

Glycemic control in children and adolescents with type 1 diabetes mellitus in post conflict Iraq: a primary report

Dena M. Kadhim* MBChB
 Eman A. Al-Kaseer* MBChB, FIBMS
 Munib A. Al-Zubaidi** MBChB, FIBMS

Abstract:

Background: Type 1 diabetes mellitus (T1DM) is a common disease in childhood. A linear relation between glycemic control (HbA1c < 7) and onset or progression of complication was detected. Only few individuals achieve glycemic control.

Objective: To estimate the glycemic control among diabetic children attending tertiary center.

Methods: All diabetic children registered in the diabetic consultancy clinic in Children Welfare Teaching hospital (298) were included in the study. Case records were reviewed and information on demography, weight and height, age at diagnosis and HbA1c was requested.

Results: Out of the total, 23.8% diabetic children had glycemic control. Glycemic control was decreasing with age ($p=0.001$), significantly prominent in preschool children ($p=0.001$), and inversely related with BMI ($p=0.03$). Sex was not affecting glycemic control.

Conclusion: Rate of glycemic control was low. It is poorer in those diagnosed in school age, adolescents and obese children.

Key words: DM, T1DM, glycemic control, Iraq.

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Introduction:

Type 1 diabetes mellitus (T1DM) is a common chronic disease in childhood.¹ Wide variation exist between the incidence rates of different population, the lowest is in China and Venezuela and the highest is in Finland and Sardinia.² The epidemiology of T1DM in Arab World was reviewed.^{3,4} In Iraq, the estimated prevalence of T1DM was increased from 7.8 in 1995 to 14.2 in 2000 and to 24.7 in 2014 per 100 000 under 15 years old children.⁴

A linear relation between HbA1c and onset or progression of complication was detected by observational studies, ^{3,4} i.e. those achieving reduced HbA1c concentration continue to have greater protection against development of progression of complications. There is an inverse relation between glycemic control and the risk of severe hypoglycemic episodes. Despite of advances in insulin therapy few individuals with T1DM achieve glycemic control.⁵

Diabetes self-care requires a high standard initial and continuing education and care provided by multidisciplinary health care team (physicians, nurses, dietitians and behavioral specialists) experienced in the management of T1DM.⁶ This study was carried out to comment on glycemic control and some factors associated with among T1DM in Baghdad.

Material and methods:

A total of 298 children with T1DM were included in this study. Their age was 9 ± 5 years with a male to female ratio of 1.2:1. They were all the diabetic children attending Diabetic consultancy Clinic in Children Welfare Teaching Hospital. The clinic keeps a file record for each patient for follow up recording all vital data and monitoring growth and development. Written consents were obtained from parents for reviewing the case reports.

Review of case records was done. Data requested was demographic (age, sex, age of diagnosis T1DM, ...etc), frequency of visits (regular or irregular), compliance with diet and insulin (compliant or non-compliant), dose of insulin, weight and height (determination of body mass index "BMI"), admission to hospital (frequency and duration), other autoimmune diseases (celiac, crohn's and thyroid), family history and HbA1c value.

BMI was categorized to underweight, normal, overweight and obese. Glycemic control was regarded as HbA1c < 7.07.

Chi square was used to examine the association of glycemic control (dependent variable) with independent variables (sex, BMI, visits ... etc). Student t test was carried out to examine the difference between means of independents e.g. age between glycemic states. $P < 0.05$ was considered significant.

Results:

Out of the total (298), 71 (23.8%) diabetic children had controlled glycemic state.

*Dept. of Family and Community Medicine, College of Medicine, Baghdad University Correspondence: Dr. Eman A. Al-Kaseer e-mail: al_kaseere@yahoo.com

** Dept. of Pediatrics, College of Medicine, Baghdad University.

Of the diabetic children aged ≤ 5 years, 41 (38.7%) were showing glycemic control; of those aged 6-12 years, 24 (25%) were demonstrating glycemic control and of children aged 13-16 years old, 6 (6.3%) had glycemic control. Significant negative effect for age on glycemic control ($\chi^2= 29.2$, d.f.=2, $p = 0.001$).

