Eating Disorders in Adolescents With IDDM

A controlled study

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OBJECTIVE — To determine the prevalence of clinical eating disorders and lesser degrees of disturbed eating in adolescents with IDDM and a matched sample of nondiabetic control subjects.

RESEARCH DESIGN AND METHODS — A cross-sectional survey of eating habits and attitudes conducted in 76 adolescents with IDDM, and age- and sex-matched nondiabetic control subjects. Eating disorder features were assessed by standardized research interview adapted for use with patients with diabetes (EDE). Glycemic control was assessed by GHb assay.

RESULTS — Adolescent girls with IDDM were heavier than nondiabetic female control subjects and were dieting more intensively to control their shape and weight. However, clinical eating disorders were no more common among adolescent girls with IDDM than among nondiabetic control subjects. Nine percent of the IDDM girls met diagnostic criteria for an operational version of "Eating disorder not otherwise specified." Fifteen percent had omitted or reduced their dose of insulin to influence their shape and weight. Eating disorder features and insulin misuse for shape and weight control were not found in IDDM or nondiabetic boys, and these two groups did not differ in their body weight.

CONCLUSIONS — Adolescent girls with IDDM are heavier than their nondiabetic counterparts and diet more intensively to control their shape and weight. Disordered eating habits and weight control behavior are common, but no more so in IDDM than in nondiabetic subjects. Insulin misuse for the purpose of shape and weight control is not restricted to subjects with a clinical eating disorder. Disordered eating is associated with impaired glycemic control.

The coincidence of eating disorders and IDDM among adolescent girls and young adult women has been a subject of interest for the past 10 yr (1). Eating disorders in females with IDDM are associated with impaired glycemic control and high rates of physical complications of diabetes (2–5), and it has been suggested that eating disorders occur more frequently in association with IDDM than would be expected by chance (5–9). If this were true, it would imply that some feature of IDDM or its treatment puts patients at increased risk of developing such disorders. However, most studies of the prevalence of clinical eating disorders among diabetic populations are confounded by serious methodological flaws, including the use of biased patient samples, unsuitable assessment measures, and failure to include suitable control groups. In a recent study that addressed these methodological issues, we found no increase in the prevalence of clinical eating disorders among young adult women with IDDM (10).

Adolescents with IDDM are of particular interest because they are entering the peak period of risk for the development of eating disorders. It is estimated that the peak incidence of anorexia nervosa occurs between ages 13 and 16 yr, whereas the onset of bulimia nervosa usually occurs later (11). The prevalence of eating disorders among IDDM subjects in this age-group has only been studied on three occasions, and none of the studies used adequate methods to establish an accurate estimate of the relative prevalence of clinical eating disorders (3,12,13). Therefore, it was decided, after our study of young adults, that it would be valuable to conduct a further study using similar rigorous methods among adolescent subjects.

The aim of this study was to compare the prevalence and severity of the features of clinical eating disorders among a sample of adolescents with IDDM and a matched control group of nondiabetic adolescents. The prevalence of insulin misuse for the purpose of shape and weight control, and the relationship between eating habits and glycemic control also were investigated.

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IDDM, INSULIN-DEPENDENT DIABETES MELLITUS; EDE, EATING DISORDER EXAMINATION; DSM-III-R, DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS (3RD EDITION, REVISED); EAT, EATING ATTITUDES TEST; DF, DEGREE OF FREEDOM; BMI, BODY MASS INDEX; NS, NO SIGNIFICANCE.

RESEARCH DESIGN AND METHODS

— The index group of adolescent patients with IDDM was obtained from the case register of a hospital outpatient clinic that provides specialist treatment for children and adolescents with IDDM. The clinic serves patients within the catchment area of the John Radcliffe Hospital in Oxford, and almost all children with IDDM in this area are known to the clinic, whether or not they attend regularly. No subject had participated in our previous project, which had been conducted 2 yr before. The control group was obtained by recruiting nondiabetic subjects, individually matched for age (±6 mo) and sex, at random from the lists of two general practices. Two practices were chosen, one serving an area of the city and one in a rural location, to minimize sampling bias.

