

Disordered Eating Behaviours in Women with Type 2 Diabetes Mellitus

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RUNNING HEAD: Binge eating and Type 2 diabetes

Objective: To investigate the relationship between disordered eating, particularly binge eating and type 2 diabetes in women.

Design: Cross-sectional.

Subjects: 215 women with type 2 diabetes (mean age: 58.9y, mean BMI 33.5 kg/m²).

Measurements: Structured clinical interview for disordered eating (Eating Disorder Examination), self-report measures of psychological functioning, glycosylated haemoglobin A1c, BMI.

Results: 20.9% of women were binge eating regularly. Binge eating was associated with poorer well-being, earlier age of diagnosis, poorer self-efficacy for diet and exercise self-management, and higher BMI. Binge eating frequency predicted blood glucose control after controlling for BMI and exercise level. A history of binge eating independently predicted age of diagnosis of diabetes.

Conclusion: Binge eating is relatively common in women with type 2 diabetes. The relationship between binge eating severity and diabetic control is not explained by overweight. Binge eating may be an independent risk factor for type 2 diabetes.

There is evidence that indicates that clinical eating disorders are present in persons with type 1 diabetes, however generally not in excess of population norms (1, 2). Even so, there is reason for concern about the impact of eating disorders on diabetes management and control. For example Takii et al (3) found that in type 1 diabetes binge eating, when combined with insulin omission, had a significant impact on glycosylated haemoglobin.

Studies examining disordered eating have tended not to involve persons with type 2 diabetes. However, recently there has been an increasing interest in binge eating disorder or BED (4). This condition often presents in individuals who are older and heavier than the population usually seen as having eating disorders (5) and is more typical of the population with type 2 diabetes. Furthermore there have been suggestions that binge eating may contribute to earlier onset of diabetes (6), possibly via its impact on weight (7). Several studies have examined binge eating in type 2 diabetes, however within these studies there have been inconsistent findings (8, 6, 9, 10, 11). This may be due to variations in sampling and assessment methods.

A significant positive relationship between binge eating and overweight has been found in most studies to date. However the relationship to glycemic control is not as clear. One study found no relationship with eating disorder diagnosis (7), a two others found a positive relationship with a self-report measure of binge eating, (9, 11), however Carroll et al (3) used a self-report measure of glycemic control.

The primary aim of the study was to determine the prevalence of disordered eating in women with type 2 diabetes. It is hypothesized that there will be a higher prevalence of binge eating among women diagnosed with type 2 diabetes in comparison to previously reported prevalence rates within the general population. It is hypothesized that disordered eating will be associated with higher body mass indexes (BMI's), and poorer glycemic control, younger age at diagnosis, and poorer psychological health. Finally, it will be hypothesized that onset of diabetes will be a function of both weight history and disordered eating history.

Method

Subjects

Of the 392 women approached, 215 (54.8%) agreed to participate in the study. All participants were female and had been diagnosed with type 2 diabetes. Upon entry into the study, 63.5% of subjects had received their diagnosis within the previous 3-month period. Participants and non-participants were compared on age, body mass index (BMI), time since diagnosis, and diabetes regimen. Differences were found on age and BMI with participants found to be significantly younger (58.85 vs 65.68, $t(390)=5.64$, $p<.001$) and have significantly higher BMI than non-participants (33.52 vs 31.05, $t(390)=3.667$, $p<.001$.) However there were no differences in diabetes treatment regimen, or time since diagnosis. The age of participants ranged from 24 to 85 y, with a mean age of 58.9 years (SD=12.4). The BMI of subjects ranged between 19.4 and 56.5 kg/m², with a mean of 33.5 (SD=7.2).

Procedure

Subjects were recruited through the Diabetes Education Centre (DEC) at Royal Newcastle Hospital and a number of its satellite centers. Patients were referred to the

DEC by general practitioners and specialists throughout Newcastle and the Hunter Area following diagnosis. All females presenting to the DEC between December 1995 and December 1997 were informed of a study of eating behaviors by dietitians conducting the nutrition education session. All female attendees were asked to complete and return a form indicating their willingness to be contacted by a research officer to discuss the study. Those agreeing to participate were interviewed using the Eating Disorder Examination (EDE) with minor modifications for use within a type 2 diabetes population. They also completed a set of questionnaires and had a glycosylated haemoglobin (HbA1c) blood test. There were two interviewers responsible for interviewing subjects at different stages in the project. The two interviewers received training in the administration of the EDE from an experienced interviewer. The training process involved training sessions, completion of the EDE against a standard, co-completion with an experienced interviewer, and ongoing supervision of the assessment procedure.

