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Fasting Growth Hormone in Treated Diabetic Children

Since growth hormone administration in diabetic patients causes deterioration of their diabetic state (Luft, 1965), the poor control seen in some diabetic children might be the result of increased growth hormone secretion. Diabetic control and growth hormone levels have been correlated in a series of diabetic children.

Patients and Methods

Twenty-four diabetic children who were treated with insulin for 1 to 10 years were investigated. 10 were girls and 14 were boys. Their ages ranged from 5 years to 15 years 9 months. In half, the diabetic control was considered good, while in the remaining half the control was poor. The criteria for assessment of diabetic control are shown in Table I.

Control data were obtained from 13 non-obese metabolically and endocrinologically normal children with no family history of diabetes or coronary disease. 6 were girls and 7 were boys. Their ages were similar to the diabetic children ranging from 4 years 8 months to 15 years 2 months.

TABLE I

Criteria used for Assessment of Diabetic Control

	Preprandial Urine Specimens for Glycosuria		Fasting Blood Sugar (mg./100 ml.)
	Daily Second—Voided		
	a.m.	p.m.	
Good control	Mainly 0% ; occasionally 0·5 % ; no ketonuria	Mainly 0% ; occasionally to 1% ; no ketonuria	< 120
Poor control	Frequent 1-2% ; only occasionally sugar free ; any ketonuria	Frequent 1-2% ; only occasionally sugar free ; any ketonuria	> 160

All patients were fasted overnight. None of the diabetic children had received insulin before blood collection. All diabetic children were treated with a mixture of semi-lente and ultra-lente insulin. Venous blood was collected from peripheral veins with minimal stasis. Aliquots were transferred to fluoride-oxalate tubes for glucose analysis and to heparin tubes for growth hormone assays. Plasma was stored at -20°C . until assayed. Blood glucose was determined by an automated glucose-oxidase method described by Discombe (1963); plasma growth hormone was measured by the double antibody radioimmunoassay method of Hartog *et al.* (1964).

Results

The fasting blood glucose and plasma growth hormone results from the control children and from the diabetic children are shown in Tables II and III.

TABLE II

Fasting Blood Glucose and Plasma Growth Hormone Levels in Control Children

Control No.	Age (yr.)	Sex	Fasting Blood Glucose (mg./100 ml.)	Fasting HGH (ng./ml.)
1	4 8/12	M	64	<1
2	5	M	64	17
3	5 4/12	M	66	<1
4	5 6/12	F	62	2
5	7 3/12	F	64	5
6	7 11/12	F	66	<1
7	8 4/12	M	63	<1
8	9 1/12	M	68	<1
9	9 5/12	F	58	<1
10	13	M	59	<1
11	13 6/12	M	79	2
12	14 7/12	F	69	6
13	15 2/12	M	72	1
Mean	7 8/12		65.6	3.0
Range	15 2/12		58—79	<1—17

TABLE III

Fasting Blood Glucose and Plasma Growth Hormone Levels in Treated Diabetic Children

Case No.	Age (yr.)	Sex	Fasting Blood Glucose (mg./100 ml.)	Fasting GHG (ng./ml.)
<i>Children with good control</i>				
1	5	F	51	10
2	5 8/12	M	65	2
3	7 9/12	F	62	5
4	8	M	104	<1
5	8 7/12	F	108	<1
6	9 7/12	F	89	<1
7	10 11/12	M	55	<1
8	11	M	110	<1
9	11 4/12	M	77	<1
10	11 7/12	M	45	<1
11	12 7/12	F	81	1
12	15 9/12	M	58	1
Mean			75.4	2.1
Range			45-110	<1-10
<i>Children with poor control</i>				
13	6 4/12	M	195	1
14	7 4/12	M	219	13
15	7 9/12	F	280	<1
16	8 3/12	M	228	<1
17	9 9/12	F	172	7
18	10 8/12	F	245	<1
19	11 3/12	M	232	<1
20	11 6/12	F	234	<1
21	12	M	306	3
22	12 6/12	M	264	<1
23	13 1/12	F	248	<1
24	14 8/12	M	198	1
Mean			235	2.6
Range			172-306	<1-13

In the control group fasting blood glucose values ranged from 58 to 79 mg./100 ml. (mean 65.6) and growth hormone values ranged from less than 1 to 17 ng./ml. (mean 3.0).

In the diabetic children with good control fasting blood glucose values ranged from 45 to 110 mg./100 ml. (mean 75.4), and growth hormone values ranged from less than 1 to 10 ng./ml. (mean 2.1).

In the diabetic children with poor control fasting blood glucose values ranged from 172 to 306 mg./100 ml. (mean 235), and the growth hormone values ranged from less than 1 to 13 ng./ml. (mean 2.6).

Discussion

The rôle of growth hormone in the pathogenesis of diabetes mellitus has been argued since Young (1937) first showed the diabetogenic effect of anterior pituitary extracts. Normal fasting growth hormone levels have been previously reported

by Drash *et al.* (1968), Parker *et al.* (1968), and Theodoridis *et al.* (1970), and raised levels have been noted by Johansen and Hansen (1969). The results presented here suggest that plasma growth hormone concentrations in treated patients with juvenile diabetes are not increased and do not approach the values associated with the development of diabetes in acromegaly. There was no difference in the growth hormone values obtained from the diabetic children whose control was good and from those whose control was poor, so that the poor diabetic control seen in some children is probably not related to an increased growth hormone production.

Summary

Fasting blood glucose and plasma growth hormone were measured in 24 treated diabetic children. Growth hormone was not raised and there was no relation between degree of diabetic control and plasma growth hormone levels.

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