Procedure

Initial contact with the index subjects was made at the clinic, in most instances, where the researcher described the study and sought informed consent from the patients and their parents to participate. Research assessments were later conducted in the patient's home. Nonattenders were contacted by letter, telephone, or home visit. All information was treated as confidential, and was not relayed to clinic staff. The control group was selected from the general practices' patient registers and contacted initially by letter. This was followed by a home visit to arrange a convenient appointment for the assessment interview. Repeat visits were made if subjects could not be contacted. The study was approved by the local research ethics committee.

Assessment measures

The principal measure of the features of clinical eating disorders was the EDE, a standardized investigator-based research interview of established reliability and validity (14–17). This measure assesses the core features of clinical eating disorders, generates operationally defined DSM-III-R eating disorder diagnoses (18), and is concerned principally with current state (preceding 4 wk), although some diagnostic items require a time frame of the preceding 3 mo. It assesses the frequency of key behavior, such as overeating and self-induced vomiting, and subscales (whose scores may range from 0 to 6) assess the severity of features such as dietary restraint and concern about shape and weight. As in our previous study of young adults with IDDM (10), the interview was adapted to permit a distinction to be made between behavior motivated by having IDDM and the demands of treatment (such as the avoidance of foods with a high sugar content for the purpose of satisfactory glycemic control) from that attributable to an eating disorder (such as extreme dietary restraint for shape and weight control). Practical constraints precluded interviewing subjects blind to diabetes status. The interviewer was trained in accordance with the standard procedures of the research group, and her ratings were subjected regularly to peer review by other trained raters. DSM-III-R diagnostic criteria were applied. "Eating disorder not otherwise specified" was taken to include subjects with markedly abnormal behavior, such as recurrent self-induced vomiting or laxative misuse for weight and shape control, and/or pathological overeating of ≥3-mo duration.

Additional questions were asked about the underuse or omission of insulin for the purpose of weight control. Insulin omission was defined as taking no insulin during a 24-h period for the purpose of weight reduction. Insulin underuse was defined as taking less insulin than prescribed on at least two occasions during the past month for the purpose of weight reduction. Both groups of subjects were weighed and measured, and asked to complete the 26-item EAT (19), a self-report measure of eating habits and attitudes. This measure was included to generate data for comparison with previous work (3). An index of the quality of glycemic control was provided by the GHb level measured at the clinic visit nearest the time of the assessment interview (20). This biochemical test yields a measure of the prevailing blood glucose level over the preceding 3 mo (21).

Statistical analyses

Proportions of subjects with specific features of eating disorders were compared using χ^2 tests. Normally distributed continuous variables were compared using Students *t* tests (assuming unequal variance). Nonnormal data (EDE subscale scores for dietary restraint, concern about shape, and concern about weight) were transformed logarithmically, and means were compared with Students *t* tests. For such data, geometric means are presented. As in our previous study of young adults (10), power calculation showed that the sample size was small for reliably detecting differences in the proportion of patients who met full diagnostic criteria, but the comparisons of continuous measures of eating disorder features were more robust. The study had a 90% chance of detecting a 50% increase in EDE subscale scores at the 5% significance level. To have the same chance of detecting even a twofold increase in the prevalence of eating disorder cases would require a sample size of almost 300 per group.

RESULTS

Characteristics of the two samples

A total of 86 IDDM subjects, aged 11–18 yr, were identified from the clinic case register as eligible for the study (51 boys, 35 girls), and of these, 76 took part (88%). Three subjects refused to participate (all boys), and 5 more subjects withdrew after the study was explained to them (4 boys). Two subjects could not be traced in spite of intensive efforts to contact them. The mean age of the subjects was 15.3 yr, the mean duration of IDDM was 7.7 yr, and no sex difference was observed for either variable. All patients were being treated with insulin.