Measures

The EDE (13) is a standardised interview that is designed to measure the current level of specific psychopathology of eating disorders. It has been used in both clinical and community based settings, has good discriminant validity, and is reliable and sensitive to change (13). During a pilot of this study it was determined necessary to modify the EDE to increase its suitability with persons with diabetes. Items related to restriction were scored accounting for the diabetic dietary constraints. Due to the removal and modification of non-diagnostic items in the original EDE, subscale scores could not be obtained. According to the EDE binge eating or bulimic episode is the consumption of a large amount of food accompanied by a feeling of loss of

control over eating. Objective bulimic episode (OBE) refers to consumption of an amount of food that most people would judge as large. Subjective bingeing (SBE) refers to the consumption of an amount of food personally perceived to be excessive but considered by others as normal. Subjective bingeing is salient for individuals with diabetes, where not only the quantity of food eaten, but also the content of the diet is significant. Objective overeating episode (OOE) refers to consumption of an amount of food that most people would judge as large but without the associated feeling of loss of control over eating. Three additional measures were derived from the EDE to indicate overall frequency of types of overeating, that is frequency of objective binge episodes, subjective binge episodes and objective overeating episodes. The EDE uses a scaling of 1-5 where the behaviour is detected. This was modified to 0-5 (0=None, 1=<1/week, 2=1/week, 3=2-3/wk, 4=4-5/wk, 5=every day.) Participants who had objective binge episodes occurring once or more per week for at least three months, but who did not meet the DSM-IV criteria for another eating disorder were classified as 'Regular Bingers'. These classification criteria have been suggested by Fairburn (13) as an alternative to the DSM-IV classification of BED. Participants who did not have objective (OBE) or subjective binge episodes (SBE), or reported having binged irregularly (less than once a week) or simply had episodes of overeating without loss of control (OOE) were placed in the 'Control' category.

The Eating Disorders Inventory (EDI) (14) is a widely used self-report measure of symptoms commonly associated with eating disorders. Respondents are asked to answer each item concerning whether it applies 'always', 'usually', 'often', 'sometimes', 'rarely' or 'never'. Within this study, only three sub-scales of the EDI

were used - bulimia, body dissatisfaction and drive for thinness as these sub-scales have been used within other studies of persons with diabetes to screen for eating (15).

The Well Being Questionnaire (WBQ) (16) provides a measure of depressed mood, anxiety, energy and positive well being for persons with diabetes. The 22 items on the WBQ are rated on a '0' to '3' likert scale, and the questionnaire and subscales are reliable and valid. The use of a scale developed for use with persons with diabetes minimises the possibility of confusing symptoms of poor diabetes control with depression (16).

The SF-12 (17) is a 12-item measure of quality of life. The SF-12 has adequate reliability and validity, and was constructed from the SF-36. Two component scores are generated by the SF-12 - a physical health component, and a mental health component.

The Diabetic Locus of Control Scale (G Pike, F Dupen, N Higginbotham, & K Bowen- unpublished data) was developed for use with persons with diabetes. The scale consists of 18 items - 6 relating to internal locus of control, 6 relating to external locus of control (fate) and 6 relating to external locus of control (powerful others).

Results

Based on the EDE 20.9 % (45) of participants (binged at least once a week for at least the past 3 months with 13.5% (29) meeting DSM-IV BED criteria. One participant met DSM-IV criteria for Bulimia Nervosa-Non Purging type, one other

engaged in daily vomiting behaviour but failed to meet DSM-IV criteria for Bulimia Nervosa because of frequency of binge eating. In total 92 (42.3%) of participants reported a past history of binge eating and 76 (35.3%) of participants had a past history of restricting their food intake associated with their shape or weight. Three reported a past history of regular purging behaviours, five had regularly used laxatives to control their weight, and one had used diuretics. The mean age of onset of binge eating was 26.74 years (SD=14.44) and mean time since onset of regular binge eating was 22.68 years (SD=16.20). Only three women reported the onset of binge eating after the diagnosis of diabetes.

