

## ORIGINAL ARTICLE

# Risk behaviors for eating disorder in adolescents and adults with type 1 diabetes

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**Objective:** To evaluate the frequency of risk behaviors for eating disorder (ED) in patients with type 1 diabetes (T1D) and their association with gender, nutritional status, variables related to T1D, and body satisfaction.

**Method:** 189 individuals with T1D (12-56 years old) answered the Bulimic Investigation Test (BITE), the Eating Attitude Test (EAT), the Binge Eating Scale (BES), Stunkard's Figure Rating Scale, and questions regarding control of T1D. Association between ED risk behaviors and the selected variables was assessed with the chi-square test and Student's *t*-test; factors that influenced the risk of ED were identified by means of logistic regression.

**Results:** Of the patients with T1D, 58.7% were at risk of ED (45, 40, and 16% according to the EAT, BITE and BES, respectively). There were significant differences between groups with and without risk for ED related to BMI ( $p = 0.009$ ), gender ( $p = 0.001$ ), insulin omission ( $p = 0.003$ ), use of the carbohydrate counting method ( $p = 0.019$ ), and body dissatisfaction ( $p = 0.001$ ). The risk of ED was nine times higher in patients who reduced or omitted insulin ( $p = 0.036$ ).

**Conclusions:** Patients with T1D demonstrated a high frequency of body dissatisfaction and ED risk behaviors; the omission or reduction of insulin was an important risk factor.

**Keywords:** Eating disorders; nutrition; other disorders; other specialties; women

## Introduction

Patients with type 1 diabetes (T1D) have a higher frequency of eating disorders (ED) and risk behaviors for ED than the general population.<sup>1-4</sup> The effects of a chronic medical condition on body image and self-esteem, the restrictive nature of the diet for controlling T1D and the overweight associated with insulin use are among the mechanisms that have been proposed to explain the association between eating problems and T1D.<sup>5</sup>

T1D is a chronic condition characterized by partial or total damage of pancreatic beta cells, resulting in progressive inability to synthesize insulin - the hormone responsible for glucose transport.<sup>6</sup> The objective of treatment is to control glucose levels and ensure the energy supply of cells. T1D can be controlled with diet, exercise and use of short, intermediate or long-acting insulin - the choice depends on individual characteristics.<sup>6</sup>

EDs are characterized as serious problems related to eating and body image; the main forms are anorexia nervosa (AN), bulimia nervosa (BN), eating disorders not otherwise specified, and binge eating disorder (BED).<sup>7,8</sup>

In patients with T1D, particularly adolescents, certain typical ED behaviors such as binge eating, purging and restrictive and excessive diets are frequent.<sup>1,2</sup> Insulin

omission is an additional purging method employed by insulin-dependent individuals.<sup>5</sup> Insulin restriction causes glucose to build up in the bloodstream instead of being used as the cells' energy supply; it causes hyperglycemia, which leads to excretion of glucose in urine and, consequently, weight loss. This purging method has been cited among the diagnostic criteria for BN in the International Classification of Diseases (ICD-10).<sup>8</sup>

The coexistence of ED and diabetes has also been named diabulimia, which can be defined as either the omission or use of less insulin than necessary for controlling T1D in order to lose weight.<sup>9</sup> However, the use of the term diabulimia is controversial; first, because it was coined by the mass media, and second, because it does not include other EDs common in T1D patients and suggests that these problems are different in people with T1D and in those without this condition. The terms ED-T1D and ED-T2D have been recently proposed to highlight the association of EDs with T1D and type 2 diabetes respectively.<sup>5,9</sup>

An association of ED with T1D may be much more hazardous than an ED alone in that it involves a serious lack of metabolic control, higher mortality rates and higher risk of complications, such as diabetic retinopathy.<sup>10,11</sup>

Studies on this subject in Brazil have focused on the presence of BED in T2D<sup>12</sup> and have also included reviews<sup>13,14</sup> and case studies.<sup>15</sup> Due to the importance and complexity of both ED and T1D, as well as the lack of research on Brazilian samples of patients with T1D and ED, the objective of this study was to evaluate the presence of risk behaviors for ED in adolescents and

adults with T1D and to investigate possible associations of these behaviors with gender, nutritional status, variables related to T1D, and body satisfaction.

