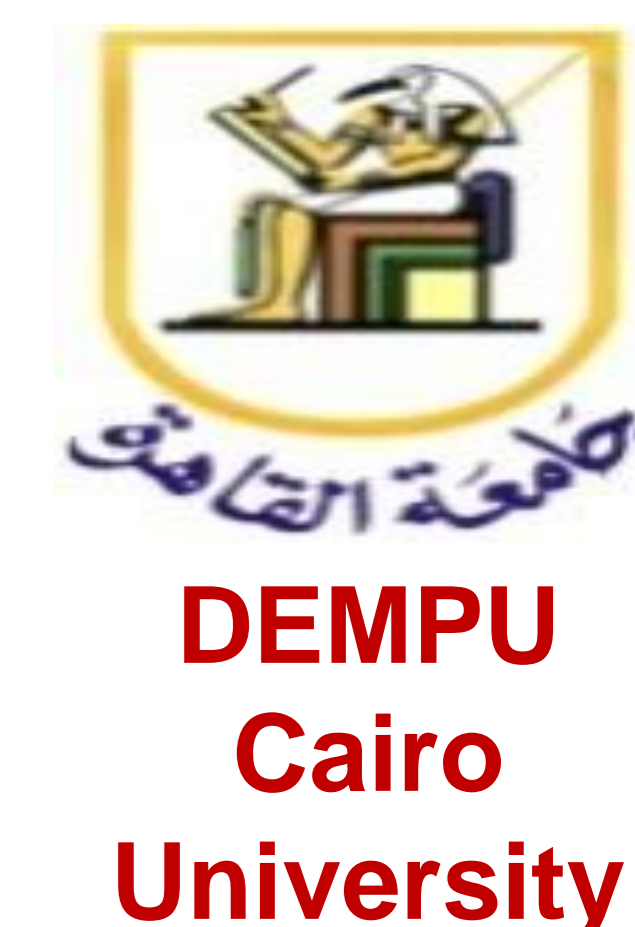


Diabetic Ketoacidosis: Clinical Features and Precipitating Factors at DEMPU

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INTRODUCTION AND OBJECTIVES

- ✓ Egypt is amongst the countries with the highest reported rates of T1DM (8-10 per 100,000 population per year in children aged <15 years) [1].
- ✓ Diabetic ketoacidosis (DKA) is a serious complication in T1DM children characterized by hyperglycemia, metabolic acidosis, dehydration and ketosis. DKA is a leading cause of mortality in T1DM children, and at diagnosis it might represent delayed presentation. Approximately, 1/3 of T1DM patients present with mild DKA and 1/6 with moderate or severe DKA [2]. Multiple factors affect the risk of developing DKA at the onset of T1DM in children. Delayed and misdiagnosis of DKA are important factors. The extent and reasons for delays are unclear, but identifying and targeting these factors may reduce this incidence [3]. DKA is frequently precipitated by infections, insulin withdrawal or undiagnosed T1DM [4].
- ✓ The aim of this study was to identify the risk factors and the most common clinical features of newly diagnosed T1DM children, in addition to the factors related to delayed diagnosis or mismanagement in these patients.

METHODS

- Over a 3 month period, 99 patients newly diagnosed with T1DM; 53 (24 females and 29 males) of which had DKA and 46 (23 females and 23 males) were hyperglycemic with mean \pm SD age of 6.89 ± 3.63 and 6.75 ± 3.53 were recruited from the inpatient department of the DEMPU, New Children Hospital, Cairo University.
- Medical history was reviewed and a complete data sheet for each patient was created including the mode of presentation of T1DM, symptoms of T1DM before diagnosis and history of possible precipitating factors. Clinical assessment and laboratory investigations were done.
- According to DKA definition as pH < 7.30 or bicarbonate < 15 mmol/L [5] and according to severity of presentation, patients were classified to: DKA group were 53 cases (53.5%); 26 (49%) with severe DKA, 24 (45.3%) moderate DKA and 3 (5.7%) mild DKA. Hyperglycemic group included 46 cases (46.5%), 9 (19.6%) without ketonuria and 37 (80.4%) with ketonuria (80.4%) (fig.(1)).

