retrospective case series we evaluated the clinical profile of children with DKA hospitalized in a tertiary care teaching hospital in India.
- Since almost half of the patients present with fever and altered sensorium, this can result in their being misdiagnosed as acute infection of central nervous system
- This can delay initiation of appropriate management of DKA.
- Therefore in patients with suspected acute infections of either CNS or respiratory tract, bedside blood glucose levels must be monitored on admission to identify T1DM early and thus prevent potentially fatal complication like DKA
- Intercurrent infection is one of the most important precipitating factors for DKA.
- We found possible intercurrent infection in 45% who presented with fever
- Majority of DKA cases are severe type, possibly a delay in diagnosis may be the factor
- Hence delayed diagnosis of patients being admitted in our Hospital may be the most likely cause of their progressing on to DKA
- This study results are correlating with other studies such as

  1. A study done by Durga Prasad et al. showed DKA was present in 37 (92.5%), of which 24/37 (64.9%) had severe DKA. There were 22 (55%) females, 24 (60%) were <10 years of age

  2. A study done by Kanwal SK, et al. Clinical profile of diabetic ketoacidosis in Indian children. Indian J Pediatr. 2012;79: 901e904 Classical symptom of T1DM like polydipsia/polyuria were present in 54.5% cases where it was lower than 87% reported from this study

  3. A study done in Saudi Arabia Al-Magamsi MS, Habib HS. Clinical presentation of childhood type1 diabetes mellitus in the Al-Madina region of Saudi Arabia. Pediatric Diabetes.2004;5:95e98. reported that 96% of cases there had polyuria/polydipsia.

  4. In this study majority (68%) of patients of T1DM presented with features of DKA. Unlike our findings only 41.9% patients were admitted with DKA in China. Xin Y, Yang M, Chen XJ, et al

**Limitations of this Study**

- Sample size is relatively small
- This study has an inherent weakness of a retrospective study.
- There could be measurement bias and issues of quality diagnostic tests.

**Conclusion**

- The majority of the newly diagnosed patients with T1DM Presented with DKA could be due to non specificity of symptoms & lack of awareness and indicates greater necessity of medical alertness for this diagnosis
- An awareness campaign is needed to increase public awareness among health care providers, parents and school teachers
- Such types of studies are also needed from other parts of India so that the actual clinical presentation and trend of T1DM, DKA in children in India is understood.
End Note

Author Information

1. Chidura Naveen, Post Graduate, Department of Paediatrics, MR Medical College, Kalaburagi
2. Sharan Gouda Patil, M.D Professor & H.O.D, Department of Paediatrics, MR Medical College, Kalaburagi
3. Kumar Angadi, M.D Assistant Professor, Department of Paediatrics, MR Medical College, Kalaburagi

Conflict of Interest: None declared

References