Diabetology

Extended Abstract

Clinical Presentation and Factors Associated with Diabetic Ketoacidosis at the Onset of Type-1 Diabetes Mellitus in Children and Adolescent at Muhimbili National Hospital, Tanzania: A Cross Section Study- Honesta Kipasika - [1]Pediatric Endocrine Training Centre for Africa, Kenya

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Abstract

Background

The incidence and clinical presentation of Type 1 diabetes mellitus (T1DM) varies markedly among countries with a worldwide trend of affected children under-5 years of age. The classical triad of polydipsia, polyuria and weight loss is the most common presentation. Similarly, the frequency of Diabetic Ketoacidosis (DKA) at the onset of T1DM is persistently high in Africa affecting more than two thirds of diabetic children. Type 1 diabetes mellitus (T1DM) is a chronic disease resulting from progressive destruction of the pancreatic beta cells leading to insulin insufficiency. If left untreated, this condition progresses to metabolic derangement, with worsening hyperglycemia, ketoacidosis and death. The age at presentation is highly variable with the youngest patients diagnosed in infancy and the oldest after the fourth decade [1]. According to American diabetes association (ADA) T1DM diagnosis in children and adolescents is diagnosed whenever there are classical symptoms (polyuria, polydipsia and weight loss) of diabetes with a random blood glucose ≥ 11.1 mmol/L or fasting blood glucose ≥ 7.0 mmol/L or HbA1c > 6.5% [2].

T1DM reportedly affects 15-30 million individuals worldwide [3] with 3% of children under age of 15 years [4]. Few studies conducted in Africa have shown that the Incidence of T1DM range between 4.4/100,000 in Algeria to 20/100,000 in Morocco [5]. In 1991 the incidence of type 1 diabetes mellitus in Tanzania was estimated at 1.5/100,000 [6].

There has been an increasing trend of under-five being affected worldwide with 25% of T1DM patients aged under 5 years reported in Saud Arabia [7]. Most patients have symptomatic onset of T1DM in childhood or adolescence [8] and the least after the age of 20 years [9]. The duration of symptoms prior to diagnosis can vary widely from few days to several months [1] but children and adolescent with T1DM have an abrupt clinical onset over a period of few weeks

Objective

To describe the clinical presentation of type 1 diabetes mellitus and factors associated with DKA at presentation among children aged 6 months to 19 years at Muhimbili National Hospital (MNH) in Dar es Salaam, Tanzania.

Methods

A hospital based descriptive cross-sectional study was conducted among 134 children and adolescents with T1DM at MNH diabetes clinic. Descriptive statistics such as proportions, means (SD) and median (range) were calculated. Proportions were compared by Chi-square and Fisher's exact tests. Group means for normally distributed variables were compared by Student's *t-test* whereas non-normal group medians were compared by non-parametric tests (Mann-Whitney-U and Kruskal-Wallis). Regression analyses were done to identify and quantify true predictors of DKA at presentation. Questionnaires were crosschecked after every collection. In case of any errors, correction was done immediately and before entry of data. SPSS (version 25) was used to analyze the data. Frequency tables were generated to check consistency and correction of any errors. Descriptive statistics such as proportions, means (SD) and medians (range) were calculated.

Proportions were compared by Chi-square and Fisher's exact tests. Continuous variables were tested for normality by Shapiro-Wilk test. Group means for normally distributed variables were compared by Students' test whereas non-normal group median was compared by non-parametric tests (Mann-Whitney-U). Regression analyses were done to identify and

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quantify true predictors of outcomes. P-Value of < 0.05 was considered significant.

Results

Nearly half (46%) of the study participants were diagnosed with DM at the age range of 5 to 10 years and almost a quarter (23%) at the age range of 11-14 years. Most of them presented with classical symptoms of Diabetes i.e. polyuria (95%), polydipsia (93%) and weight loss (79%). Almost 4 out of 10 presented with DKA at the onset of T1DM. Age below 5 years and delayed diagnosis were the factors significantly associated with DKA at onset. Family history of DM and high education level of caretakers were found to be protective factors against DKA at diagnosis of T1DM. Mean duration of symptoms before diagnosis was 3 weeks. However, children who were diagnosed at the age between 11 to 14 years were found to have a relatively longer duration of symptoms.

Conclusion

The overall proportion of children diagnosed with DKA at the onset of T1DM was lower compared to previous study in the same hospital. Age below 5 years, delayed diagnosis and low level of education of guardian were found to be significantly associated with DKA in children with newly diagnosed T1DM. In this study, younger age was associated with an increased risk of DKA at diagnosis. This increased risk was mostly observed in children less than 2-years-old and was still present at 5 years as compared to children above 5 yrs. Moreover, children diagnosed with T1DM at age above 5 years had lower odds of presenting with DKA as compared to those diagnosed at the age less than 5 years. This is due to increased risk for DKA in the youngest. This is in line with a Meta-analysis consisting of 32 studies reporting that children ages less than 2-years-old had 3 times the risk of presenting with DKA as children ages greater than 2-years-old. And this increased risk continued up to age 5 years [36]. Also other studies reported the same findings that younger age at T1DM diagnosis is a risk factor for DKA [21,24,37]. The reasons for the higher rates of DKA in the younger age groups are multifactorial. Firstly, clinicians may have a lower index of suspicion for diabetes among young children. Secondly, classical symptoms of T1DM may be subtle and not easily distinguishable from other acute illness at this age [36,38]. Thirdly, young children have a less developed mechanism of metabolic compensation resulting in quickly development of dehydration and acidosis

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