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## Eating disorders and type 1 diabetes mellitus – case reports

### Zaburzenie odżywiania i cukrzyca typu 1 – opis przypadków

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#### Abstract

Type 1 diabetes and eating disorders, especially anorexia and bulimia, are increasingly common in children and adolescents. The coexistence of these diseases is both a diagnostic and therapeutic challenge. Focusing on food, both in terms of its quality and quantity, is one of the basic aspects of diabetes treatment, but also one of the integral elements of eating disorders. The article presents two cases of patients with type 1 diabetes who developed eating disorders. In one case, the reason was the patient's fear of gaining weight after starting insulin therapy. In the other case, anorexia developed independently of the diagnosis of diabetes, but its emergence was masked as an attempt to improve glycaemic control. The need for cooperation between the diabetes team and the psychiatric team is also highlighted. In addition, we present methods to avoid weight gain that are typically used by diabetic patients.

**Keywords:** type 1 diabetes mellitus, feeding and eating disorders of childhood, diabulimia

#### Streszczenie

Cukrzyca typu 1 i zaburzenia odżywiania, zwłaszcza anoreksja i bulimia, coraz częściej występują u dzieci i młodzieży. Współwystępowanie tych schorzeń stanowi wyzwanie zarówno diagnostyczne, jak i terapeutyczne. Koncentracja na jedzeniu, jego jakości i ilości jest jednym z podstawowych elementów leczenia cukrzycy, ale jednocześnie jednym z integralnych elementów zaburzeń odżywiania. W artykule przedstawiono dwa przypadki pacjentów z cukrzycą typu 1, u których rozwinęły się zaburzenia odżywiania. W pierwszym przypadku przyczyną była obawa przed przybraniem masy ciała po rozpoczęciu insulinoterapii. W drugim anoreksja rozwijała się niezależnie od rozpoznania cukrzycy, ale jej rozwój maskowany był jako próba poprawy kontroli glikemii. Autorki omawiają również potrzebę współpracy zespołu diabetologicznego z zespołem psychiatrycznym. Dodatkowo przedstawiono sposoby unikania przyrostu masy ciała, charakterystyczne dla pacjentów cukrzycowych.

**Słowa kluczowe:** cukrzyca typu 1, zaburzenia odżywiania młodocianych, diabulimia

## INTRODUCTION

Type 1 diabetes (T1D) is one of the most common autoimmune diseases in children and adolescents, and its prevalence is rising rapidly both in Poland and worldwide (Mayer-Davis et al., 2018; Mobasser et al., 2020). In the Polish population, the increase in prevalence is estimated to be at least fourfold between 2005 and 2025 (Jarosz-Chobot et al., 2011). Eating disorders (ED) are an important comorbidity of T1D. Because of the amount of attention that must be given to maintaining proper metabolic control of T1D, the first symptoms of ED may be hard to notice. Studies show that adolescent patients with T1D are twice as likely to develop ED than their peers without T1D (Shaban, 2013). It seems that the diagnosis of T1D itself is a risk factor for ED development (Jones et al., 2000). From the moment of diagnosis, eating starts to be the most important (and problematic) part of life. Patient need to control what they eat, how much they eat, and when they eat – which is a straight way to develop orthorexia or unspecific eating/feeding disorders (Grammatikopoulou et al., 2021). What is more, T1D is usually diagnosed in children, adolescents, and young adults – when physical appearance and reception by peers are important parts of building self-esteem. Many patients are anxious about gaining body weight because of insulin therapy. Typically, before the diagnosis of T1D, they lose body weight due to dehydration and fatty and muscle tissue loss due to ketoacidosis. Nowadays, more patients are overweight/obese before T1D diagnosis – and as they do not understand where the decline in body weight comes from, they are happy about it. This means that fast weight regain, at the start of therapy, also adds to the fear of gaining weight due to insulin therapy (Coleman and Caswell, 2020). Eating disorders, combined with T1D, can lead to acute life-threatening complications of diabetes – ketoacidosis or hypoglycaemia. In the long-term, they also promote the development of long-term sequelae including retinopathy and nephropathy. For all the reasons mentioned above, it is necessary to educate both doctors and patients on how frequently the two diseases coexist.

### CASE 1

A female patient aged 13 years and three months was admitted to the Paediatric Diabetology Department due to a diagnosis of insulin-dependent diabetes, and, because of that, to assess the need for insulin, choose the best method of insulin therapy – personal insulin pump, pens – and educate both the patient and her parent about self-control of the disease. The first symptoms occurred about 6 months earlier, including periodic polyuria and loss of body weight (approx. 5 kg). Two weeks before admission, the girl reported polyuria, polydipsia, and weakness. Her sexual maturity was assessed as stage II in the Tanner scale. The patient was under the care of a pulmonologist, as she had well-controlled asthma, taking drugs only in cases of disease exacerbation. The family history was negative for diabetes or other autoimmune diseases.

