Growth of diabetic children in post conflict Baghdad, Iraq

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Abstract:

Background: previously type 1 diabetes mellitus (T1DM) was listed among causes of sever growth retardation. Iraq was exposed to wars and conflicts that affect health services which in turn affect the glycemic state of diabetic patients.

Objective: To report on growth of diabetic children in post conflict Iraq.

Methods: A total of 100 children with T1DM were included in the study. They were attending the consultancy clinic in Children Welfare Teaching Hospital for the period from 1st of Feb to 30th of May 2017. Weight and height were measured. The growth indices at diagnosis were taken from case file.

Results: A total of 100 children with T1DM included in this study. Their age was 9.3 ± 3.2 years with a male to female ratio of 1. Peak age of children at diagnosis was < 5 years. Of the total diabetic children in this study, (5%) was stunted, (2%) wasted, and (5%) was underweight. Duration of T1DM was a significant determinant of growth indices (height and weight). No significant differences in growth indices (weight, height and BMI) between males and females with T1DM.

Conclusion: peak of age at diagnosis was < 5 years, sex ratio was equal and weight and height were almost lower than that supposed to be healthy.

Keywords: type 1 diabetes mellitus, children, growth.

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Introduction:

Type 1 diabetes mellitus (T1DM) was listed among the causes of sever growth retardation among children. (1) New treatment modalities and self- monitoring techniques (good glycemic control) improve the clinical course and outcome of diabetes among children. Retardation of growth is no more a dominant clinical problem in countries with a well health system of diabetic care. (2) In Iraq, low figures of glycemic control were reported recently (10%(3) and 23%(4)). The low reported figures were attributed to the social strife, which in turn affects pharmaceutical storage, issues of transporting of insulin i.e. availability, and also, the social strife weakened health services delivery. Reports showed that TIDM has been increasing worldwide. (5) Iraq is Facing epidemic of diabetes like that of Middle East. (6) Changing economy was attributed as the first determinant of this epidemic. This situation in addition to the scanty publication on growth indices (7) and the poor glycemic control (3,4,8) were the impetus to carry out this study. This study was done to report on growth of diabetic children in post-conflict situation in Iraq.

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Subjects and methods:

A total of 100 children with T1DM were included in the study. Their age was 9.3 ± 3.2 years with a male to female ratio of 1. They were diabetics attending the consultancy clinic for DM in the Children Welfare Teaching Hospital for the period from 1st of February to 30th of May.The consultancy clinic keeps a file record system for the diabetic children. The records contain vital data in addition to the monitoring data on growth indices and indicators of glycemic control. Consents were obtained from parents of diabetic children for reviewing the case file and interviewing the child with measurement of weight and height. The requested data after reviewing case records were demographic data (age, sex, age at diagnosis … etc.) and growth indices (weight and height). Growth indices at time of interview were obtained in the same methods in the consultancy clinic. Supine height for children (all the children in the studied sample were aged > 2 year). A wall mounted scale was used. The child stood shoeless with heel and back in contact with wall. The head was held so that to look straight forward. A calibrated scale (Secca) was used for measuring weight. Secca was standardized for 5 kg and 10 kg before every day work. The weight was measured for the nearest o.25 kg. Z scores of weight and height was calculated using the Center of Disease Control (CDC) growth calculator. The diabetic children were categorized as:(9)

Weight	Z score	Interpretation
Normal	-1< WAZ< 0	Well nourished
Marginally underweight	-2<WAZ<-1	Mildly malnourished
Moderately underweight	-3<WAZ<-2	Moderately malnourished
Sever underweight	WAZ<-3	Severely malnourished

Height	Z score	Interpretation
Normal	-1< HAZ< 0	Well nourished
Marginally stunted	-2<HAZ<-1	Mildly malnourished
Stunted	-3<HAZ<-2	Moderately malnourished
Severe stunted	HAZ<-3	Severely malnourished