Insert Table 1 about here

As shown in Table 1, women who engaged in regular binges were on average, significantly younger, heavier, had a greater maximum adult weight and had a lower occupational status than the control group. There were no differences found for education level across groups. Exercise levels, smoking status and SF-12 Physical Health scores did not differ between groups.

No differences were found on HbA1c between the groups. However on measures of self-efficacy controls had significantly higher self-efficacy for adherence to diet and exercise requirements than regular bingers. While there were no differences found on time since diagnosis of diabetes, regular bingers were significantly younger at the time of diagnosis. Binge eating commenced, on average, at a significantly earlier age than the age at diagnosis of type 2 diabetes ($t(39)=9.00, p<.001$). Only three women reported the onset of binge eating following the diagnosis of diabetes.

Insert Table 2 about here

Women who binge regularly reported significantly higher levels of WBQ-Depression and Anxiety than controls. Those in the control group had significantly higher levels of WBQ-Energy and General and Positive Well Being and SF-12 Mental Health than regular bingers. On the Diabetes Locus of Control a significant difference was found between the groups only on degree of internal locus of control. Groups differed significantly from each other on the EDI Bulimia, Drive for Thinness and Body Dissatisfaction subscales with regular bingers scoring the highest. Regular bingers had significantly more frequent OBE's and OOE's but did not differ from controls on SBE's.

Insert Tables 3 and 4 about here

There was no significant relationship between type of diabetes treatment regimen and binge eating (see Table 3.) Women who binged regularly were more likely to be prescribed appetite suppressants ($X^2(1)=18.41, p<.001$), and anxiolytics ($X^2(1)=6.36, p<.05$), but rate of prescription of antidepressants did not differ across diagnostic group.

The subjective binge episode frequency and the objective binge episode frequency were combined in order to develop an index of overall binge eating. This was correlated with key study variables to explore their relationships with binge eating

severity (see Table 4). Total Binge Frequency (TBF) has the highest correlation with EDI Subscales supporting its validity. It is positively associated with restrictive eating practices, but also with greater BMI. TBF is associated with indicators of poorer diabetes management and control including HbA1c and higher BMI, and it is generally associated with poorer mental health.

In order to determine the relative importance of binge frequency (TBF) versus physical risk factors in the prediction of diabetic control a setwise multiple regression was performed. In the first set BMI, physical activity and smoking alcohol use status (never/past/current light/current heavy) were entered against HbA1c. The change in R^2 was not significant with this step (R^2 change=0.02, $F_{inc}(4,187) = 1.20$, ns). In the next step TBE was entered, and this was associated with a significant incremental change in R^2 (.03, $F_{inc}(1,186) = 6.49$, $p < .05$). The final multiple R was .24 ($F(5,191)=2.29$, $p < .05$), and total $R^2=.06$. Thus TBF predicts diabetic control, even after weight, physical activity, alcohol use and smoking are taken into account.

Finally, in order to evaluate the relative importance of overweight and binge-eating in the prediction of diabetes onset, highest adult weight and history of binge eating, alcohol use and smoking were entered into a multiple regression against age at diagnosis of diabetes. There was a significant prediction of age at diagnosis ($R^2=.15$, $F(4, 184) = 16.03$, $p < .001$), with both highest weight ($B = -.25$, $p < .001$) and binge eating history ($B = -.21$, $p < .01$) contributing significantly to the prediction.

Discussion

In this study we aimed to determine the relative prevalence of binge eating for women with type 2 diabetes. Our findings indicate that binge eating is relatively common in this population with one fifth of women engaging in weekly binge eating. Furthermore BED is also relatively common with over 13% of women meeting DSM-IV criteria. Whilst these percentages is much higher than community prevalence rates (e.g. 18), they are lower than that found for a weight control sample with similar BMI (5). The rates of binge eating were more than twice those found by Herpertz and colleagues (7, 10), but comparable to prevalence rates found in the Italian sample (9). Both of these studies used non-standard assessment methodologies, making comparison difficult. However, the Eating Disorders Examination (EDE) is generally considered to be the superior methodology for assessment of disordered eating (19).

