
Delayed puberty in Female with Type 1 Diabetes Mellitus

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Abstract:

Objective: To assess the growth and maturation of female with type 1 D.M.

Patients & Method: Eighty one type I diabetic females aged 9-18 years & a matched control group were studied in term of height, weight in addition to assessment of sexual maturation rate of breast, pubic hair and menarche.

Results: The study revealed that there is retardation in weight & height among diabetic patients. Also there was a significant statistical difference between diabetic patients & controls for all the studied variables.

Conclusion: Derangement of metabolic control leads to growth retardation. Diabetic who are maintained in good control can mature at normal rates.

Key words: Delayed puberty, female type 1 diabetes mellitus.

Introduction

Diabetes mellitus is the most common childhood & adolescent endocrine disorder^[1,2]. One of the complication of diabetes mellitus is impaired growth & delayed pubertal development that may occur in poorly controlled diabetes mellitus^[1,3]. Insulin has a major role on the growth hormone, insulin growth factor (IGH : IGF – 1) axis & its absence leads to a major endocrine disturbance particularly during puberty^[4,5]. An earlier onset of diabetes is associated with decreased growth and IGF-1 level is often lower, with poor glycemic control in prepubertal children^[4]. During puberty, the high level of G.H cause insulin resistance. A Correlation exists between insulin dose & IGF- 1 levels during puberty & between glycemic control & peak height velocity^[4]. In addition to these endocrine abnormalities a glucosuria related to loss of calcium & phosphorous may add to stunted bone growth. The risk for over weight appears to increase around puberty, particularly during multiple insulin therapy, as the decrease of insulin sensitivity during puberty is associated with peripheral glucose metabolism^[6], beside that a distinct sex difference in insulin sensitivity with a decreased insulin mediated glucose utilization in female adolescents with type1 IDDM exists^[7]. Also craving for carbohydrate which accompany premenstrual syndrome is blamed for the elevated blood sugars^[8,9].

Patients & methods

A case control study was conducted comprising 81 patients with type 1 IDDM attending the national diabetic center, at Al-Mustansiriya university college of medicine & the central teaching hospital for children during

the period from 1st Dec. 2001 to 1st June 2002. An aged matched control group of 136 apparently healthy girls was included, they were randomly selected from primary, secondary & high schools. The age range was between 8-18 years. The pre pubertal stage was considered (9-12 y) & pubertal (13-18 y)^[10].

Full history was taken including duration of disease (data from the first insulin injection) history of associated diseases such as celiac disease, hypothyroidism, Addison disease & others was asked about, the presence of complications (early & late) due to diabetes were checked. A clinical examination was performed for both groups (patients & controls) which include weight using measurement using (detecto, France made), height by stadiometer (Secca, Germany made).

Examination of breast, pubic hair maturity was assessed & adopted by Tanners, staging^[11]. Values was measured by number of SD above or below the mean of Tanners, staging. Weight & height measurement were compared with the normal values on children growth chart of the National Center of Health Statistic (NCHS percentile). The growth of patients & controls was calculated by number of SD above or below the standard mean. T test was used & P value < 0.05 was considered significant. Results of Hb-A_{1C} were taken in consideration for the assessment of the control of glycemia in diabetic patients.

Results:

Table (1) shows the distribution of patients & control according to weight and height and SDs above & below the standard mean. It shows that 55 (68%) of patients had weights ranging between 0.5-3.5 SDs below standard mean compared to 39 29% of the healthy controls. As

to the height 65 80% of the patients had heights that ranged between 0.5-3.5 SDs below then standard mean versus 60% among controls, a result which reveals that there is retardation both in weight & height among diabetic patients.

Table (2) shows distribution of patients & controls according to maturation signs .It shows that 40 (49.4%) of patients their breast

development was below the standard mean compared to 36 (26%) of the healthy controls & that for pubic hair 57% of the patients had a range of 0.5- 3.5 SDs below the standard mean versus 24 % among the controls .The same was found for age of menarche where 20 patients 24.6% were 0.5- 3.5 SDs below mean versus 11% of the controls.

Table (1): Distribution of patients and controls weight and height according to SD below and above mean.