Forty five (27.8%) male children and 26 (19.1%) of the females were glycemic controlled. No significant effect for sex on glycemic control ($\chi^2= 3$, d.f.=1, $p = 0.08$).

Out of diabetic children diagnosed in preschool age, 57

(32.4%) and 14 (11.4%) of those diagnosed at school age were glycemic controlled. Age at diagnosis was significantly affecting glycemic control ($\chi^2= 11.3$, d.f.=1, $p = 0.001$).

Sixteen (38.1%) of underweight diabetic children, 29 (26.9%) of children with normal BMI, 8 (14.5%) of those overweight children and 18 (19.4%) of obese children were glycemic controlled. BMI was negatively affect the glycemic control ($\chi^2= 8.8$, d.f.=3, $p = 0.03$). These findings are shown in Table1.

Table 1 Distribution of glycemic control according to age, sex, age at diagnosis, and BMI

Variable	Total diabetic patients	Good Glycemic control		Chi square
		No.	%	
Age				
≤ 5	106	41	38.7	$\chi^2 = 29.2$, d.f.= 2, $p = 0.001$
6 - 12	96	24	25.0	
13 - 16	96	6	6.3	
sex				
Male	162	45	27.8	$\chi^2 = 3$, d.f.= 1, $p = 0.08$
female	136	26	19.1	
Age at diagnosis				
Preschool age	176	57	32.4	$\chi^2 = 11.3$, d.f.= 2, $p = 0.001$
School age	122	14	11.5	
BMI				
underweight	42	16	38.1	$\chi^2 = 8.8$, d.f.= 3, $p = 0.03$
normal	108	29	26.9	
overweight	55	8	14.5	
obese	93	18	19.4	

Discussion:

Rate of glycemic control (achieved target HbA1c) was 23.8%. Literature 1,2 showed that glycemic control is still poor in children despite of home monitoring of blood glucose and introduction of new devices and insulin.

The observed glycemic rate is much higher than that reported in Basrah, southern Iraq (10%).⁸ This difference might be attributed to social strife in Basrah. Several publications documented that strife.⁹ It affects pharmaceutical storage, issues in transporting of insulin which effect the availability, low quality diagnostic tools and weakened service delivery. Mentioned factors limit access to self-monitoring tests. In Basrah, most likely underlying cause of the low glycemic control rate is lack of insulin supply and difficulty in storage (refrigeration). The observed glycemic control rate (23.8%)

was lower than that reported in Saudi Arabia (31.4%).¹ The low observed figure might be explained by the fact that Iraqi healthcare system was devastated by wars, conflicts, political and economic isolation. Publishing in Iraq documented the deterioration of health system on glycemic control.^{10,11}

As it is expected, the observed glycemic control rate (23.8%) is poorer than that reported in more prosperous countries e.g. USA (39.1%)¹² or findings from Hvidore study.¹³ The high rates of glycemic control in prosperous countries might be attributed to better access of healthcare. In agreement with that in Saudi Arabia¹⁴, the poorest glycemic control was observed at pubertal age (9%). Numerus changes occur during pubertal age might be contributed factors to this finding. Hormones secreted at puberty are associated with insulin resistance which compromise glycemic control.¹⁵ In addition, array of

behavior changes (psychological stress, anxiety, emotional liability, unpredictability in daily routine, neglecting proper diet and exercise ...etc) during this critical developmental period further affecting metabolic control. In contrast with that reported in Basrah, Iraq 8, glycemic control in preschool children (38.7%) was higher than that in school children and adolescents (15.6%). This difference might be explained by differences in type of the study and sampling. Differences in socioeconomic status might be contributed to this difference, too. The observed rate of glycemic control among preschool children (38.7%) was almost similar to that reported in Saudi Arabia (32%) 1. In Welsh, glycemic control was more among children aged > 10 years.16

In the line of that in literature 1,2,8, sex was not significantly affecting glycemic status. This study revealed high rates of overweight and obesity among T1DM patients. Correspondingly, the rate of who reached glycemic control was low (17.5%). This finding is concurrence with that in literature.17-19.

Conclusion:

Rate of glycemic control among T1DM children was low. It was poorer in preschool children, overweight and obese children.

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