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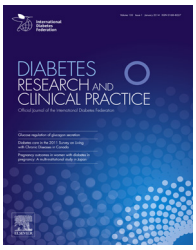

Current status of diabetes management, glycemic control and complications in children and adolescents with diabetes in Egypt. Where do we stand now? And where do we go from here?

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ABSTRACT

The aim: of this study was to use the Diabetes Registry of the Pediatric Diabetes Clinic, Ain Shams University Hospital to examine risk factors related to poor glycemic control and to provide data to health professionals for planning, evaluation and optimizing diabetes care.
Subjects and methods: Data from 600 children and adolescents with diabetes with information in the registry provide information on current clinical status, metabolic control, acute and long-term complications, presence of concomitant autoimmune diseases, and psychiatric aspects of patients.
Results: Mean age of patients was 13.3 ± 5.1 years, mean duration of diabetes was 6.4 ± 3.6 years, mean HbA1c was 8.8 ± 4.6% [73 ± 27 mmol/mol], and 71% had poor glycemic control. Acute complications included ketoacidosis in 19.7% and severe hypoglycemia in 2.8%. Chronic complications including peripheral neuropathy, retinopathy, and persistent microalbuminuria were present in 6.3%, 1.8%, and 6.8%, respectively. The majority (97.2%) were on intensive insulin therapy. Patients with poor glycemic control had higher disease duration, DKA frequency and diabetic microvascular complications. However, regular education lecture attendance and regular SMBG were associated with better glycemic control.
Conclusions: These registry data indicate that although the majority of the patients were on intensive insulin therapy, poor glycemic control was common and diabetic microvascular complications were observed. These findings will provide potential avenues to improve quality of care and could be the first step in the development of a national registry for diabetes in Egypt.

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1. Introduction

Diabetes is now one of the most common non-communicable diseases globally. It is the fourth or fifth leading cause of death in most high-income countries and there is substantial evidence that it is epidemic in many low- and middle-income countries [1].

Type 1 diabetes is one of the most frequent chronic diseases in children and represents a public health challenge globally. Its burden is considerable in developing countries where access to diabetes care and necessary insulin are limited and there is a lack of a basic means for reaching reasonable glycemic control. Because of the lack of reliable epidemiological data, the natural history of type 1 diabetes, including its complications, is largely unknown in this region [2]. In 2010, the International Diabetes Federation reported that almost a quarter of all diabetic children in the Middle East and North Africa (MENA) region under the age of 15 years are in Egypt with a prevalence of 12.6% [3]. However, the overall status of diabetes in Egypt is unknown.

Registry systems for diabetes have been in place in many countries for years. These systems make it possible to monitor many aspects of diabetes including quality of life, metabolic control and clinical course, and assist in developing standards for diabetes treatment and monitoring. There are currently very few observational studies on diabetes in the African region [4–8] focusing on type 1 diabetes in children and adolescents.

This study reports data on a cohort from the pediatric Diabetes Clinic, Ain Shams University Children's hospital collected from the Electronic Registration System in the period from June 2010 until January 2013. With this descriptive cross-sectional, single center study, we aimed to assess the clinical status of registry participants, metabolic control, acute as well as chronic diabetic microvascular complications, presence of concomitant autoimmune diseases and psychiatric aspects in patients diagnosed with diabetes during childhood and adolescence. Furthermore, to assess the impact of a diabetes structured education program on metabolic control.

2. Subjects and methods

The Diabetes Registry system was designed by the Pediatric Diabetes Clinic, Ain Shams University Hospital in 2010. To be included in this study, patients needed to meet the following criteria: (1) be identified as having diabetes; (2) attending routine clinic visits for continuous care (eight visits per year were recommended for all children); (3) be adherent to medication prescribed by physicians. Exclusion criteria included participants who had only baseline visits or were lost to follow-up and those with non-adherence to treatment.

A structured questionnaire was used after approval from the Ethical Committee of Ain Shams University and informed consent was obtained from each patient or their legal guardians to collect demographic data from patients and/or parents before enrollment into the study.

All subjects underwent the following data collection for the electronic registry program. A detailed questionnaire collected demographic data (age, sex, family history of diabetes, level of education); disease related characteristics including age at onset, duration of diabetes, type of diabetes (type 1, type 2, maturity-onset diabetes of the young (MODY), neonatal diabetes, and secondary diabetes); type of insulin therapy, mean total daily insulin dose, number of injection per day. Insulin adherence was defined as "taking medication as prescribed and/or agreed between the patient and the health care provider over a period of one month." Non adherence was defined as "not taking medication as prescribed and/or agreed between the patient and the health care provider >20% over a period of one month." Those who missed less than 20% of the prescribed insulin doses were defined as having irregular adherence to treatment and were included in the final analysis of the study. Other information included insulin therapy (intensive, conventional), insulin availability, accessibility, methods of insulin delivery (pen, vials, pump), number of visits to a doctor/clinic per year, medication history, frequency of checking of blood glucose, metabolic control, acute complications (frequency, timing and severity of hypoglycemia, history of developing diabetic ketoacidosis (DKA) and hospital admissions), chronic diabetic complications were recorded and presence of concomitant autoimmune diseases. Attendance at a series of four diabetes lectures was recorded. History of psychiatric symptoms requiring treatment such as mood or personality disorder (evaluated thoroughly by our clinic psychiatrist) was collected from parents. This included symptoms of depression, violent and aggressiveness after diagnosis, behavioral changes, accept of the disease, and attendance at group therapy. Scholastic performance (regular attendance, failure) of the child was recorded.

The clinical assessment included measurements of height and weight and calculation of BMI and plotting on percentiles for age. Injection sites were assessed and pubertal status using the Tanner criteria was determined [9]. Examination for peripheral neuropathy used the simple rapid bedside neuropathy disability score (NDS) [10] and results were confirmed by nerve conduction velocity [11]. Diabetic retinopathy (DR) was diagnosed by ocular examination and grading according to the International Clinical DR and macular edema disease severity scale [12].

HbA1c was assessed by the three monthly measurements and calculation of mean values for the year. Serum C peptide level was recorded (if measured) especially in clinically suspected cases with type 2 diabetes. Thyroid status was assessed by measuring fT4 and TSH levels [13]. Gluten-sensitive enteropathy (GSE) was diagnosed by presence of IgA anti-tissue transglutaminase (IgA-tTG), antiendomysium antibodies, and/or by biopsy findings [14]. Urinary albumin excretion was measured by immuno-turbidimetric method and classified into the three stages of diabetic nephropathy [15].

2.1. *Statistical analysis*

Data were analyzed using Statistical Program for Social Science (SPSS) version 18.0. Quantitative data (ratio and interval) were expressed as mean ± standard deviation (SD). Qualitative data (nominal and ordinal) were expressed as frequency and percentage Independent-samples *t*-test of significance was used when comparing two means. Chi-square (χ^2) test of