Simultaneous recordings from three sites in the oesophagus using a perfused manometry catheter

Fig 2 Three channel oesophageal manometry showing an increase in amplitude and velocity of peristalsis when head rotated and tilted towards the left shoulder. (a) Shows two representative swallows with 5 ml boluses while head in the midline. Peristaltic waves are broad based and of low amplitude. (b) Shows two representative swallows with 5 ml boluses while head rotated to the left. Amplitude of peristaltic waves is increased especially in middle channel. Distances y and y' are less than x and x' showing that peristaltic waves are travelling more rapidly in mid to lower oesophagus.

oesophageal motility remains unclear. Manometric studies in future patients may help to explain the abnormal movements seen in this rare and intriguing disorder.

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Accepted 20 April 1989

Obesity and diabetic control

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SUMMARY Children with diabetes mellitus are not significantly heavier than their peers, and those who are obese do not have poorer diabetic control.

Adults with insulin dependent diabetes are often obese, and this may adversely affect their diabetic control, resulting in complications.¹ We are unaware of any publication on the incidence of obesity in childhood diabetes or of its effect on diabetic control. In this study we report the incidence of obesity in children attending our diabetic clinic, and relate this to their diabetic control.

Patients and methods

One hundred and six children (58 boys and 48 girls) attending the diabetic clinic at the Bristol Children's

Hospital who had had diabetes for more than one year were studied over the 12 month period. Their mean age during the study period was 14.9 years (range 5-22), and their mean age at diagnosis was 8.3 years (range 1.3-15.9). The mean duration of their diabetes was 6.4 years (range 1-16.6). All the children were receiving quick and intermediate acting insulins twice daily, with the exception of three patients who used an insulin pump.

They were seen at intervals of three months, when their height and weight (measured with a Harpenden stadiometer) were recorded. Skinfold thickness (triceps and subscapular) was measured using a Harpenden skinfold caliper, and puberty was assessed clinically by the method of Tanner and Whitehouse.² Each child's height, weight, and skinfold thickness was then taken as the average over visits during the year of investigation.

The children were regarded as overweight when

Figure Weights in diabetic girls and boys.

their absolute weight was more than 20% above the median for their age and sex (Tanner charts), or their relative standard weight percentile (actual weight/standard weight $\times$ 100) was greater than 120%, or their skinfold thickness, both triceps and subscapular, was above the 70th centile (Tanner charts).

Glycated haemoglobin (HbA_{1c}) was measured at each visit by electroendosmosis. The mean annual HbA_{1c} value was calculated and diabetic control graded as good when the mean HbA_{1c} value was 10.5% or less, and poor when the mean HbA_{1c} was over 10.5%.

Statistical analysis comparing various indices of body fat with the quality of control (HbA_{1c}) was by the Mann-Whitney U test and probabilities of less than 0.05 were considered to be significant.

Results

The scatter of children's weights (figure), skinfold thickness, and relative standard weight percentiles were no different from those given in the Tanner charts. The mean annual HbA_{1c} concentration was 11.6% (range 7.2–17.2) (boys 11.4%, girls 11.9%). Thirty seven children (35%) had a mean annual

Table Characteristics of good and poor diabetic control in 106 diabetic children

	Good control ($\text{HbA}_{1c} \leq 10.5\%$)	Poor control ($\text{HbA}_{1c} > 10.5\%$)	95% Confidence interval
Mean age at diagnosis (years)	8.5	8.3	
Median absolute weight (kg)	53.1	50.0	–7.63 to 7.34
Mean duration (years)	6.1	6.6	
Median triceps skinfold (mm)	13.6	12.0	–3.0 to 1.6
Median subscapular skinfold (mm)	8.0	8.0	–1.0 to 2.0
Relative standard weight (%)	97.3	95.6	–7.30 to 5.20
Insulin dosage (U/kg/day)	0.9	0.9	

There were no significant differences between the groups.

HbA_{1c} concentration of 10.5% or less and 69 children (65%) had a mean annual HbA_{1c} concentration of more than 10.5%.

There were no significant differences in the median HbA_{1c} among those children whose absolute weight was more than 20% above the mean (median HbA_{1c} 11.9%), those whose relative weight was more than 120% (median HbA_{1c} 11.1%), or those whose skinfold thickness was more than 70% (HbA_{1c} 11.5%) when compared with their peers (median HbA_{1c} concentrations 11.6%, 11.6%, and 11.7%, respectively). The 95% confidence interval of the difference in medians was -1.20% to 1.15% for absolute weight, -1.7% to 1.2% for relative weight, and -1.2% to 1.0% for skinfold thickness. Conversely, no significant differences were found between those with good as opposed to poor control and the various indices of obesity (table).

Discussion

Any definition of obesity is arbitrary as the distribution of weight in the general population does not segregate into distinct populations of obese and non-obese. Furthermore, methods for evaluating fatness cannot be compared directly and thus it is not easy to derive acceptable criteria for the diagnosis.³ Direct methods for the measurement of body fat are generally invasive, but it can be measured indirectly by estimating skinfold thickness, and it is this pain free and non-invasive method that is generally used in children.

We are unaware of any publications on the incidence of obesity in childhood diabetes, or on its effect on diabetic control. Many paediatricians believe, however, that children with diabetes are often overweight and that this may have a deleterious effect on their diabetic control. We have found the scatter of the children's weights to be no different from those of the standard national weight charts, and only 9% of children had weights in excess of 120% of relative weight compared with a mean relative weight of 117% in adults with insulin dependent diabetes.⁴

Obesity affecting mainly the upper half of the body correlates with increased atherogenic and diabetogenic mortality and should be considered more seriously than obesity that predominantly affects the hips and lower limbs.⁵ In this study 20% of the children had excess fat affecting the upper half of the body. We found no evidence, however, of poorer diabetic control among them, and no correlation between skinfold thickness and HbA_{1c} concentration.

Obesity leads to insulin resistance, but we have no evidence to suggest that this is the case in the obese children as their mean insulin dosage—U/kg body weight—and their mean HbA_{1c}% were similar to those among non-obese diabetic children.

Our diabetic population is not obese and this may reflect the high fibre, low fat diet prescribed in our clinic. As work in adults has confirmed an association between obesity, poor diabetic control, and diabetic complications, it is important to emphasize the prevention of excessive weight gain.

We are grateful to Dr AO Hughes for statistical advice.

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Accepted 23 March 1989