## Method

### *Design and setting*

Cross-sectional study with prospective data collection. The research was carried out at three institutions specializing in diabetes care in the city of São Paulo: the diabetes clinic of the Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo (HC-FMUSP), the Diabetes League of HC-FMUSP, and the Juvenile Diabetes Association. In the city of Santos, state of São Paulo, the Northwest and Central Zone units of the AMBESP (outpatient specialty clinics) were involved.

### *Participants*

Male and female patients diagnosed with T1D (by means of oral glucose tolerance test and/or fasting plasma glucose) from institutions specializing in the treatment of diabetes in São Paulo and Santos were invited to participate in the study, which took place between August 2008 and January 2009.

The inclusion criteria were: diagnosis of T1D established at least one year prior to enrollment; age between 12 and 59 years; literacy; current treatment at one of the involved diabetes services; and provision of written informed consent for participation in the study. The exclusion criteria were pregnancy, breastfeeding, and kidney problems due to T1D.

### *Measures*

Risk behaviors for ED were evaluated using three self-administered questionnaires that have been translated/validated for Portuguese:

- The Eating Attitude Test (EAT-26),<sup>16</sup> which is used to track ED symptoms, particularly restrictive and dieting behaviors;
- The Bulimic Investigation Test of Edinburgh (BITE),<sup>17</sup> which evaluates BN symptoms, such as overeating and compensation;
- The Binge Eating Scale (BES),<sup>18</sup> which evaluates binge habits.

An individual is considered to have risk behavior for ED upon reaching the following scores:  $\geq 21$  in the EAT-26,  $\geq 10$  in the BITE, and  $\geq 17$  in the BES.<sup>16-18</sup> In the present study, participants with a positive score on any of the above-mentioned instruments were classified as having risk behavior for ED.

Satisfaction with body image was evaluated using the outline-based Stunkard's Figure Rating Scale,<sup>19</sup> in which the measurement of body satisfaction is based on the difference between the number respondents choose to describe their current figure and that of their desired figure.

The patients also answered socio-demographic questions and questions related to T1D, such as time elapsed

since their diabetes diagnosis, whether they use fast-acting or long-acting insulin, whether they use the carbohydrate counting method, and whether they restrict or omit insulin in order to lose weight.

Nutritional status was evaluated using the body mass index (BMI) and classified according to World Health Organization categories for adults and BMI percentiles for age for adolescents.<sup>20,21</sup>

### *Statistical analysis*

All analyses were carried out using SPSS 14.0 (SPSS Inc., Chicago, IL, USA). The significance level was set at 5% for all analyses.

The sample was divided into two groups: those with and those without ED risk. These two groups were compared according to socio-demographic variables, nutritional status, and variables related to T1D by means of Student's *t*-test and the chi-square test (or Fisher's exact test, as appropriate).

To evaluate differences in body satisfaction, the proportion of individuals whose desired figures were thinner than their current figures were compared between the ED risk and the no ED risk groups using the chi-square test.

The combined interference of the ED risk variables was evaluated using forward stepwise logistic regression, where only the variables showing a statistically significant difference on univariate analysis were entered in the final model.

All patients provided written informed consent and the study was approved by the USP School of Public Health Research Ethics Committee (Of. COEP/169/08) and by the Ethics Committee of the Municipal Department of Health of the city of Santos (COFORM/DEPRO/SMS).

## Results

Of the 189 patients who participated in the study, 75% (n=141) were female, and 72.5% (n=137) were between 20 and 56 years old. On average, the population studied was in adulthood and had a normal BMI. They were mainly adolescents when first diagnosed with T1D and, at the time of data collection, reported having had diabetes for an average of approximately 13 years. Group characteristics are presented in Table 1.

Regarding patient nutritional status, Table 2 demonstrates that the majority had normal weight and approximately one-third were overweight.

**Table 1** Clinical characteristics of the participants with type 1 diabetes mellitus (n=189)

	Mean $\pm$ SD	Range
Age (years)	26.0 $\pm$ 9.8	12.0-56.0
Body mass index (kg/m <sup>2</sup> )	23.9 $\pm$ 4.0	14.7-41.3
Age at T1D diagnosis (years)	12.5 $\pm$ 7.4	0.7-45.0
Duration of T1D (years)	13.5 $\pm$ 8.1	1.0-35.0
IU/kg/day	0.8 $\pm$ 0.4	0.15-5.6

IU = insulin units; SD= standard deviation; T1D = diabetes mellitus type 1.

