

## Disordered eating behaviors in type 1 diabetic patients

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### Abstract

Patients with type 1 diabetes mellitus are at high risk for disordered eating behaviors (DEB). Due to the fact that type 1 diabetes mellitus is one of the most common chronic illnesses of childhood and adolescence, the coexistence of eating disorders (ED) and diabetes often affects adolescents and young adults. Since weight management during this state of development can be especially difficult for those with type 1 diabetes, some diabetics may restrict or omit insulin, a condition known as diabulimia, as a form of weight control. It has been clearly shown that ED in type 1 diabetics are associated with impaired metabolic control, more frequent episodes of ketoacidosis and an earlier than expected onset of diabetes-related microvascular complications, particularly retinopathy. The management of these conditions requires a multidisciplinary team formed by an endocrinologist/diabetologist, a nurse educator, a nutritionist, a psychologist and, frequently, a psychiatrist. The treatment of type 1 diabetes patients with DEB and ED should have the following components: diabetes treatment, nutritional management and psychological therapy. A high index of suspicion of the presence of an eating disturbance, particularly among those patients with persistent poor metabolic control, repeated episodes of ketoacidosis and/or weight and

shape concerns are recommended in the initial stage of diabetes treatment, especially in young women. Given the extent of the problem and the severe medical risk associated with it, more clinical and technological research aimed to improve its treatment is critical to the future health of this at-risk population.

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**Key words:** Anorexia nervosa; Bulimia nervosa; Eating disorders not otherwise specified; Disordered eating behaviors; Type 1 diabetes

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### INTRODUCTION

Diabetes mellitus has been found to be the sixth leading cause of death for those living in the United States, affecting the young and old people at an alarming rate<sup>[1]</sup>. Type 1 diabetes typically has an early onset in life but can occur at any age. As the majority of patients with type 1 diabetes are children or adolescents, the nutritional anomalies have important consequences. To be diagnosed with diabetes represents a very hard experience that requires subsequent psychological adaptation. Unfortunately, this often does not occur and is followed by frustration and the non-acceptance of the disease.

The management of diabetes and its associated health-

risk factors are often complex and require considerable patient education and frequent medical monitoring<sup>[2]</sup>. The participation of patients is basic in order to obtain a correct degree of metabolic control; however, this carries a considerable amount of stress as a consequence. People on insulin must learn how to regulate their blood sugars by monitoring blood glucose levels daily while carefully attending to their food intake and an exercise regimen. Careful blood glucose monitoring is necessary to prevent wide variations in blood sugars that affect both short and long term health and functioning. Hypoglycemia reactions are a concern in the short run not only because they are frightening and disruptive, but also because, when severe, they can lead to unconsciousness, coma and death<sup>[3]</sup>.

The three diagnostic forms of eating disorders (ED) are Anorexia Nervosa, Bulimia Nervosa and Eating Disorder Not Otherwise Specified. Common to all three is a core problem in which self-evaluation is unduly influenced by body weight or shape. According to the Diagnostic and Statistical Manual of Mental Disorders 4th Ed<sup>[4]</sup>, Anorexia nervosa is an eating disorder characterized by refusal to maintain a healthy body weight and an obsessive fear of gaining weight. It is often coupled with a distorted self image which may be maintained by various cognitive biases that alter how the affected individual evaluates and thinks about her or his body, food and eating. Bulimia nervosa is characterized by binge eating, or consuming a large amount of food in a short amount of time, followed by an attempt to rid oneself of the calories consumed, usually by purging (vomiting) and/or by laxatives, diuretics or excessive exercise. ED Not Otherwise Specified are described as disorders of eating that do not meet the criteria for any specific eating disorder.

Type 1 diabetic patients have a high risk of suffering from ED as these patients have to select the food they eat carefully in an early period of their development and because both entities, type 1 diabetes and ED, often affect adolescents and young adults. Furthermore, adolescents with type 1 diabetes also suffer from other anomalies related to their eating behavior since they commonly diet or exercise to control weight and to overcome body dissatisfaction. Other adolescents, mainly girls, may present more severe misbehaviors such as splitting insulin doses or restricting food intake in order to reduce their body weight, bingeing and purging, using laxatives or adhering to an overly strict exercise regimen. All the above mentioned misbehaviors are called **disordered eating behaviors (DEB)**<sup>[5,6]</sup>.

In this study, we will review these psychological anomalies suffered by type 1 diabetic patients, especially DEB and ED, and also discuss some aspects of their forms of presentation, management and prevention.

