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"Children with Type 1 Diabetes Mellitus Presenting With Ketoacidosis: Frequency, Severity And Clinical Profile"

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Abstract:
Background: *Worldwide, approximately 65,000 children aged under 15 years develop T1DM each year.*
Objective: *To identify & describe the frequency and severity of DKA & clinical profile at diagnosis of type 1 diabetes mellitus in children in our hospital.*
Material &Methods: *It is a hospital based retrospective study done during January 2015 to January 2017,in children admitted in paediatric intensive care at niloufer hospital attached to Osmania medical college , Hyderabad.*
Results: *Out of 70 children admitted during 24months period, females were 44 (64%), 42(60%) were <10 years of age and 56 (80%) were of rural background. 68% of children had DKA at diagnosis of Diabetes mellitus-1. Among the 70 admitted patients 66 (94%) improved and were discharged.*
Conclusions: *Since almost half of the patients present with fever and altered sensorium, this can result in them being misdiagnosed as acute infection of central nervous system,,hence bedside blood glucose levels must be monitored on admission to identify T1DM early and thus prevent potentially fatal complication like DKA. Delay in diagnosis may be the factor for majority of DKA cases being severe type*
Keywords*: Cerebral edema, DKA ,Ketoacidosis, Sick day guidelines , type 1diabetes mellitus.*

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I. 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[1].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 [4] . The mortality rate for DKA in children in the developed countries has declined to 0.15% to 0.31%.[2,3] 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 [5,6]

1.1Defenition:

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. 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.

Tab 1:CLASSIFICATION OF DIABETIC KETOACIDOSIS(7)

	NORMAL	MILD	MODERATE	SEVERE
CO2 (mEq/L,	20-28	16-20	10-15	<10
pH	7.35-7.45	7.25-7.35	7.15-7.25	<7.15
Clinical	No change	Oriented, alert but fatigued	Kussmaul respirations; oriented but sleepy; arousable	Kussmaul or depressed respirations; sleepy to depressed sensorium to coma

1.2Aims and objectives of the study: To identify & describe the frequency and severity of DKA & clinical profile at diagnosis of type 1 diabetes mellitus in children in our hospital.

II. Materials And Methods

It is a hospital based retrospective study done during January 2015 to January 2017, in children less than 16 years admitted in paediatric intensive care at niloufer hospital attached to Osmania medical college , Hyderabad. Sample size is 70.

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: Set of questions & proforma for the study was prepared and consent of hospital authority was taken later the information from hospital records was abstracted. 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 was noted.

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.

III. Observations And Results

A total of 70 children were admitted during the period of 24 months. All the patients received appropriate management using standard guidelines.[8]It was observed that females were 44 (64%), 42(60%) were <10 years of age and 56(80%) were of rural background. 68% of children had DKA at diagnosis of Diabetes mellitus-1. Of them Mild are 12.5%, moderate are 25%, severe DKA are 62.5%. Among the 70 admitted patients 66 (94%) improved and were discharged.

Tab 2: Age Wise Distribution Of Dka Cases

	MALE	FEMALE
DM-1 WITH DKA	18	30
DM-1 WITH OUT DKA	8	14
TOTAL	26	44

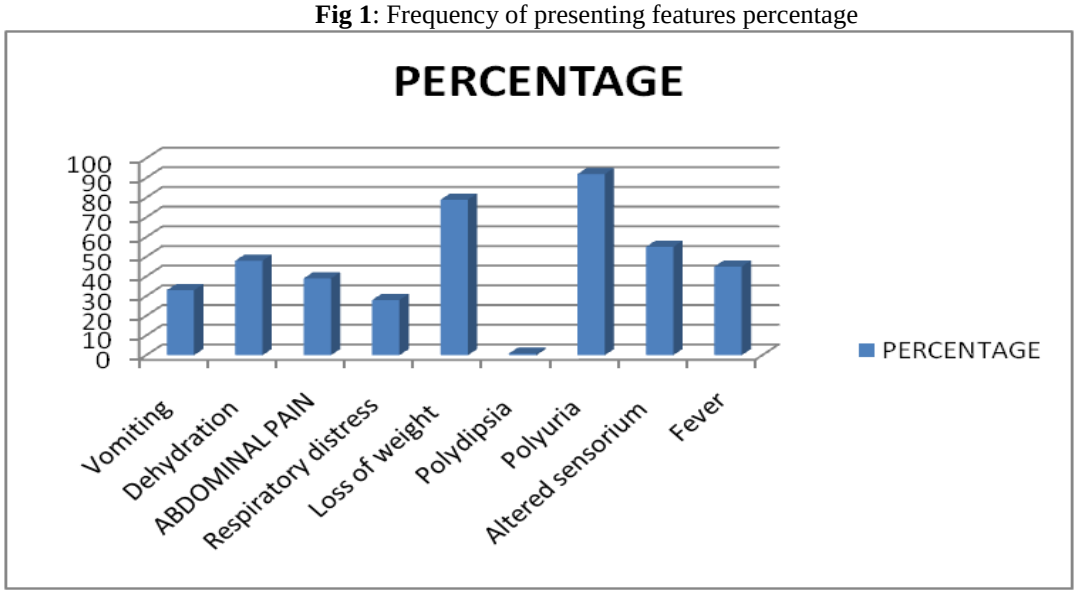
Tab 3: Age Wise Distribution Of Dka Cases

	0-5 YEARS	5-10 YEARS	10-16 YEARS
MILD DKA		6	
MODERATE	4	2	6
SEVERE DKA	8	12	10
TOTAL	12	20	16

Frequency of presenting features:

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

Fig 1: Frequency of presenting features percentage



IV. 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.[9] 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 .

Tab 4: Correlation with other studies

	Polyuria/polydypsia	DKA
Present study	87%	68%
Durga Prasad et all[12]	65%	92.5%
Kanwal SK, et all[13]	54.5%	>50%
Al-Magamsi MS, Habib HS[14]	96%	55.2%

Limitations of 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.

V. 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 [10,11] . Such types of studies are also needed from other parts of India So that the actual clinical presentation and trend of T1 DM, DKA in children in India is understood.

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