We successfully contacted 89 po-

Table 1—*Demographic characteristics*

	IDDM patients		Nondiabetic subjects	
	Boys	Girls	Boys	Girls
N	43	33	43	33
Age (yr)	15.2 ± 2.2	15.4 ± 2.0	15.3 ± 1.9	15.3 ± 1.8
Duration of diabetes (yr)	8.0 ± 3.7	7.2 ± 2.8	—	—
Age distribution N (%)				
11–12 yr	8 (19)	5 (15)	4 (9)	4 (12)
13–14 yr	12 (28)	6 (18)	18 (42)	8 (24)
15–16 yr	13 (30)	14 (42)	11 (26)	14 (42)
17–18 yr	10 (23)	8 (24)	10 (23)	7 (21)
Socioeconomic group* N (%)				
I	3 (7)	4 (12)	15 (35)	10 (30)
II	15 (35)	6 (18)	13 (30)	11 (33)
IIINM	5 (12)	7 (21)	1 (2)	1 (3)
IIIM	14 (32)	9 (27)	10 (23)	7 (21)
IV	4 (9)	5 (15)	2 (5)	3 (9)
V	0 (0)	0 (0)	0 (0)	0 (0)

Values for age and duration of diabetes are means ± SD.
*Socioeconomic groups are based upon the British Registrar General's classification of the household wage earner's occupation: I, professional; II, intermediate; IIINM, skilled– –nonmanual; IIIM, skilled– –manual; IV, semi-skilled; V, unskilled.

tential age- and sex-matched control subjects, of whom 76 took part (85%). Of the 13 subjects who refused to participate, 8 were boys and 5 were girls. Details of the subjects' demographic characteristics are shown in Table 1. Although the proportion of subjects from higher socioeconomic groups (I/II/IIINM vs. IIIM/IV/V) among the control subjects was slightly higher (51 vs. 40), this difference did not reach the conventional level of statistical significance (χ^2 = 3.17, df = 1, P = 0.08). The number of girls who had not yet reached menarche in each group was not significantly different (5 in the IDDM sample, 8 in the nondiabetic sample).

Features of clinical eating disorders

Table 2 shows the prevalence and severity of the features of clinical eating disorders in the IDDM and nondiabetic groups. As found among young adults (10), the proportion of female subjects engaging in behavior characteristic of patients with eating disorders did not differ between the two groups. However, in contrast to our findings among young adults, the adolescent girls with IDDM did have a significantly higher BMI than their nondiabetic counterparts (22.7 vs. 20.7, t = 2.2, df = 61, P = 0.03), and higher scores on the dietary restraint subscale of the EDE (1.0 vs. 0.5, t = 2.0, df = 64, P = 0.05). The intensity of dieting for weight or shape control among adolescent girls with IDDM was comparable with that found in young adults, whereas that of the nondiabetic adolescent girls was lower. The IDDM girls also had significantly higher scores on the EAT (11.2 vs. 5.8, t = 2.8, df = 58, P = 0.007) than nondiabetic girls.

Eating disorder diagnoses were made according to DSM-III-R diagnostic criteria (18). No subjects met criteria for anorexia nervosa or bulimia nervosa, but

Table 2—*Features of clinical eating disorders*

	IDDM patients		Nondiabetic subjects		
	Boys	Girls	Boys	Girls	Significance*
BMI (kg/m^2)	20.0 ± 2.6	22.7 ± 3.9	20.0 ± 2.3	20.7 ± 3.4	0.03
EDE					
Objective bulimic episodes					
Any	0	0	0	0	NS
At least 4/mo	0	0	0	0	NS
Objective overeating					
Any	1	1	3	5	NS
At least 4/mo	1	1	1	3	NS
Vomiting	0	1	0	0	NS
Laxative misuse	0	0	0	0	NS
Insulin misuse					
Current	0	4	—	—	
Past	0	1	—	—	
Insulin omission					
Current	0	1	—	—	
Past	0	0	—	—	
Subscale scores					
Dietary restraint	0.2	1.0	0.1	0.5	0.05
Shape concern	0.3	0.7	0.3	0.7	NS
Weight concern	0.3	0.9	0.4	0.6	NS
EAT	8.6 ± 5.4	11.2 ± 9.0	3.7 ± 3.1	5.8 ± 5.2	0.007
HbA_{1c}	11.6 ± 2.8	11.9 ± 2.2			

Values for BMI, EAT scores, and HbA_{1c} are means ± SD.
*Comparison of IDDM and nondiabetic girls.