## EPIDEMIOLOGY OF DISORDERED EATING BEHAVIOR AND ED IN TYPE 1 DIABETIC PATIENTS

Disordered eating behavior is common in young women

living in westernized countries where thinness is valued and dietary restraint is pursued<sup>[7]</sup>. Prevalence studies in North America indicate that full syndrome bulimia nervosa may be found in 1%-3% of adolescents and young adult women and subthreshold disorders are even more common<sup>[8,9]</sup>. The rates of these disorders are lower but rising in less-westernized countries such as in Asia and Africa as Western attitudes towards weight and shape become more pervasive<sup>[10-12]</sup>. However, survey findings indicate that the number of subjects with ED or abnormal eating attitudes has increased significantly during the past three decades in non-Western countries.

In Japan, the rate of ED ranges from 0.025% to 0.2% for Anorexia Nervosa and from 1.9% to 2.9% for Bulimia Nervosa<sup>[13]</sup>. Nasser<sup>[14]</sup> in Cairo reported that the estimated prevalence of Bulimia Nervosa was 1.2% among the school girls and, using the same type of survey as the one used in Cairo, investigators estimated that 3.2% of Iranian school girls suffer from Bulimia Nervosa. Buhrich<sup>[15]</sup> reported that 0.05% of the psychiatric patient samples in Malaysia were diagnosed with Anorexia Nervosa and this prevalence rate had not increased for 15 years. Differences in the prevalence of ED varies according to different ethnic groups<sup>[16,17]</sup>. However, a study found that ethnic differences in eating disorder symptoms disappeared when body mass index was controlled<sup>[18]</sup>. At present, there is no information on the effect of culture and race on ED in people with diabetes.

The risk of eating disturbances has been postulated to be higher in type 1 diabetic patients than in the general population due to multiple interacting factors related to diabetes and its treatment<sup>[19,20]</sup>. Diabetes management imposes some degree of perceived dietary restraint, particularly patients who eat according to a predetermined meal plan rather than in response to internal cues for hunger and satiety. Such neglect of internal cues may contribute to dietary dysregulation in susceptible individuals<sup>[21]</sup>. The relationship between higher weight and disordered eating behavior presents a management dilemma for clinicians, since both dietary restraint and higher weight are clear risk factors for the development of ED and their negative health consequences.

## BEHAVIORAL ANOMALIES ASSOCIATED WITH BODY WEIGHT OR SHAPE DISSATISFACTION IN TYPE 1 DIABETICS

The association of chronic illness, such as type 1 diabetes, asthma, attention deficit disorder, physical disabilities and seizure disorders, with disordered eating behavior is well known<sup>[5,6]</sup>.

By controlling diabetes with insulin injections, many diabetics face a constant struggle with their weight<sup>[22]</sup>. As insulin encourages fat storage, many people with type 1 diabetes have discovered the relationship between reducing the amount of insulin they take and their corresponding weight loss<sup>[23]</sup>. It is well-known that adolescents with type 1 diabetes tend to exhibit increased difficulty in