	Weight				Height			
	Patients		Control		Patients		Control	
	No.	%	No.	%	No.	%	No.	%
(0.5-3.5) SD above mean	22	27	89	65	6	7.5	36	26
Mean	4	5	8	6	10	12.5	19	14
(0.5-3.5) SD below mean	55	68	39	29	65	80	81	60
Total	81	100	136	100	81	100	136	100

Table (2): Distribution of patients and controls according to maturation signs SD above & below mean.

Breast	Pt		Control	
	No.	%	No.	%
+ mean	19	23.5	19	14
mean	22	27.1	81	60
- mean	40	49.4	36	26
Total	81	100	136	100
Pubic Hair SD (0.5-3.5)	No.	%	No.	%
+ mean	8	10	15	11
mean	27	33	89	65
- mean	46	57	32	24
Total	81	100	136	100
Menarche SD (0.5-3.5)	No.	%	No.	%
+ mean	6	7	13	10
mean	55	68	108	79
- mean	20	24.6	15	11
Total	81	100	136	100

Table (3) shows the relation of (means \pm SD) of patients and controls according to weight, height and maturation signs .There was a

significant difference between the means \pm SD of patients and controls for the studied variables. The characteristics of patients when the sample was divided into prepubertal (9-12y) and pubertal age group (13-18y) is showed in **table(4)** .The study showed that complications

were present in 60 (74%) & the main complication was (lipodystrophy 40 patients). Other complications included vaginal moniliasis (4), ocular complications (4), skin pustules & furuncles (3) & peripheral neuropathy & UTI (1) for each.

Table (3): Relation of patients & controls (mean \pm SD) according to wt., Ht & maturation signs.

	Patients	Control	P value
Wt. Mean (SD)	-1.24 (\pm 1.25)	+0.5(\pm 1.5)	< 0.005
Ht. Mean (SD)	-1.75(\pm 1.3)	-0.58(\pm 0.9)	< 0.05
Breast Mean (SD)	-0.7(\pm 0.92)	-0.13 (\pm 1.02)	<0.005
Pubic hair Mean (SD)	-1.1(\pm 0.85)	-0.19 (\pm 1.3)	<0.005
Menarche	-0.68 (\pm 1.01)	-0.08(\pm 0.35)	<0.005

Table (4):- The characteristic of Diabetic group

Risk Factor	Prepubertal (9-12) yr.	%	Pubertal	%	Total	%	P value
Duration of the disease/yr							
≥ 5	36	62	23	38	59	73	< 0.005
< 5	8	36	14	64	22	27	
HBA1C							
7-9 %	19	63	11	37	30	37	< 0.05
≥ 9 %	22	43	29	56	51	63	
Complication							
+ ve	32	53	28	47	60	74	< 0.05
-ve	8	38	13	62	21	26	
Associated Disease							
+ ve	4	33	8	67	12	15	> 0.05
- ve	37	54	32	46	69	85	
No. of Hospitalization							
+ ve	18	40	26	60	44	54	< 0.005
- ve	23	62	14	38	37	46	

Discussion

The retardation in growth & maturation was noticed in this study may be due to the poor metabolic control & food shortage resulting from prevailing circumstance in our country, it agrees with the result of Saeed study which was conducted in Iraq during the same period of time^[12], also with other investigations results in other regions^[13,14].

The study revealed that delayed maturation of females with type1 diabetes mellitus occurred in patients with poor glycemic control as reflected by the level of Hb A1c & the presence of complications, this was also recognized by other studies^[15, 13]. Children & adolescents with IDDM & celiac disease had their growth affected but was not significantly, this finding agrees with the findings of Rossi et al^[16].

A hyper or hypoglycemia lasting from 2-5 days specifically in prepubescent girls was the main complication which lead to hospitalization in the present study, the same finding was evident in other study results^[17,9].

This study show that the ocular complications in addition to lipodystrophy of skin as a complication & to a lesser extent UTI infection & peripheral neuropathy supports other's believe that better control means better prognosis with respect to the microvascular complications specifically the retina^[13].

In conclusion derangement of metabolic control leads to growth retardation. Diabetic children who are maintained on higher degree of control can grow & mature at normal rates.

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