5 girls were identified who met our operational criteria (10) for "Eating disorder not otherwise specified," of whom 3 were in the IDDM group (9%), and 2 were in the control group (6%). The ages of the affected IDDM subjects were 16.0, 16.1, and 18.4 yr, their BMIs were 23.5, 19.2, and 25.3, and their GHb levels were 13.6, 13.2, and 13.1%, respectively. The ages of the affected nondiabetic subjects were 12.6 and 17.3 yr, and their BMIs were 26.2 and 24.2. The number of cases of eating disorders is too small for further statistical analysis, but it is of note that all 3 affected IDDM subjects had GHb levels in excess of 13%, whereas the mean level for the rest of the group was 11.8%. Overall correlations were not significant between GHb and continuous measures of eating disorder psychopathology (EAT, EDE subscales) or BMI among boys or girls.

Features of clinical eating disorders were not found among male subjects, although EAT scores were higher in IDDM boys than nondiabetic boys (8.6 vs. 3.7, $t = 4.7$, $df = 72$, $P < 0.001$). Nondiabetic boys and girls did not differ significantly in BMI, whereas the IDDM girls had a significantly higher BMI than the IDDM boys (22.7 vs. 20.0, $t = 3.6$, $df = 72$, $P = 0.001$).

Underuse of insulin for shape or weight control

Five girls with IDDM (15%) gave a history of omitting or reducing their dose of insulin for the purpose of shape or weight control, only one of whom showed other features of a clinical eating disorder. Again the small size of this subgroup of subjects precludes further statistical analysis, but most had poor glycemic control, and the mean GHb level of these 5 subjects was 12.6%. Insulin misuse for weight and shape control was not reported by the boys with IDDM.

CONCLUSIONS — Although the results of previous studies suggest that clinical eating disorders may occur more frequently among females with IDDM than in the nondiabetic population (5–9), the findings of our previous study cast doubt on this conclusion (10). It is therefore important to extend this research to adolescents, because although they have a lower prevalence of eating disorders, they are entering the period of peak incidence (11). Using the same rigorous methods as in previous work, even though the available sample size was small, differences between IDDM and nondiabetic female subjects were identified; notably the adolescent girls with IDDM in this sample were significantly heavier than their nondiabetic counterparts, and were taking steps (in the form of more intensive dieting to change their shape or weight) to remedy this situation. The overall prevalence of eating disorder features was somewhat lower than that observed among young adult women. Eating disorder features were not reported by male subjects. The higher scores on the EAT seen in the boys with IDDM are presumed to result from items confounded by the presence of IDDM and are not supported by similar differences in any of the interview measures. As found in our study of young adults (10), insulin misuse for the purpose of weight control, albeit mostly of a transitory nature, is not uncommon and is not restricted to subjects with a clinical eating disorder. We also have replicated our earlier finding that features of clinical eating disorders are associated with impaired blood glucose control. The finding that the prevalence of cases of eating disorders was not different between the two groups must be interpreted cautiously in view of the small sample size.

The findings of this study are consistent with those of Wing et al. (3), but because this earlier study did not report data on body weight, it is difficult to establish whether the higher scores reported on the dieting subscale of the EAT reflected more intensive dieting for weight and shape control, or simply adherence to the diabetic diet. It is for this reason that interview measures of eating disorder features are indispensable in studies of this population.

It is widely believed that dieting in adolescence is a risk factor for the development of eating disorders (11). The findings of this study suggest that adolescent girls with IDDM might be at increased risk of developing such disorders. However, the results of this study, and of earlier work among young adults (10), suggest that this actually may not occur. Therefore, either dieting of this intensity is not a significant risk factor, or, more likely, protective factors counteract its effect in the diabetic population. Such protective factors might include reluctance on the part of subjects with IDDM to engage in behavior such as binge-eating, vomiting, or laxative misuse for fear of risk to their physical health, and closer surveillance by parents or professionals, leading to early detection and remedy of mild eating problems.

Although clinical eating disorders are not common among adolescent girls, and their prevalence apparently is not raised among those with IDDM, disturbed eating habits and extreme weight control behavior affect an important subgroup of ~10% and are associated with poor blood glucose control, which is likely to increase vulnerability to physical complications of diabetes in the future. It therefore is important for clinicians to consider the possibility of disordered eating in young female patients with poor metabolic control, and to ask routinely about eating habits, weight and shape concerns, and weight control behavior in patients of this age-group. A treatment approach that deals with these patients' characteristic attitudes and behavior appears to show promise (22,23).

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