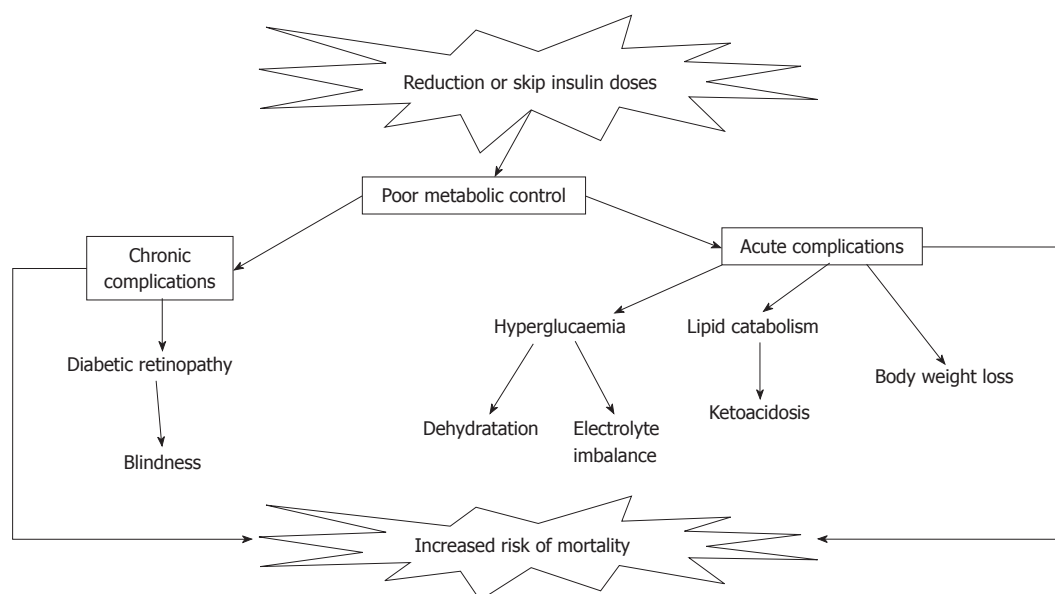


Figure 1 Consequences of reducing or skipping insulin doses in type 1 diabetes patients.

maintaining optimal weight and also are more inclined to be concerned about their weight than their non-diabetic counterparts<sup>[24]</sup>.

Since weight management during this state of development can be especially difficult for those with type 1 diabetes, some diabetics may restrict or omit insulin, a condition known as diabulimia, as a form of weight control<sup>[25-27]</sup>. In a study that looked at 143 adolescents with type 1 diabetes who completed the Assessing Health and Eating among Adolescents with Diabetes survey, unhealthy weight control practice was observed in 37.9% of females and 15.9% of males. Among the females, 10.3% reported skipping insulin and 7.4% reported taking less insulin to control their weight<sup>[28]</sup>. Only one male reported doing either of these behaviors. In another 4-year follow-up study of 91 girls with diabetes aged 12 to 18, dieting was reported by 38% of the sample, binge eating by 45%, insulin omission by 14% and self-induced vomiting by 8% at baseline. These behaviors were even more common at follow-up, when most of the girls were at the age of the highest risk for ED. At this time, more than half of the sample reported dieting for weight loss and binge eating and one-third reported deliberate insulin omission to prevent weight gain<sup>[29]</sup>.

In general terms, it is estimated that between 30% and 40% of adolescents and young adults with diabetes skip insulin after meals to lose weight<sup>[30]</sup>.

## CONSEQUENCES OF DISORDERED EATING BEHAVIORS IN TYPE 1 DIABETICS

A spectrum of severity of disturbance of eating habits and attitudes and subthreshold eating problems, seen as relatively mild in non diabetic patients, can give rise to clinically important disturbances of self-care and glycaemia control in diabetics. In general terms, glycosilated

hemoglobin was higher in patients with diabetes who had ED compared with those with diabetes without ED<sup>[29-31]</sup>.

The lack of proper insulin treatment in type 1 diabetics may lead to many harmful physical effects. Reducing insulin to lose weight increases the risk of dehydration, break down of muscle tissue and high risk of developing infections and fatigue. If this behavior continues, it may also result in kidney failure, eye disease leading to blindness<sup>[32,33]</sup>, vascular disease and even death<sup>[34]</sup>.

ED in type 1 diabetics have been clearly shown to be associated with impaired metabolic control<sup>[29,35-39]</sup>, more frequent episodes of ketoacidosis<sup>[40]</sup> and an earlier than expected onset of diabetes-related microvascular complications, particularly retinopathy<sup>[29,38,41-43]</sup>. Furthermore, disordered eating status was more predictive of diabetic retinopathy than the duration of diabetes, which is a well-established risk factor for microvascular complications<sup>[44]</sup>. Furthermore, ED in type 1 diabetic patients is associated with high mortality<sup>[45]</sup>.

Regarding mortality, an 11-year follow-up study reports that insulin restriction conveyed more than a three-fold increased risk of mortality in type 1 diabetic patients after controlling for age, body mass index and HbA1c values. Age of death was younger among insulin restrictors, with a mean age of death of 45 years, as compared to 58 years among those reporting appropriate insulin use<sup>[46]</sup> (Figure 1).

## MANAGEMENT OF EATING BEHAVIORAL ANOMALIES IN TYPE 1 DIABETICS

Despite the fact that little research has been done to determine the best treatment approaches for the problem of type 1 diabetic patients with ED or disordered eating behavior, a multidisciplinary care team is considered the standard to treat these people. Such a team should

include an endocrinologist/diabetologist, a nurse educator, a nutritionist with ED and/or diabetes training and a psychologist or social worker to provide weekly therapy. Depending on the severity of related psychiatric symptoms, such as depression and anxiety, a psychiatrist for psychopharmacological evaluation and treatment should also be consulted. Team members must be allowed to frequently and openly communicate with each other to maintain congruent treatment approaches, messages and goals.