RESULTS

- ✓ Polyuria, polydipsia, weight loss, polyphagia and nocturia were the most common symptoms preceding the diagnosis, both groups (93.8%, 92% and 80.8%, 76.8%, 46.5 respectively) with no statistical difference between the different groups. However, DKA presented with more significant symptoms; vomiting, dehydration and abdominal pain (fig 2).
- ✓ Delayed diagnosis (> 72 hr between the onset of symptoms and diagnosis) occurred in 98.1% and 58.7% of DKA and hyperglycemic groups respectively and was significantly higher in DKA group.
- ✓ Misdiagnosis was reported in 69.8% of the DKA group as respiratory problems (30.2%), gastroenteritis (26.4%) and urinary tract infections (1.9%).
- ✓ Mismanagement was detected in 28.3% of DKA group, however among hyperglycemic group only one patient was mismanaged with statistically significant difference between two groups. Forms of mismanagement included prescribing diet change (amount and type) only, diet change and exercise, diet change and sugar free diet oral hypoglycemic drugs. All forms of mismanagement lead to delayed diagnosis and delayed delivery of insulin, hence, contributed to DKA development risk (fig 3).
- ✓ Multivariate analysis to predict the most significant risk factor(s) associated with the development of DKA at the time of diagnosis of T1DM showed delayed start of insulin therapy was the most significant risk factor associated with development of DKA with (OR= 1.267, p value=0.023) (table 1).
- ✓ No significant difference between both groups as regards sex, residence, consanguinity, birth order in the family, number of children in the family, family history of diabetes, type of diabetes in the family, number of relatives with diabetes and the degree of relation.

Fig (1): Classification of the patients according to the severity of presentation