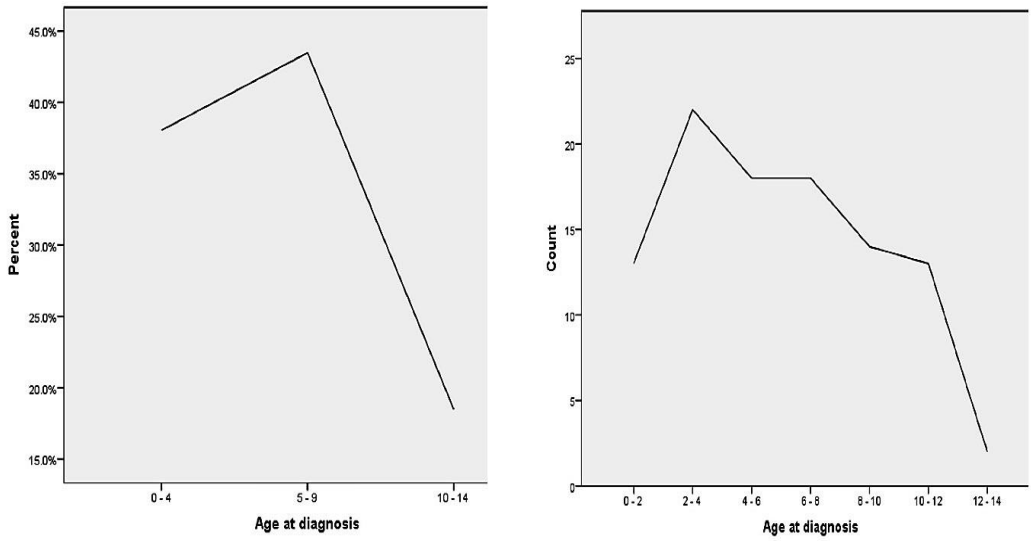
BMI	Z score	Interpretation
Normal	-1< BMI for age < 0	Well nourished
Marginal wasted	-2<BMI for age <-1	Mildly wasted
Wasted	-3<BMI for age <-2	Moderately wasted

Although z score for BMI is not popular, it was used in measurement of anthropometric indices.

ANOVA was used to examine the differences in means of age, age of onset, duration of T1DM and HbA1c between different categories of weight (normal weight, marginal underweight, underweight and Malnourished), height (normal height, marginal stunted, stunted and sever stunted) and BMI (normal, marginal wasted, and wasted). Student's t test was done to examine differences in means of z scores of weight, height and BMI between males and females. P < 0.05 was considered significant.

Results:

The age of diabetic children in this study was 9.3 ± 3.2 years, with a male to female ratio of 1. The age at diagnosis was 5.9 ± 3.2 years. The peak of age of diagnosis was at 5 - 9 years. If data was tabulated on 2 years interval, then the peak of age at diagnosis was on < 5 years of age. These finding is demonstrated om Fig. 1 in A and B. Of the total diabetic children in this study, 5 (5%), 2 (2%) and 5 (5%) were stunted, wasted and underweight, respectively.