The treatment of type 1 diabetes patients with disordered eating behavior and ED have the following components.

### Diabetes treatment

The diabetes team has the important responsibility of monitoring insulin regimens and providing education about diabetes management and potential complications to patients and families<sup>[47]</sup>. The traditional approaches to poor blood glucose control involving a stricter and more intensive monitoring of the diabetic management may increase the risk for disordered eating<sup>[20]</sup>. For this reason, a less rigid approach is recommended in the insulin regimen and nutrition therapy such as the dose adjustment for normal eating protocol, which is a 5 d training course aimed to provide patients with type 1 diabetes the skills to fit diabetes into their lives rather than their lives into diabetes through daily insulin adjustment together with a flexible diet<sup>[48]</sup>. Lowering the amount of time spent on diabetes management during the day may help to lessen stress associated with the diabetes, which may in turn help alleviate disordered eating behavior. Krakoff<sup>[47]</sup> suggested that self-destructive insulin manipulation within the context of an ED may also be an indirect call for help, signaling the need for more parental/adult intervention in patient's physical and mental health.

Trento *et al.*<sup>[49]</sup> suggest that offering a carbohydrate counting program within a group care management approach may help patients with type 1 diabetes acquire better self-efficacy and to restructure their cognitive and lifestyle potential.

Technological advances can also be used to address specific treatment issues seen in these patients. For example, the first challenge that most patients face is weight gain associated with insulin restart. Patients need to be taught to identify insulin edema, which may make them feel fat, bloated and uncomfortable, as temporary water retention that is different from the development of fatty tissue. Special tools designed to measure water-related weight vs lean muscle mass vs fat mass could help patients tolerate the temporary weight gain related to edema<sup>[46]</sup>. Additionally, newer insulin analogs show evidence of improving weight profiles which could be of help<sup>[50,51]</sup>.

### Nutritional management

The dietician must balance the difficult tasks of providing diabetes education, ED education, writing meal plans and defining weight goals for patients and families<sup>[47,52]</sup>.

The challenge presents when trying to balance the goal of slow weight gain and/or maintenance with diabetes meal planning. As the patient continues to increase calorie intake, insulin doses will need to be adjusted to match the amount of food eaten, avoiding hyperglycemia. Establishing a realistic goal of good blood glucose control is recommended instead of optimal blood glucose levels (that means levels between 70 and 130 mg/dL before meals and less than 180 two hours after starting a meal, with a glycated hemoglobin (A1C) level less than 7 percent<sup>[53]</sup>) as the body readjusts to refeeding and the patient begins to benefit from psychotherapy. Multiple daily injections regimens that use insulin to carbohydrate ratios provide greater flexibility with meal times and amounts of food but do require increased blood glucose monitoring and insulin injections. Such intense diabetes management may increase the potential for disordered eating as the child or adolescent must think constantly about the effects of food, insulin and exercise on his or her blood glucose levels. This may not be an ideal approach to diabetes meal planning during the treatment and recovery from the ED. As the individual's physical and psychological health improves, the incorporation of more flexible meal-planning strategies may be useful. Care professionals, including nutrition therapists and diabetes educators, should be sensitive to weight-related changes and concerns in youths with type 1 diabetes. It is important for all health care professionals to be aware that weight loss may be related to glycemia control.

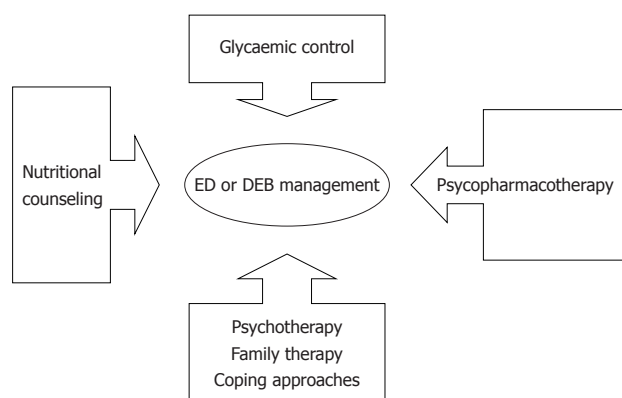
### Psychological therapy

Psychoeducation is a useful method to aid the patient to develop skills that will help him or her to cope with a chronic disease. Therefore, it can be helpful in type 1 diabetic patients who have difficulties accepting the disease.

