

## ARTICLE

## The Profile of Diabetic Children in Benghazi, Libya 2013

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### Abstract

**Background and Objectives:** Diabetes is a public health challenge and its prevalence appears to be increasing worldwide. We aimed to assess the epidemiological characteristics of diabetes mellitus in children, and to describe its effect of on health. **Materials and Methods:** Descriptive cross sectional study was conducted in Benghazi pediatric diabetic clinics by interviews questionnaires to the parents of the patients based on published international and national guidelines. **Results:** Female to male ratio was 1:1.2. History of parental consanguinity was 32.7%. Positive family history of diabetes was 48%. Glycosylated hemoglobin and random blood glucose clinic values indicated suboptimal control. No psychological support in the clinics, but nutritional education was present. Delayed growth or pubertal development reported in 38% of the children. **Conclusions:** Patients with T1DM do attend on fairly regular follow-up to the clinics, families share the children in healthy diet but health education does not seem adequate and formal psychological support is non-existing whereas it should have been an integral part of standard management. Metabolic control in this convenience sample was poor. There is an ample room for improvement to bring practices to the internationally and nationally accepted standards.

**Key words:** Diabetes, Type 1 diabetes, Children, Epidemiology.

### Introduction

Type 1 diabetes mellitus (T1DM) is a common chronic disease in childhood. T1DM represents a public health challenge globally and its prevalence appears to be increasing worldwide (1,2). In the last quarter of the past century, diabetes has become a health problem in several

developing countries, and the incidence of both types rising (3). It was estimated that in year 2000, one hundred and seventy million people had diabetes. This is expected to be doubled by 2030. World Health Organization (WHO) projected that deaths due to diabetes will increase between 2005-2030. In Africa this

metabolic disorder is found in a wide variety of atypical forms (4). Its burden is huge in developing countries due to the lack of basic means for reaching diagnosis and solid epidemiological data.

The natural history of T1DM including its complications is largely unknown. The etiology and natural history of T1DM are still not known but both genetics and environmental factors seem to contribute to the development of the disease (3-4). The principles of management of diabetes in children are well established now, these include dietary and life style modification, psychological support and insulin replacement therapy (5-7).

How that is implemented in various parts of the world vary widely. Data on type 1 diabetes in our city is getting old (8-9), Therefore we wished to document the demographic and clinical characteristics of childhood diabetes and its management in Libya by studying the "profile" of patients seen in a the main two clinic in its second largest city, Benghazi.

## **Patients and Methods**

### ***Settings***

The main diabetic clinic for children in the city of Benghazi and its surrounding areas is located at the Benghazi Paediatric Hospital (BPH) and Benghazi Medical Center (BMC). The follow up clinics are run twice weekly in BPH and once weekly at BMC. At the time of study, these clinics provide care to 918 and 232 at BPH and BMC respectively. The clinics dispense medications, assess metabolic control and advice about managing hypoglycemia. The laboratory services include testing of blood glucose, urine glucose/ketone strips, renal function test and lipid profiles. Glycosylated haemoglobin (HbA1c) are not readily available on consistent basis.

The clinics provides insulin and insulin syringe and insulin pen was fluctuated. Dieticians are available in the hospitals and provide counseling for the patients on one to one basis. Education programs for patients are occasional and not on regular basis at BPH but in BMC there is an education session every Monday for new patients with priority given the neglected or non educated parents. Measurements of weight and height are taken on every scheduled visit.

### ***Study Design***

We aimed to document the demographic and clinical characteristics of diabetes mellitus in children and to describe the effect of diabetes on health among patients attending diabetic clinics in Benghazi, Libya. Descriptive cross sectional study was conducted. A convenient sample including (150) diabetic children was included. A total of 150 diabetic patients and their parents agreed to be included. 125 from Benghazi Pediatric Hospital and 25 Benghazi Medical Center, Benghazi, Libya. Data were collected by semi-structured interviews. The questionnaires and from medical records of patients and their parents, attending the diabetic clinics at the time of follow up. The questionnaire was based on published American Diabetes Association (ADA) standards of medical care (6) and Libyan National Diabetes Care Guidelines (7).