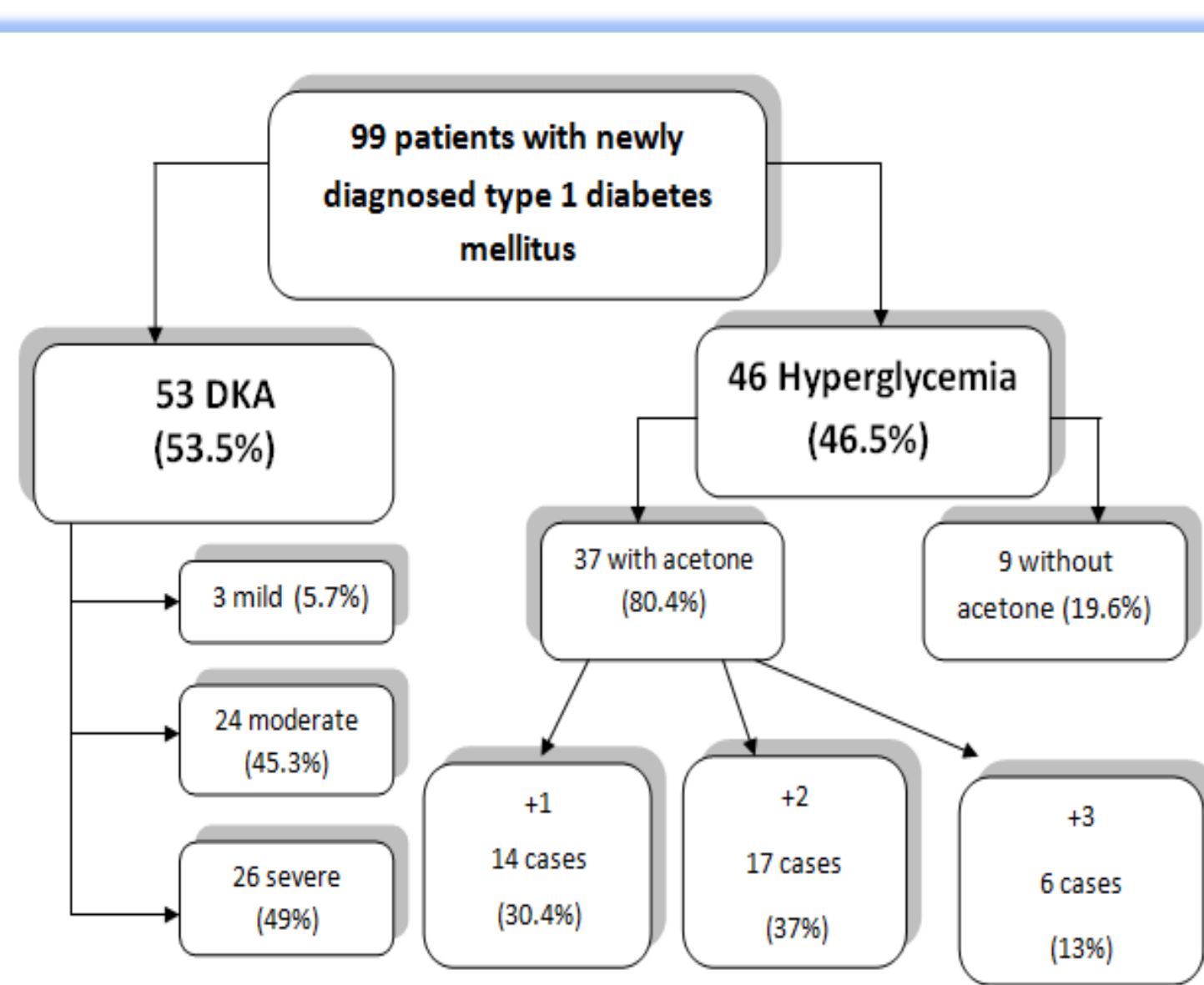
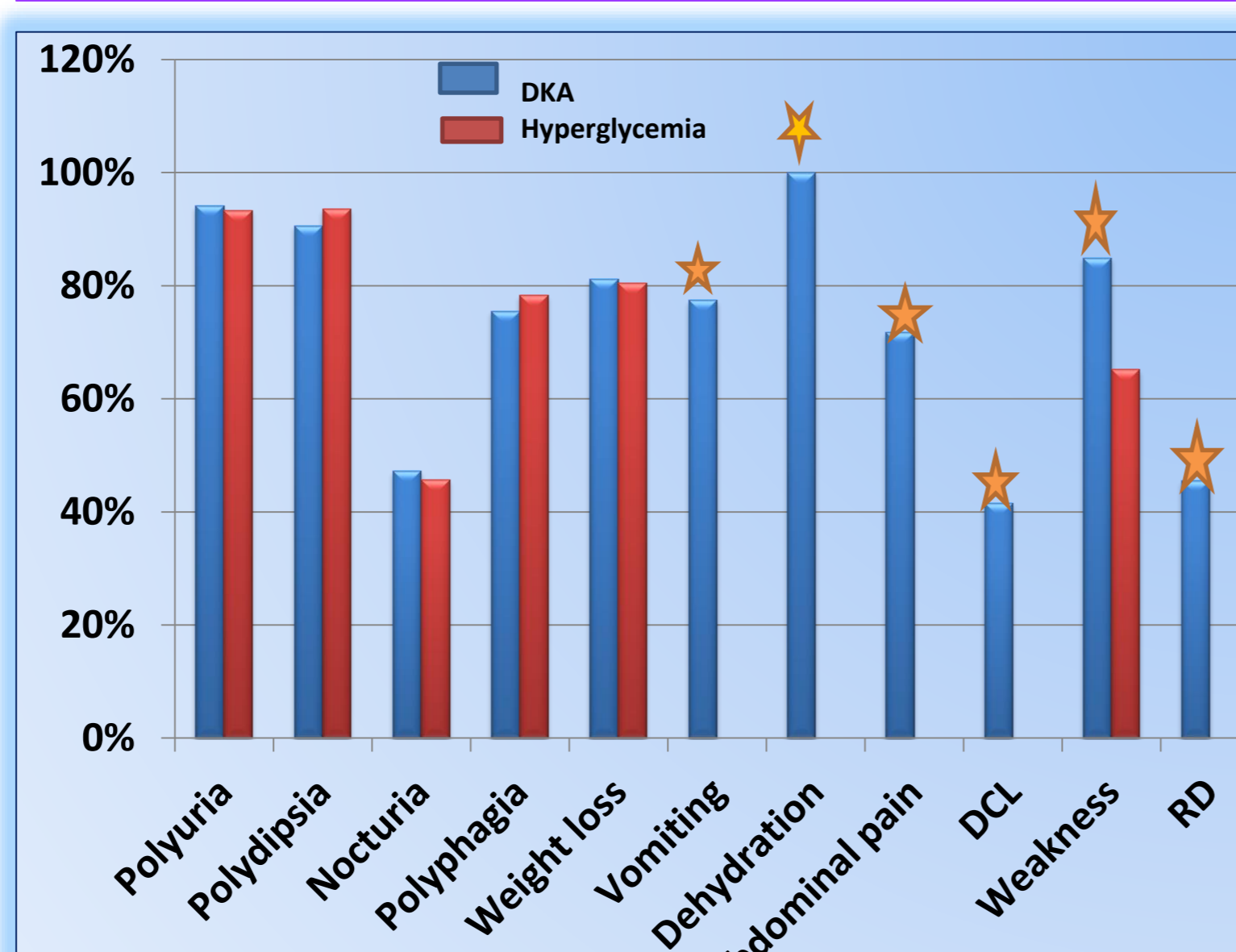
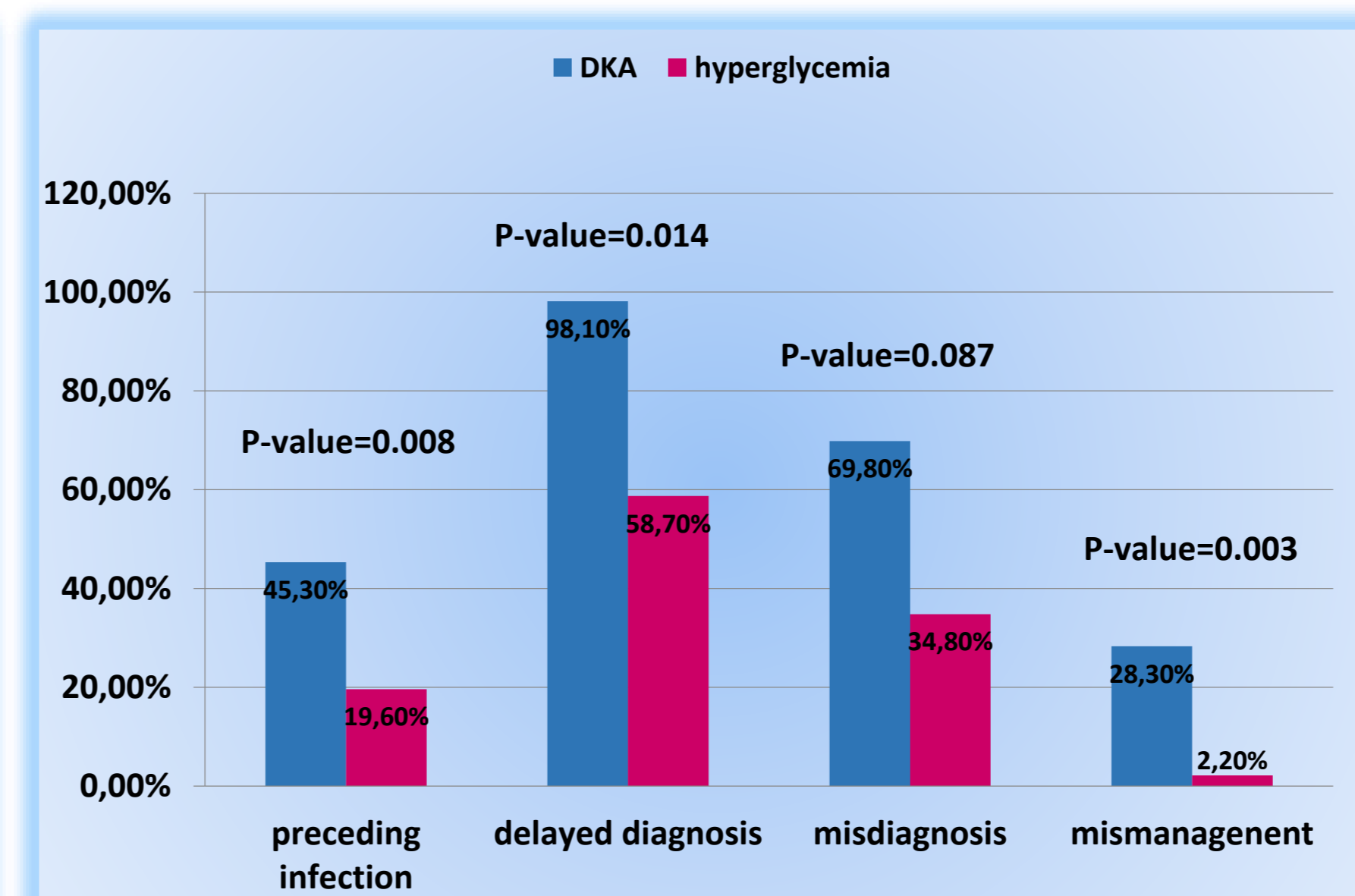