Individual psychotherapy, group and family therapy are the most common ways to treat ED<sup>[54]</sup>. There are no studies showing the best psychotherapy modality for patients with type 1 diabetes and ED or disordered eating behavior. Some authors propose individual therapy to help patients to recover from ED and diabetes mismanagement<sup>[47]</sup>. Adolescents with type 1 diabetes often struggle with emotional issues related to having the illness and use an ED as a maladaptive coping mechanism. Individual therapy can help patients to develop more healthy coping strategies. Often families of patients with diabetes and ED have not adequately coped with the feelings of grief related to having a chronic illness in the family and thus they have not adequately supported the patient with diabetes. Dysfunctional family dynamics can exacerbate difficulties of adjusting to the illness and of resolving issues of grief and loss associated with the diagnosis. Family therapy is recommended to help the family to develop more functional ways of relating and in addressing issues of grief and loss that may be contributing to ED symptoms.

A psychiatric intervention is recommended to make a comprehensive mental health evaluation and to explore





**Figure 2** Components for eating disorders and disordered eating behaviors treatment in type 1 diabetes. DEB: Disordered eating behaviors; ED: Eating disorders.

**Table 1** Prevention of eating disorders or disordered eating behaviors in type 1 diabetics

Avoid rigid glycaemic control in susceptible patients
High index of suspicion for health professional attended adolescents patients in order to precocious diagnosis
Consider psychological factors in patients with poor metabolic control
Use of a validate questionnaire in subjects with high risk of DEB or ED

ED: Eating disorders; DEB: Disordered eating behaviors.

the factors that might contribute to the eating disorder. The psychiatrist is also skilled in identifying and treating young people who may have other treatable problems such as depression, anxiety or substance abuse. Psychopharmacological agents such as fluoxetine and topiramate are useful to treat anxiety and binge eating episodes<sup>[52,55]</sup> (Figure 2).

## PREVENTION

Since most type 1 diabetic patients do not admit to having an ED, this condition is commonly detected first by health care professionals<sup>[56]</sup>. The diabetes team may be the first to discover ED and can play a crucial role in recommending proper treatment to the patient and family. It is unlikely that diabetes management will improve until appropriate treatment begins for the concurrent ED.

Clinic-based group interventions for young women with diabetes and disordered eating behavior may be the most practical and nonstigmatizing approach to prevention and early intervention for this problem. Rigid approaches to the dietary management of diabetes can contribute to the development of disordered eating behavior. For these reasons, less intensive regimens are recommended in the initial stage of diabetes treatment, especially in young women<sup>[57-59]</sup>.

It is recommended that the health care professionals who treat young women with type 1 diabetes maintain a high index of suspicion for the presence of an eating disturbance, particularly among those patients with

persistent poor metabolic control, repeated episodes of ketoacidosis and/or weight and shape concerns<sup>[20,60]</sup>.

Screening for DEB in type 1 diabetics would be the best approach for early detection of behavioral abnormalities in these patients; however, a validated screening tool is not available yet<sup>[60]</sup>. Recently, Markowitz *et al*<sup>[61]</sup> proposed a 16 item diabetes-specific self-reported measure of disordered eating as a brief screening tool for disordered eating in diabetes. The revised 16 item Diabetes Eating Problem Survey is a self-report measure of disordered eating that can be completed in less than 10 min. It has demonstrated excellent internal consistency, construct validity and external validity in a group of 112 youth with type 1 diabetes<sup>[61]</sup>.

Individual or group interventions aimed to increase self-esteem, appearance and body acceptance and family-based interventions with the objective of developing flexible approaches to food and meal planning may help to avoid the development of disordered eating behavior in type 1 diabetic patients (Table 1).

## CONCLUSION

Today it is well-known that DEB and subthreshold disordered ED are more prevalent in girls with type 1 diabetes than their peers without diabetes. Full established disordered eating behavior and ED are difficult to manage, requires a multidisciplinary team formed by an endocrinologist/diabetologist, nurse educator, nutritionist, psychologist and, frequently, a psychiatrist. The best psychological methods to treat these anomalies are not determined yet. Results of the treatment of these entities from experienced health professionals are not available yet. The key for the management is early diagnosis and treatment. Therefore, it is important that the staff of the diabetes team who treats these patients should know the relationship between poor diabetes metabolic control and intentional misuse of insulin or the recommended diet to control weight gain.

ED in type 1 diabetic patients represent some of the most complex patient problems to be treated both medically and psychologically. Given the extent of the problem and the severe medical risk associated with it, more clinical and technological research aimed to improve its treatment is critical to the future health of this at-risk population.

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