**Table 2** Distribution percentage of the patients (n=189) with type 1 diabetes according to nutritional status classification, gender, and stage of life, n (%)

Nutritional status	Adolescents		Adults		Total sample
	Female	Male	Female	Male	
Underweight*	1 (2.9)	-	2 (1.9)	2 (6.5)	5 (2.6)
Normal range <sup>†</sup>	19 (54.3)	13 (76.5)	67 (63.2)	20 (64.5)	119 (63.0)
Overweight	15 (42.9)	4 (23.5)	37 (34.9)	9 (29.0)	65 (34.4)
Total	35	17	106	31	189

\* Adolescents = BMI  $\leq$  5th percentile for age; adults = BMI  $\leq$  18.5 kg/m<sup>2</sup>

<sup>†</sup> Adolescents = BMI between 5th and 85th percentile for age; adults = BMI between 18.5 and 24.99 kg/m<sup>2</sup>

<sup>‡</sup> Adolescents = BMI  $\geq$  85th percentile for age; adults = BMI  $\geq$  25 kg/m<sup>2</sup>

Nearly all participants (97%) used injectable insulin (various brands), whether long-acting or not; a small proportion (2.6%) used an infusion pump.

A total of 51.3% (n=97) of the patients reported using the carbohydrate counting method. Sixteen females (10 of whom were overweight) reported omitting or reducing insulin doses in order to lose weight.

The responses to the risk evaluation questionnaires indicated the following percentages of patients at risk for ED using cutoff scores: 45% according to the EAT, 40% according to the BITE (14.3% presented clinically significant behavior on the severity scale) and 16% according to the BES. The number of instruments on which patients had positive scores for ED was also evaluated; it was found that 41.3% (n=78) of the sample presented ED risk on any of the tests and 58.7% (n=111) were classified as being at ED risk. A total of 28.05% (n=53) scored positively on only one of the tests, 19.05% (n=36) did so on two tests and 11.60% (n=22) on all three tests.

Female patients in both life stages (adolescence and adulthood) presented a higher frequency of ED risk on the EAT and BITE (symptom) scales, but not on the BITE severity and BES scales. EAT scores  $\geq$  21 were more common in adults than in adolescents (Table 3).

Table 4 presents associations between ED and female gender, BMI, overweight, non-use of glargine insulin and use of NPH insulin, reduction or omission of insulin for weight loss, non-use of the carbohydrate counting method, and body dissatisfaction in the two groups.

Regarding body satisfaction, 76.2% (n=144) of the individuals were dissatisfied with their bodies, with 31

individuals wanting to be heavier and 113 individuals wanting to be thinner. Overweight and obese patients answered more frequently that they wanted to be thinner than those with normal weight ( $p < 0.001$ ).

Body dissatisfaction was higher among females than males (77.8 vs. 22.2%;  $p < 0.001$ ). Comparing adults and adolescents, there were no differences among groups wanting to be thinner, the same or heavier ( $p = 0.755$ ).

Besides the fact that body dissatisfaction was higher among those at risk of ED, patients who reported reducing or omitting insulin more frequently reported wanting a thinner figure ( $p < 0.001$ ).

Logistic regression analysis revealed a 4.18 times greater chance of ED risk ( $p < 0.001$ ) in women than in men. Furthermore, the risk of ED among users of NPH insulin was 2.4 times higher than among non-users ( $p = 0.003$ ). Moreover, those who reduced or omitted insulin to lose weight had a 9.34 times higher ED risk ( $p = 0.036$ ) than those who did not.

## Discussion

As far as could be ascertained, this is the first study to investigate the risk of ED development in a sample of Brazilian patients with T1D. The magnitude of risk behavior for ED was clearly evident in this population, and was associated with BMI, gender, use of the carbohydrate counting method, body dissatisfaction, and insulin omission (the variable which showed the greatest association with odds of ED risk).