Whilst categorical classification of women with binge eating does not provide any evidence of an association with diabetic control as assessed by HbA1c, overall frequency of bingeing is significantly but only moderately predictive of HbA1c. This relationship holds up even after accounting for the other traditional risk factors of weight, exercise, alcohol consumption and smoking.

Fairburn and others (20) have argued that the severity of binge eating required to meet criteria for BED is too strict and have suggested that this should be relaxed. Were these suggestions to be applied to the present sample, most women within the regular binger would be included within a revised BED category. In setting aside the categorical diagnostic system, we were able to find relationships between binge eating severity and glycemc control, indicating that at least in women with type 2

diabetes, frequency of binge eating is important in determining impact on diabetic control. Furthermore, it is worth noting in that using the DSM-IV criteria some important differences emerge between the more severe BED group and regular binge eating. Age at diagnosis is significantly related to differences in the different groupings reflecting a link to binge eating severity. Those women with BED appear to have had a more pathological weight history, with greater maximum adult weight and more rapid adult rate of weight gain.

There was no specific pattern of diabetes treatment regimen found, suggesting that diabetes treatments are not being tailored for bingers. However treatment for binge eaters appears to include an appetite suppressant, perhaps in an attempt to control the intense hunger often reported by binge eaters. Also the higher rates of anxiolytic prescription may be a response to the distress that is associated with binge eating. Thus there is a need to develop and evaluate a specific treatment program for binge eaters within the type 2 diabetes population and this is being undertaken by our research team.

How does binge eating relate to the development of type 2 diabetes? Our findings indicate that the likely sequence is that dieting and relatively low weight is associated with the commencement of binge eating, which is followed by increasing weight and finally the onset of diabetes. However instead of binge eating simply being a covariate of overweight, our findings point towards the conjoint contribution to diabetes onset by both binge eating and overweight. Thus binge eating may represent an independent risk factor for diabetes.

Binge eating constitutes a nexus of both psychological morbidity and pathological dietary behaviours, bringing a potent combination of problems for the management of type 2 diabetes. Furthermore binge eating may directly effect diabetes onset and progression. For example Schneiderman and Skyler (21) have developed a model which posits that psychological stress impacts on insulin resistance via sympathetic nervous system and hypothalamico-pituitary-adrenocortical system activation as well as having more indirect effects via diet and exercise. This model may help to explain the role of binge eating in diabetes onset and glycemic control. Further research is needed to examine the possible role of insulin resistance, stress hormones and binge eating in type 2 diabetes.

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References

- 1 Striegel-Moore R, Nicholson T, Tamborlane, W. Prevalence of eating disorder symptoms in preadolescent girls with IDDM. *Diabetes Care* 1992; **15/10**: 1361-1368.
- 2 Fairburn C, Peveler R, Davies B, Mann R, Mayou R. Eating disorders in young adults with IDDM: A controlled study. *BMJ* 1991; **303**: 17-20.
- 3 Takii M, Komaki G, Uchigata Y, Maeda M, Omori Y, Kubo C. Differences between bulimia nervosa and binge-eating disorder in females with type I diabetes: The important role of insulin omission. *J Psychosom Res* 1999; **47/3**: 221-231.
- 4 American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 4th edn. American Psychiatric Press: Washington DC, 1994.
- 5 Spitzer R, Devlin M, Walsh B, Hasin D, Wing R, Marcus M, Stunkard A, Wadden T, Yanovski S, Agras W, Mitchell J, Nonas C. Binge eating disorder: A multisite field trial for the diagnostic criteria. *Int J Eat Disord* 1992; **11**: 191-203.
- 6 Kenardy J, Mensch M, Bowen K, Pearson S. A comparison of eating behaviors in newly diagnosed non-insulin-dependent diabetes mellitus and case-matched controls. *Diabetes Care* 1994; **17**: 1197-1199.
- 7 Herpertz S, Albus C, Wagener R, Kocnar M, Wagner R, Henning A, Best F, Foerster H, Schleppinghoff BS, Thomas W, Kohle K, Mann K, Senf W. Does diabetes control reflect disturbed eating behavior? *Diabetes Care* 1998b; **21**: 1110-1116.
- 8 Wing R, Marcus M, Epstein L, Blair E, Burton L. Binge eating in obese patients with type 2 diabetes. *Int J Eat Disord* 1989; **8**: 671-679.
- 9 Mannucci E, Bardini G, Ricca V, Tesi F, Piani F, Vannini R, Rotella CM. Eating attitudes and behaviour in patients with type II diabetes. *Diabetes Nutr Metab* 1997; **10**: 275-281.
- 10 Herpertz S, Wagener R, Albus C, Kocnar M, Wagner R, Best F, Schleppinghoff B, Filz H, Forster K, Thomas W, Mann K, Kohle K, Senf W. Diabetes Mellitus and eating disorders: A multicenter study on the comorbidity of the two diseases. *J Psychosom Res* 1998a; **44**: 503-515.
- 11 Carroll P, Tiggemann M, Wade T. The role of body dissatisfaction and bingeing in the self-esteem of women with type II diabetes. *J Behav Med* 1999; **22**: 59-74.