A B

Fig. 1 Distribution of age at diagnosis of diabetic children

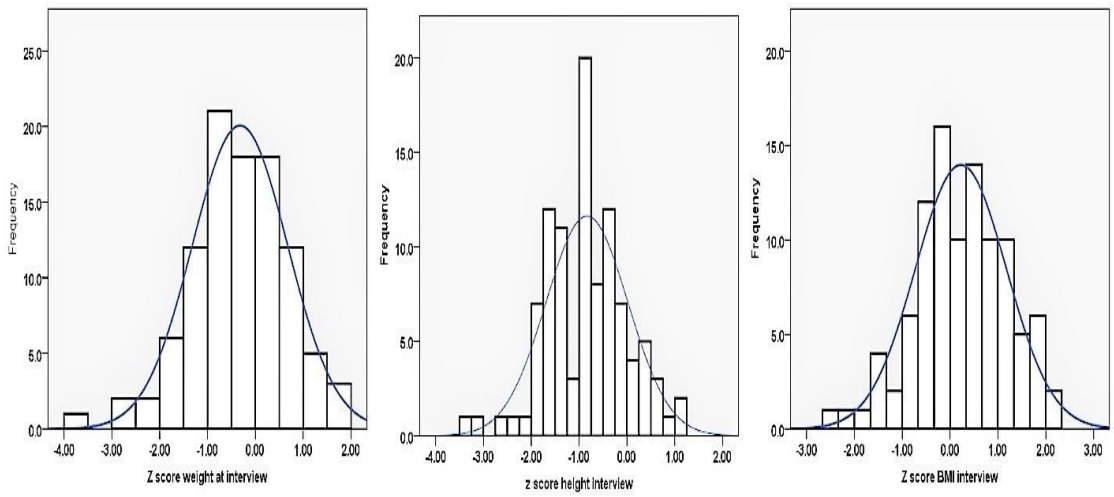


Fig. 2 Z score distribution of weight, height and BMI of diabetic children

Fig. 2 shows the z distribution of weight, height and BMI of studied diabetic children. Z distribution of weight and height were almost normal. Maximum point of weight distribution was 2 scores, and height to 1 score. BMI distribution was slightly shifted to left, and the upper limit 2 z scores. Table 1 shows the distribution of age, age at diagnosis, duration of T1DM and HbA1c with categories of weight (normal, marginal underweight, underweight and sever malnourished) among the studied diabetic children. Duration (years) of T1DM was significantly differ between different categories of weight (F= 4.1, d.f.=3.96; p = 0.008). Age at interview, age at diagnosis and HbA1c were not significantly differed between categories of weight (F=1.7, d.f.= 3,96, p= 0.1; F= 08, d.f.=3,96, p= 0.4, and F=1.7, d.f.=3,96, p=0.1, respectively). Distribution of categories of height (normal, marginal stunted, stunted, and sever stunted) of studied diabetic children with age, age at diagnosis, duration of T1DM and HbA1c are shown in Table 2. No significant differences in the height of diabetic children by age of interview (F=1.7, d.f.=3,96, p=01), age at diagnosis (F=1.3, d.f.=3,96, p=0.2) and HbA1c (f=2.1, d.f.=3,96, p=0.1). There were significant differences in duration of T1DM between categories of height (F=3.1, d.f.=3,96, p=0.03). Distribution of BMI and age at interview, age at diagnosis, duration and HbA1c were not significantly differed between categories of BMI (normal, marginal wasted and wasted) (F=1.7, d.f.=2,97, p= 01; F=0.2, d.f.=2,97, p=0.7; F=1.4, d.f.=2,97, p=0.2; F=1.1,d.f.=2,97, p=0.3; respectively) (Table 3). Table 4 shows the z score distribution of anthropometric indices in male and female diabetic children. Mean z score of weight were -0.3 ± 1.1 and -0.3 ± 0.8 in males and females, respectively. The z score of height in males and females were -0.8 ± 0.9 and -0.8 ± 0.7 in males and females, respectively. Z score of BMI in males was 0.23 ± 0.9 and in females was 0.2 ± 0.93. Z score was not significantly differed between males and females for weight (t=0.3, d.f.=98, p=0.7), height (t=0.1, d.f.=98, p=0.8) and BMI (t=0.1, d.f.=98, 0.8).

Table 1: Distribution of age at interview, age at diagnosis, duration and HbA1c according to weight categories.

Weight	No.	Age (year)	Age at diagnosis (year)	Duration of T1DM (year)	HbA1c
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Normal	77	9.1 (0.3)	6.04 (3.2)	3.0 (2.02)	10.4 (2.08)
Marginal underweight	18	10.6 (2.6)	6.02 (3.3)	4.5 (2.9)	11.3 (1.7)
underweight	4	7.3 (0.8)	5.5 (1.9)	1.7 (0.8)	11.2 (2.1)
Sever malnourished	1	8.1	1.0	7.1	13.4
	100	F=1.7, d.f=3,96; p = 0.1	F=0.8, d.f=3,96; p = 0.4	F=4.1, d.f=3,96; p = 0.008	F=1.7, d.f=3,96; p = 0.1

Table 2: Distribution of age at interview, age at diagnosis, duration and HbA1c according to height categories.