**Table 3** Frequency of positive scores and percentages on the Eating Attitude Test (EAT), Binge Eating Scale (BES), and Bulimic Investigation Test of Edinburgh (BITE) according to patient gender and stage of life (n=189), n (%)

	Adults			Adolescents			Total	
	Male	Female	p-value	Male	Female	p-value	Male	Female
EAT								
(-) < 21	24 (77.4)	46 (43.4)		15 (88.2)	19 (54.3)		39 (81.3)	65 (46.1)
(+) $\geq$ 21	7 (22.6)	60 (56.6)	0.001	2 (11.8)	16 (45.7)	0.016	9 (18.7)	76 (53.9)
BES								
(-) < 17	29 (93.6)	88 (83.0)		16 (94.1)	26 (74.3)		45 (93.7)	114 (80.9)
(+) $\geq$ 17	2 (6.4)	18 (17.0)	0.144	1 (5.9)	9 (25.7)	0.089	3 (6.3)	27 (19.1)
BITE (symptom)								
(-) < 10	24 (77.4)	61 (57.5)		13 (76.5)	15 (42.9)		37 (77.1)	76 (53.9)
(+) $\geq$ 10	7 (22.6)	45 (42.5)	0.045	4 (23.5)	20 (57.1)	0.023	11 (22.9)	65 (46.1)
BITE (severity)								
(-) < 5	28 (90.3)	87 (82.1)		17 (100.0)	30 (85.7)		45 (93.7)	117 (83.0)
(+) $\geq$ 5	3 (9.7)	19 (17.9)	0.271		5 (14.3)	0.101	3 (6.3)	24 (17.0)

**Table 4** Qualitative variables according to the risk or non-risk of eating disorders among patients with type 1 diabetes (n=189)

Qualitative variables	Eating disorder risk, n (%)		p-value
	No	Yes	
Gender			
Male	33 (42.3)	15 (13.5)	< 0.001
Female	45 (57.7)	96 (86.5)	
Body mass index			
Underweight	2 (2.6)	5 (4.5)	0.009
Normal range	61 (78.2)	63 (56.8)	
Overweight	15 (19.2)	43 (38.7)	
Long-acting insulin type			
Novolin	-	1 (0.9)	0.021
Glargine	39 (50.0)	37 (33.3)	
Detemir	4 (5.1)	4 (3.6)	0.006
Humulin	3 (3.8)	5 (4.5)	
NPH	29 (32.7)	64 (57.7)	
Insulin reduction/omission			
Yes	1 (1.3)	15 (13.5)	0.003
No	77 (98.7)	96 (86.5)	
Carbohydrate counting			
Yes	48 (61.5)	49 (44.1)	0.019
No	30 (38.5)	62 (55.9)	
Body dissatisfaction			
Yes	45 (57.7)	99 (89.2)	< 0.001
No	33 (42.3)	12 (10.8)	

#### *ED risk behavior in the study population compared with the international literature*

The total of patients classified with ED risk, because they had a positive score for ED on at least one of the scales used, was 58.7%. The methodology of this study, which considered a positive score on any of the tests as a risk for ED, differs from that of other studies, which prevents a close comparison between the results.

Due to possible bias associated with EAT items (see limitations section), the 45% risk found using this instrument may be an overestimate. It bears stressing that, as a screening tool (as are BITE and BES), the EAT shows higher risk rates than diagnostic scales. The results of the BITE were similar to those found on the EAT (40 vs. 45%), and this instrument is more specific when evaluating overeating and compensatory behaviors. The lowest positive value (16%) for risk behavior was found in the BES, which essentially is an evaluation of binge behaviors.

It can therefore be inferred that the most frequently detected behavior among these patients is restriction/dieting, which is essentially the instruction given them by clinicians. The second most frequently found behavior was compensatory or purgative behavior, which indicates problems with eating and controlling T1D. The third was binge eating.

There was a higher proportion of females among those with the highest scores: adult and adolescent women scored higher on the EAT as well as on the BITE (symptoms) than men. This result is congruent with the higher prevalence of ED and risk behavior generally found among females, regardless of clinical comorbidity.<sup>22,23</sup>

Even though it is difficult to compare data due to methodological differences, the risk behavior values

found in the present study are generally higher than those in studies from other countries. Some of these studies used diagnosis scales - such as the Eating Disorder Examination (EDE), Eating Disorder Inventory (EDI), and Diagnostic Survey for Eating Disorders (DSED) - instead of screening tools (EAT, BITE, BES), and lower risk rates would be expected.

For example, when evaluating adolescents with T1D, Smith et al.<sup>4</sup> found that 27.5% had BN or BED according to the EDE. Grylli et al.<sup>24</sup> observed that 11.5% of the girls in their sample evinced diagnostic criteria for ED according to the EAT, EDE and EDI. Neumark-Sztainer et al.,<sup>1</sup> using their own questionnaire, found that 35% of girls with T1D had binge behavior and 27% had purging behavior, whereas only 20 and 18% of boys with T1D had binge and purging behavior, respectively.