- 12 Fichter MM, Herpertz ST, Quadflieg N, Herpertz-Dahlmann B. Structured Interview for Anorexia and Bulimic Disorders (SIAB-Ex) for DSM-IV and ICD-10, updated 3rd rev. *Int J Eat Disord* 1998; **24**: 227-249.
- 13 Fairburn C, Cooper Z. The eating disorder examination 12th edition. In: Fairburn C, Wilson G (eds.) *Binge Eating, Nature, Assessment and Treatment*. Guilford Press: London, 1993, pp 317-360.
- 14 Garner DM, Olmstead MA, Polivy J. Development and validation of a multidimensional Eating Disorder Inventory for anorexia nervosa and bulimia nervosa. *Int J Eat Disord* 1983; **2**: 15-34.
- 15 Rodin G, Johnson L, Garfinkel P, Daneman D, Kenshole A. Eating disorders in female adolescents with insulin dependent diabetes mellitus. *Int J Psychiatry Med* 1986; **16**: 49-57.
- 16 Bradley C. The Wellbeing Questionnaire. In Bradley C (ed). *Handbook of Psychology and Diabetes*. Harwood Academic Publishers: Chur, Switzerland, 1994, pp 89-109.
- 17 Ware J, Kosinski M, Keller S. A 12-item short form health survey. *Med Care* 1996; **34/3**: 220-233.
- 18 Hay P. The epidemiology of eating disorder behaviors: an Australian community-based survey. *Int J Eat Disord* 1998; **23**: 371-382.
- 19 Wilson GT. Assessment of binge eating. In Fairburn C, Wilson G (eds). *Binge Eating, Nature, Assessment and Treatment*. Guilford Press: London, 1993, pp 227-249.
- 20 Streigel-Moore RH, Dohm FA, Solomon EE, Fairburn CG, Pike KM, Wilfley DE. Sub-threshold binge eating disorder. *Int J Eat Disord* 2000; **27/3**: 270-278.
- 21 Schneiderman N, Skyler J. Insulin metabolism, sympathetic nervous system regulation and coronary heart disease prevention. In Orth-Gomer K, Schneiderman N (eds). *Behavioral medicine approaches to cardiovascular disease prevention*. Mahwah, NJ: Lawrence Erlbaum Associates: Mahwah, NJ, 1996, pp 105-133.

Table 1 Means and standard deviations for Comparison, Regular binge-eaters and those with Binge Eating Disorder (BED) on background variables, health and diabetes related variables.