### ***Data collection and analysis***

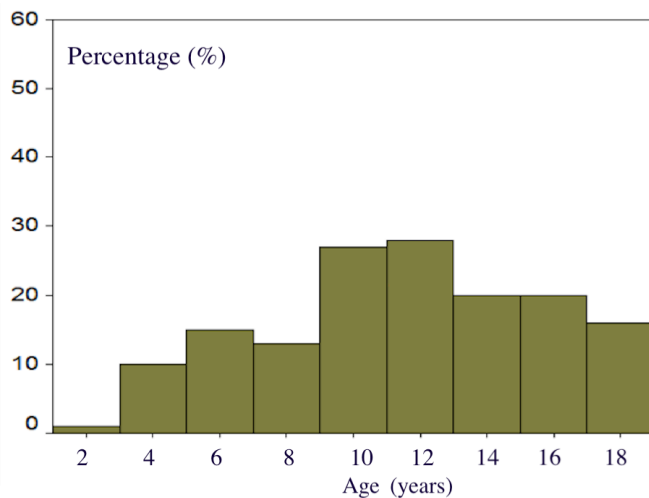
Data were collected during the period between December 2012 and May 2013. Data set included age, sex, residence, onset of diagnosis, duration of disease, type of treatment, associated co- morbidity, history of consanguinity of parents, history of breastfeeding, immunization, and history of same illness in the family. Parents perception weather DM effected the children's growth and pubertal development and school performance, the attitude of parents regarding DM is genetic or not, knowledge about the symptoms of hypoglycemia and complication of DM and history of autoimmune diseases in the family, presence of psychological support in the clinic, presence of nutritional education in the clinic and follow up the diabetic clinics. The latest basic investigations (plasma glucose and serum HbA1c) were noted and measurements of the weight and height at the time of follow up were extracted. Simple descriptive statistics of some parameters such as mean, standard deviation were calculated using Statistical program SPSS package (Chicago, Illinois).

## **Results**

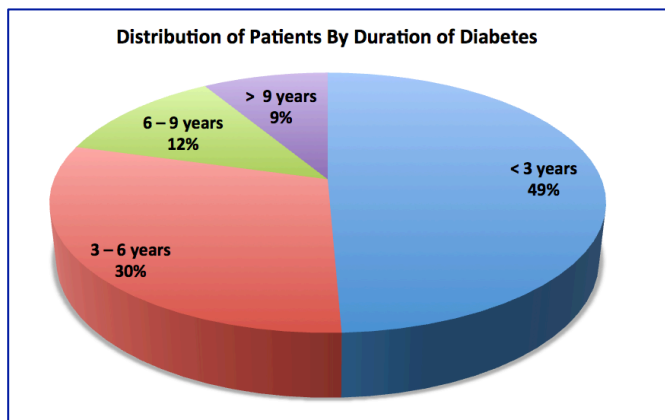
### ***Demographic and clinical characteristic***

There was minimal female preponderance in the study sample with 54.7% being females The mean age was  $11\pm 4.1$  years The age distribution is shown in Figure 1. Majority of the patients (80%) resided within the City of Benghazi 80%. Positive history of consanguinity of parents was present in 32.7 % of the patients. The latest

documented clinic blood glucose was shows  $206 \pm 123$  mg/dl [Range: 36-700 mg/dl] in 150 patients and the latest HbA1c was  $9.7 \pm 2.2$  % (range 5-16%) available from 124 patients. A good majority of patients (129; 86%) had had a period of breast feeding for 4 months or longer. History of receiving full childhood immunization was reported in all the 150 patients. Family history of diabetes was reported in 72 patients (48%) and family history of autoimmune disease was positive in 22 patients (14.6%).



**Figure 1.** Age distribution of the 150 patients with diabetes enrolled in the study



**Figure 2.** The distribution of 150 patients with diabetes by the disease duration

### ***Knowledge, attitudes and practices***

Knowledge of 150 diabetic children regarding was assessed on two aspects. Their responses were correct about symptoms of hypoglycemia in 72/90 responders (48%) and 60 offered no responses at all. The knowledge about diabetic complications was correct in 83 out of 114

responses (55.5%) and 36 offered no answer. Just over one third of parents (34%) acknowledged of inheritance potential for diabetes where 41% denied this and remainder had no idea about the subject. The reported child, family and clinic practices are summarized in table 3 and figure 3. Only 39.3% of the children reported planning for diet control although 64% reported that family share a healthy diet and 74% confirmed receiving nutritional education in the clinic. However 76% denied receiving any psychological assessment or support in the diabetic clinic (Figure 3).

### **Discussion**

Knowing the clinical and epidemiological characteristics of disease processes is an important aspect to help plan care and allocate resources appropriately (1). Periodic auditing and re-auditing of the care should be a continuous process (5). However, short of this, cross sectional studies may give some clues on the quality of diabetes care. In the present study, we wished to document the epidemiological and clinical characteristics of childhood diabetes in Libya by studying the “profile” of patients seen in a clinic in its second largest city, Benghazi thus updating our impressions from previous studies (8-9).