Jones et al.,<sup>2</sup> using the EAT and DSED, found that 10% of the adolescents with T1D in their sample had ED and 14% had subclinical cases. With the same instrument, Rydall et al.<sup>10</sup> found that 29% of girls with T1D demonstrated ED behavior. In a study by Colton et al.,<sup>25</sup> the results of the EDE indicated that 3% of adolescents with T1D were binge eaters, 2% omitted insulin and 10% used physical activity for weight control; moreover, they found that 8% of their sample presented a combination of two ED risk behaviors.

Several studies comparing diabetic and non-diabetic populations have observed more inappropriate eating behavior among diabetics than controls.<sup>1,2,25-27</sup> Other studies involving individuals with T1D, however, have not found such differences.<sup>28,29</sup>

#### *Association of the study variables with risk behavior for ED*

Comparison between the ED risk and no ED risk groups revealed that the risk group included more women, more underweight and overweight individuals, fewer users of the carbohydrate counting method, more individuals who reduce or omit insulin, greater differences in insulin type, and a greater number of individuals dissatisfied with their bodies.

The association with female gender, overweight/obesity, insulin reduction or omission, and body dissatisfaction has been previously discussed by other authors.<sup>30</sup>

Overweight individuals suffer from greater body dissatisfaction, which is a known risk factor for inappropriate weight control practices and, therefore, a risk factor for ED.<sup>31</sup> Thus, the presence of more patients dissatisfied with their body image in the ED risk group is understandable. The relation between dissatisfaction with body image and disordered eating behavior among girls with T1D has already been confirmed in another study.<sup>32</sup> Neumark-Sztainer et al.,<sup>30</sup> in an evaluation of adolescents with T1D, found no association with BMI, although high levels of body dissatisfaction were associated with unhealthy weight control practices.

Approximately half the study population used carbohydrate counting to help with glycemic control and, in this study, not counting carbohydrates was associated with

ED risk. Carbohydrate counting was planned to allow dietary flexibility, but some patients use it in a stricter way, with excessive worries about food composition, food planning, and meal and portion sizes; this could lead to obsession about food and health, a feeling of lack of control, a belief that diabetes controls life, and inadequate eating behaviors<sup>2,25,33</sup> - attitudes and behaviors similar to those of patients with ED.<sup>25</sup>

The association between not counting carbohydrates and ED risk contradicts the literature, in which the possible rigid control that accompanies the carbohydrate counting method is associated with inappropriate eating behaviors.<sup>25</sup> It has been recommended that nutritional follow-up of patients with T1D, especially for those at risk of ED, involve flexible strategies for meal planning without emphasizing carbohydrate counting until the patient has recovered from disordered eating symptoms.<sup>25</sup>

Diabetes is a disease that demands interdisciplinary treatment, including a specialized and careful nutritional approach. Erroneous concepts about eating and nutrition, combined with weight gain due to insulin therapy and the resulting body dissatisfaction, can contribute to restrictive, compensatory, and binge behaviors, which place the individual at risk of ED.<sup>9,33</sup>

With regard to insulin types, NPH use was higher and glargine use was lower among those at risk of ED. It has also been observed that patients who used NPH insulin had approximately twice the risk according to logistic regression analysis. No study correlating insulin type with ED risk was found, but there has been discussion about a relationship between the type of insulin used and weight gain. It is known that higher weight or BMI can be predictors of ED risk.<sup>34</sup>

Clinical trials with adults have demonstrated that basal insulins such as detemir and glargine seem to cause less weight gain than NPH insulin.<sup>35</sup> Groups treated with intensive insulin therapy, i.e., three or more daily insulin doses or continuous infusion, gain more weight than those treated with conventional therapy involving two insulin administrations per day.<sup>36</sup>

#### *Insulin omission*

In the present study, the proportion of patients who reported reducing or omitting insulin doses to lose weight was higher than that reported both by Howe et al.,<sup>37</sup> who found that 1.4% of the patients omitted insulin and 1% reduced their doses to lose weight, and by Colton et al.,<sup>3,25</sup> who reported 2 and 3.1% omission, respectively.