Variable	<i>Control</i>	<i>Regular Binge</i>	<i>Level of Signif.</i>
<i>CHARACTERISTICS</i>			
Age	60.48 (12.15)	52.26 (11.77)	.000
Education Level (1=some primary, 8=postgrad.)	3.98 (1.31)	3.73 (1.14)	.269
Occupation Status (1=high, 9=low)	6.14 (2.47)	6.97 (2.12)	.048
<i>Health Status</i>			
Body Mass Index (kg/m ²)	32.27 (6.39)	38.39 (8.06)	.000
Maximum adult weight (kg)	86.73 (19.81)	109.32 (26.15)	.000
Alcohol Consumption (1=never, 2=past, 3=light, 4=heavy)	2.20 (1.44)	2.28 (1.47)	.748
Smoking Status (1=never, 2=past, 3=light, 4=heavy)	1.44 (.84)	1.57 (.94)	.405
Current Exercise Status (0-112)	15.26 (18.92)	15.74 (23.18)	.889
SF-12 Physical Health	15.56 (4.01)	14.06 (4.30)	.152
<i>Diabetes</i>			
HbA1c	7.05 (1.28)	7.36 (1.42)	.169
Age at Diagnosis of Diabetes (months)	57.69 (12.19)	48.76 (11.82)	.000
Time Since Diagnosis of Diabetes (Months)	23.66 (48.95)	28.30 (58.16)	.607
Diet Self-Efficacy (1=low 5=high)	4.18 (.68)	3.80 (.51)	.001
Exercise Self-Efficacy (1=low 5=high)	3.60 (.93)	3.21 (.83)	.011

Table 2 Means and standard deviations for Comparison, Regular binge-eaters on psychological variables and disordered eating variables

Variable	<i>Control</i>	<i>Regular Binge</i>	<i>Level of Signif.</i>
<i>General Psychological Measures</i>			
Internal Locus of Control	13.26 (2.52)	14.36 (2.49)	.020
Fate Locus of Control	5.82 (3.30)	5.58 (2.70)	.687
External Locus of Control	11.84 (2.93)	11.08 (2.28)	.152
WBQ-Depression	4.31 (3.22)	6.19 (3.03)	.000
WBQ-Anxiety	5.84 (4.49)	8.02 (3.54)	.004
WBQ-Energy	6.11 (3.00)	4.10 (2.72)	.000
WBQ-Positive Well Being	12.80 (4.44)	9.55 (4.60)	.000
WBQ-General Well Being	44.77 (12.68)	35.43 (10.49)	.000
SF-12 Mental Health	21.47 (4.07)	18.00 (4.26)	.001
<i>Disordered Eating Measures</i>			
EDI-Bulimia	1.13 (1.88)	4.95 (4.36)	.000
EDI-Drive for Thinness	5.58 (4.44)	8.73 (5.70)	.000
EDI-Body Dissatisfaction	15.38 (7.65)	21.57 (4.78)	.000
EDE-Objective Bulimic Episodes (OBE)	0.08 (0.27)	3.51 (1.32)	.000
EDE-Objective Overeating Episodes (OBE)	0.79 (1.37)	1.63 (1.99)	.001
EDE-Subjective Bulimic Episodes (SBE)	0.37 (0.93)	0.49 (1.33)	.497
Total Binge Frequency (SBE + OBE)	0.45 (0.98)	4.09 (1.76)	.000

Table 3 Binge Status by Treatment

Treatment	<i>Control</i>	<i>Regular</i>	<i>Total</i>
		<i>Binger</i>	
Diet Only	112	28	140
	66.3%	62.2%	
Diet Plus Metformin	18	4	22
	10.7%	8.9%	
Diet Plus Metformin Plus Sulphonylurea	11	5	16
	6.5%	11.1%	
Diet Plus Sulphonylurea	27	6	33
	16.0%	13.3%	
Diet Plus Insulin	1	2	3
	0.6%	4.4%	
Appetite Suppressant	30	20	50
	18.3%	47.6%	
Anxiolytic/hypnotic	15	8	23
	10.5%	22.9%	
Antidepressant	10	3	13
	7.0%	8.6%	

Table 4: Correlations on eating variables, psychological variables and binge eating frequency (TBF)

Variable	Correlation with Total Binge Frequency
EDI-Bulimia	.55***
EDI-Drive for Thinness	.21**
EDI-Body Dissatisfaction	.27***
Physical Activity	.02
Smoking	.07
Drinking	.00
BMI	.27***
HbA1c	.20**
Age of Diagnosis of Diabetes	-.26***
Diabetes Diet Self-Efficacy	-.26***
Diabetes Exercise Self-Efficacy	-.20**
SF-12 Physical Health	-.15
SF-12 Mental Health	-.32***
WBQ-Depression	.30***
WBQ-Anxiety	.17*
WBQ-Energy	-.25***
WBQ-Positive Wellbeing	-.32***
WBQ-Total	-.31***

*=p<.05, **=p<.01, ***=p<.001