Fig (2): The common presenting symptoms in the DKA and hyperglycemic groups



DKA : diabetic ketoacidosis, DCL: disturbed conscious level, RD: respiratory distress, ★ Significant P-value < 0.05

Fig. (3): The risk factors for developing DKA



Significant P-values < 0.05

Table (1): Logistic Regression for Variables predicting the Occurrence of DKA at Diagnosis of T1DM

Risk factors	Odds ratio	95% CL for OR		P value
		Upper	Lower	
Age	0.962	1.043	0.887	0.343
Time lapse between symptoms & diagnosis	0.992	1.011	0.973	0.407
Time lapse between diagnosis & start of insulin	1.267	1.552	1.034	0.023*

CONCLUSIONS

- The classic triad (polyuria, polydipsia and weight loss) are the commonest presenting symptoms for T1DM children with and without DKA.
- Misdiagnosis and mismanagement are common and account for more severe presentation (DKA) among newly diagnosed T1DM children. Hyperglycemic cases were detected more early with less incidence of misdiagnosis, however, mismanagement occurred more among cases of DKA with more incidence of misdiagnosis this shows that misdiagnosis, delayed diagnosis and delayed start of insulin therapy are risk factors for DKA development.
- Increase awareness of : 1) the symptoms and signs suggestive of diabetes among parents, public and physicians by health education in the pediatric age group and the urgency for early diagnosis to improve outcome, 2) Education and information about DM in children should be widely distributed to decrease mortality in DKA and 3) Insulin should be started once diagnosis of T1DM is reached without delay to prevent the progression to DKA.

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