Considering that all of the patients who reported omitting insulin in the present study were women, the data are similar to those of Ackard et al.<sup>29</sup> These authors found insulin omission for the purpose of weight control in 1.4% of men and 10.3% of women, as well as reduced doses in 1.4% of men and 7.4% of women. Furthermore, Neumark-Sztainer et al.<sup>30</sup> found that 7 to 10% of their adolescent participants omitted insulin.

Several authors have found higher frequencies of insulin reduction or omission than those found in the

present study.<sup>2,10</sup> One factor that could affect this frequency is gender, as the frequency of insulin omission seems to be higher in studies of women. Another factor is nutritional status, considering that patients with higher BMI tend to be more dissatisfied with their body image, which may lead to inappropriate weight control strategies. Thus, studies involving patients with higher BMIs may find higher rates of insulin reduction or omission.

In this study, the majority of those who omitted insulin were also overweight and more dissatisfied with their bodies. Perhaps the dissatisfaction with body image had some influence on the decision to use such a drastic attempt at weight loss/control. It is also debated whether intensive insulin therapy may be related to weight gain and insulin omission, considering that the patient would have to administer insulin more frequently each day. Of all the patients who omitted insulin, only one took less than three insulin doses per day, i.e., the others were treated with intensive doses.

On logistic regression analysis, insulin omission was the highest risk factor for ED; those who reported this behavior had approximately nine times the ED risk of the other patients. It is known that insulin restriction is associated with increased diabetic complications and a higher mortality risk. Evaluation of women with T1D in an 11-year follow-up study found a 3.2 higher mortality risk associated with insulin omission.<sup>38</sup> There is an association between prolonged insulin omission (insulin reduction or omission of at least 1/4 of the prescribed dose), duration of T1D, and both retinopathy (odds ratio of 1.35 and 1.25, respectively) and nephropathy (odds ratio of 1.35 and 1.21, respectively).<sup>11</sup>

The results of the present study should alert health care professionals to this and other dangerous practices used for weight control among patients with diabetes. Appropriate preventive treatment should be provided, considering that these patients have an increased risk of developing ED as well as microvascular complications common to diabetes at an early stage.<sup>10,11</sup>

#### *Limitations*

One of the limitations of the present study is related to the scales used. Although other instruments specific to the investigation of risk behavior for ED in patients with T1D are available, none have been translated into Portuguese or validated for Brazil.<sup>25-27</sup> It bears noting that certain items of standardized tests, instead of representing risk behavior for ED, could rather be seen as indicating adequate control of diabetes.<sup>9,33</sup> This could be the case for EAT items such as "I eat diet foods," "I avoid foods with sugar in them," and "I particularly avoid foods with a high carbohydrate content."

Nevertheless, the EAT is probably the most commonly used test for ED; it has been translated and validated in a number of languages and countries,<sup>22</sup> and has been used in a several studies to evaluate ED behavior in diabetic patients.<sup>2,24,25,28,39</sup> Moreover, Cantwell & Stell<sup>39</sup> reported that the EAT-40, associated with questions regarding the handling of insulin, was effective for identifying patients at

high risk of ED. Studies evaluating risk in adolescents and young adults without T1D have generally found lower positive EAT values than those of the present study<sup>22</sup> and thus, the magnitude of positive scores in the present study stands out.

In addition to the scales themselves, it should be noted that using a greater number of instruments could increase the rate of false-positives and including in the ED positive risk behavior a group of patients with different characteristics (e.g., restriction, uncontrolled eating).

Furthermore, the sample included in this study, with both adolescent and adult T1D patients, could be overly heterogeneous for certain analyses; not only is the duration of diabetes different in these age groups, but teenagers also have different concerns about body image, for example. This study also did not evaluate a control group of healthy adolescents and adults.

Therefore, other studies should be carried out with more homogeneous Brazilian samples, using diagnostic scales, to evaluate the frequency of both ED risk behavior and ED criteria in patients with T1D. We recommend that case-control studies be conducted to measure the prevalence of such behaviors in populations with and without diabetes.

In sum, this sample of patients with T1D exhibited a high frequency of ED risk behavior, as shown in studies carried out in other countries. They also exhibited a high frequency of body dissatisfaction and reduced or omitted insulin for weight loss, consistent with what has been described in international studies. These results demonstrate the need for extensive care of T1D patients focusing on the prevention, follow-up and treatment of ED risk behaviors, with special attention to insulin reduction or omission, due to its association with severe clinical complications.

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## Disclosure

The authors report no conflicts of interest.

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