Height	No.	Age (year)	Age at diagnosis (year)	Duration of T1DM (year)	HbA1c
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Normal	62	8.7 (3.2)	5.8 (3.2)	2.8 (1.9)	10.4 (2.2)
Marginal stunted	33	10.1 (2.7)	6.4 (3.2)	37 (2.5)	10.6 (1.5)
stunted	3	10.3 (5.4)	4.4 (2.1)	5.9 (3.4)	12.8 (1.3)
Sever stunted	2	7.3 (1.06)	2.3 (1.8)	5.05 (2.8)	12.8 (0.8)
	100	F=1.7, d.f=3,96; p = 0.1	F=1.3, d.f=3,96; p = 0.2	F=3.1, d.f=3,96; p = 0.03	F=2.1, d.f=3,96; p = 0.1

Table 3: Distribution of age at interview, age at diagnosis, duration and HbA1c according to BMI categories.

BMI	No.	Age (year)	Age at diagnosis (year)	Duration of T1DM (year)	HbA1c
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Normal	89	9.2 (3.2)	6.0 (3.2)	3.2 (2.2)	10.6 (2.05)
Marginal wasted	9	10.9 (2.07)	6.7 (3.2)	4.2 (3.5)	11.4 (1.8)
wasted	2	6.4 (0.9)	5.2 (1.2)	1.1 (0.1)	12.2 (1.1)
	100	F=1.7, d.f=2,97; p = 0.1	F=0.2, d.f=2,97; p = 0.7	F=1.4, d.f=2,97; p = 0.2	F=1.1, d.f=2,97; p = 0.3

Table 4: Sex distribution of growth indices among patients with T1DM

Sex	No.	Z score					
		Weight		Height		BMI	
		Mean	SD	Mean	SD	Mean	SD
male	50	-0.3	1.1	-0.8	0.9	0.23	0.9
Female	50	-0.2	0.8	-0.8	0.7	0.2	0.93
Total							
		t= 0.3, d.f.=98, p=0.7		t= 0.1, d.f.=98, p=0.8		t= 0.1, d.f.=98, p=0.8	

Discussion:

The peak of age of diagnosis was 5 – 9 years. It is consistent with reported previously in Baghdad (7). Global data (DIAMOND group) demonstrated that the 5 – 9 years old had 1.62 times higher risk. (10) If data were tabulated on 2 years classes, then the peak was < 5 years. This finding might be explained by the improvement of awareness of parents to diabetes. Improved health services might be another explanation. This study revealed that sex ratio was equal. Literature (10), documented that overall sex ratio is roughly equal in children. In Iraq, studies reported the same finding. (7) In the line of that reported in Baghdad previously (7), no significant differences were observed between male and female in anthropometric measurement (weight, height and BMI) (p = 0.7, 0.8 and 0.8, respectively). Similar findings are reported recently in literature. (11) This study revealed that diabetic children were shorter (mean z score=-0.8) than the supposed normal. It is consistent with that in literature. (12) Conflicting findings on anthropometric indices in diabetic children were reported. It is generally agreed that the T1DM affect negatively the stature. (13) Studies on growth of diabetic children reported that stature is most affected when diabetes diagnosed prepubertally. (14,15) This study revealed that age at diagnosis was not significantly affect the stature (p=0.2). The difference might be explained by differences in samples and skills of management. The study was conducted in a consultancy clinic in tertiary teaching hospital dealing primarily with T1DM on regular visit i.e. monitoring and evaluation of metabolic control. Previous studies in Baghdad (7) reported that height was retarded in diabetic children diagnosed at puberty. In this study, HbA1c was 10.6 ± 2.1. Almost similar figures were reported in literature. (11, 12) It was reported that retarded anthropometric indices and mainly stature were related to difficulties in metabolic control of T1DM. Other studies (14, 15) stated that the retarded height cannot be attributed to metabolic control. This study showed that there was no significant differences in HbA1c between categories of anthropometric indices (p=0.1, 0.1 and 0.3) for weight, height and BMI, respectively. This finding might suggest other mechanisms for the defect in anthropometric indices. No significant differences in growth indices (weight, height and BMI) between males and females with T1DM (p=0.7, 0.8 and 0.8, respectively). It is agreement with that in literature. (10-12) Conclusions: peak of age at diagnosis was < 5 years, sex ratio was equal and weight and height were almost lower than that supposed to be healthy.

Authors' contributions:

Zena S. Hadi: collection of data, following of the diabetic patients

Eman A Al-Kaseer: analysis of data, discussing of results, writing of manuscript,

Munib A Al-Zubaidi: sharing in discussion

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