In the present study, the male to female ratio was 1:1.2 similar to larger studies from the same city in 2000 and is also similar to data from other counties in the region (8). Majority of the children in the sample had diabetes for 1-3 years making our data fairly representative of the local population with diabetes similar to previous studies. Prospective study from Benghazi revealed that the mean annual incidence between 1981-1990 was 7 in the 0-14 years old with no significant difference between males and females, this figure increased to 8.3 between 1999 - 2000 with females being higher than males similar to those reported from most of the non-Arab Mediterranean countries. Ramesh and Edge reiterated that there is variation with age and sex in all populations and that there is a general trend for diabetes incidence to increase with age up to 15 years. The lowest incidence is below the age of 5 years and the highest in children aged 10-14 years likely to be attributable to the onset of puberty (10).

All patients have reportedly received full childhood immunization explained by the high uptake and free access to vaccination in Libya. A high proportion of mothers of children in this sample (86%) have reported breast feeding for 4 months or more in line with local

<b>Table 1.</b> The effects of the diabetes on the general health and well being of the 150 children on health and co- morbidity.		
<b>Effect of diabetes</b>	<b>Number</b>	<b>%</b>
Delay daily activity of the child	54	36
Delay of growth or pubertal development	57	38
Negative effect on learning process and performance at school	119	79.3
Greater other comorbidities	16	10.7

<b>Table 2.</b> The patient, family and clinic practice reported by diabetic children and their parents relating to 150 patients.						
<b>The practices</b>	<b>Always</b>		<b>Sometimes</b>		<b>Never</b>	
	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>
Having a plan for dietary control.	59	39.3	60	40	31	20.7
Other family members sharing in healthy diet.	96	64	29	19.3	25	16.7
Nutritional education in the clinic.	111	74	35	23.3	4	2.7

cultural customs. The considerable worldwide variation in diabetes is partly related to genetic or climatic variations. Other environmental factors include nutritional factors such as high intake of dairy products and vitamin D deficiency (1-3). Majority of the patients do have regular follow up at diabetic clinics in this study and others. In our study history of diabetes in the family was 48% when compared with Kadiki study in adult patients mentioned that the prevalence of DM was one to three fold higher among obese subjects with positive family history of diabetes and hypertension (9). The study from Kuwait showed a remarkably high frequency a positive family history of type 1 diabetes among the first-degree relatives of affected children as well as the population. One-third of children with T1DM had a family history of the disease first-degree relatives is consistent with the nation that diabetes etiology involves exposure to environmental factors in genetically susceptible individuals. Children with first-degree relatives having T1DM are at increased risk for developing the disease.

No psychological support for the children was acknowledged by majority of parents. Psychological problems in children with diabetes are 25–30% higher than in healthy children. Girls with diabetes more than boys report anxiety and depressive symptoms in the year after diagnosis, and the risk of developing psychological problems is greater the older the child (6). Although

pediatric diabetes team members are usually capable of offering support and education for the child and family to deal with the diagnosis, some of them may need additional support beyond the expertise of the team (6,7). In our study, the effects of diabetes were evident on several aspects of wellbeing including daily activity of the children but more than half of the parents (62%) reported that diabetes did not delay growth and pubertal development of the their children. Hadeed et al. (reporting from Tripoli, in the same country) revealed that diabetes lead to delayed growth and delayed pubertal development (10,11). In girls particularly it caused marked delay in the onset of menarche with poor glycemic control appearing to be causally related. Other autoimmune diseases associated with diabetes may also affect the onset of menarche (10).

Finally, our study results identified that educational programs were present but not consistently. This dietician is a core member of the diabetes care team, and should be readily available in clinic for immediate advice when needed (6,7). About half of the parents in our study identified correctly symptoms of hypoglycemia parents' long-term complications of diabetes. A causal association of poor glycemic control with development and progression of acute complications and long term complication of diabetes as nephropathy and diabetic retinopathy is well established (12). Older previous studies from adult diabetes clinics in Benghazi city

reported that there were no education programs and that nearly half of the sample had never had their blood pressure checked and none had ever had glycosylated hemoglobin estimation in clinic and many patients were not compliant with treatment and were ignorant about hypoglycemia symptoms or the complications of diabetes (9,13).

We conclude that the patients with T1DM do attend on fairly regular follow-up to the clinics, families share the children in healthy diet but health education does not seem adequate and formal psychological support is non-existing whereas it should have been an integral part of standard management. Metabolic control in this convenience sample is very poor as measured by both random clinic blood glucose and glycosylated hemoglobin. There is obviously an ample room for improvement to bring practices to the internationally and nationally accepted standards. Repeating the study in larger samples on periodically with measure variables set against care standards and regular attention to all deficiencies discovered is essential quality assurance exercise.

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