Standard treatment for ketoacidosis and T1D was introduced. Both the patient and her mother were educated about T1D self-control, insulin therapy, and dose adjustments. During their 7-day stay in the Department, the first routine psychological appointment was carried out due to the diagnosis of a chronic disease. Psychoeducation was provided. As the disease started during the COVID-19 pandemic, the first appointment was conducted via phone because of technical problems with the connection to the videoconference. A month later, during the first diabetes educator's appointment, they were referred to the Department's psychologist, but due to the parent's high level of anxiety they did not come. During the next three medical appointments, lower daily doses of insulin and a tendency to hypoglycaemia were observed. Once again, the patient and her parent were directed to contact the Department's psychologist. The main reason given by the patient's mother for psychological consultation was emotional problems, experienced both by the mother and the patient, related to the ending remission of T1D and the need for more insulin. The patient started eating approx. 500 kcal divided into 3–4 meals daily. At the time of diagnosis, her height was 155 cm (25 cc), and her body weight was 45 kg (50–75 cc to height age), with a body mass index (BMI) of 19. During the phone calls, the mother said she weighed her daughter, and her body weight had risen to 49 kg. At the first face-to-face visit, seven months after diagnosis, the girl's weight was 45.9 kg at 157 cm. She noticed that she was concentrating hard on the caloric and nutritional values of food, so that she would not need to take insulin for the meal (as during the remission). She started to eat less carbs and sometimes refused to eat altogether, she lost the pleasure of eating, and reported a lower mood. She had lost body weight, and later, her menses. Negative thoughts about her body image surfaced; unpleasant memories of peers making fun of her looks emerged. The patient was living with her mother and older sister. When she was 5 years old, her father died suddenly because of acute pancreatitis. The patient linked her disease to the condition diagnosed in her father, as both of them affect the pancreas; incidentally, she was diagnosed in the same hospital in which he died. A few months after the patient's diagnosis, her grandmother, who played a significant part in her upbringing, died. Both the patient and her mother strongly emphasised the loss of relatives and the lack of any outside support. The pandemic was also a reason why the patient had less to no contact with her peers. During this visit, the patient was referred to the psychiatrist and psychotherapist immediately. During the first two months of therapy, her body weight fell down to 43.5 kg at a height of 157 cm. Eating disorders associated with T1D were diagnosed, based on the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5); the patient's body mass had not fallen drastically, yet the fact that the patient should have regained weight lost due to prediabetes and diabetes was taken into consideration. After a preliminary consultation, follow-up actions were planned by the psychologist, clinical dietician, and diabetologist in charge.

## CASE 2

A female patient, 13 years and five months old, was admitted to the Paediatric Diabetology Department due to life-threatening body weight loss. She was diagnosed with prediabetes of T1D at the age of 5 years and 10 months, during hospitalisation for inadequate height in the Paediatric Endocrinology Department. From that time onwards, she was on a restrictive low glycaemic index diet and exercised regularly. Insulin therapy was started at the age of 8 years and 8 months. During a follow-up visit in the Outpatient Diabetology Department, the patient's mother often expressed concern about the amount of insulin taken by the child; she also encouraged the girl to exercise and did not allow any snacks, which led to the child eating them without her knowledge and having an additional insulin dose. Both the doctors and psychologists educated the patient's mother on the risk of ED related to her behaviour. Two months before admission, the patient suddenly stopped snacking and started exercising at least 2–3 hours a day. Later, occasional appetite attacks started, followed by the patient's refusal of insulin injection and additional exercises. During the two months between her visits to the Outpatient Diabetology Department, the patient lost 6 kg (from 32 kg to 26 kg), with a height of 147 cm. There was no menarche. About two years previously, the patient had an episode of depression with autoaggressive behaviours – self-harm. During the psychiatric consultation, it was determined that the patient was previously unhappy with her looks and felt that she was “fat and ugly”. Those feelings were not connected with the need for insulin therapy. She was diagnosed with anorexia based on the DSM-5 criteria but did not meet the main criteria for diabulimia – she did not restrict her eating routine to take less insulin but took less insulin because she ate less. She did not manipulate glycemia readings to take less insulin, nor did she manipulate insulin pump readings. Because of her extremely low body weight, she was hospitalised immediately for intragastric infusions. Because of the patient's large accumulation of food-related anxiety and secondary appearance of depressive symptoms – a decision was made to provide pharmacological support – fluoxetine was started at a dose of 20 mg, resulting in a gradual improvement of mood and reduction of anxiety. The patient tolerated the drug well, and she did not experience any symptoms of intolerance. Psychotherapy sessions took place daily. Feeding treatment was initiated, with additional insulin therapy. During the day, the patient was given lispro (rapid-acting) insulin for meals, glargine (long-acting) insulin as basal insulin, and human insulin (short-acting) for intragastric infusion at night. After achieving a safe body weight, the girl was re-evaluated by a psychiatrist. Monthly follow-up visits with a psychiatrist and individual psychotherapy were initiated.

## DISCUSSION

Eating disorders are becoming more and more common, regardless of age, sex, and comorbidities. In the case of T1D

children, it is hard to determine whether the ED is developing because of T1D, or “on the side” of it (Winston, 2020). For example, in classic bulimia two subtypes are recognised: purging and non-purging. The patient with T1D and bulimia may abstain from taking insulin for meals so as not to absorb carbohydrates. It can be classified as purging behaviour, harder to notice by medical practitioners other than diabetologists, as it may be seen in the patient's readings from FGM (flash glucose monitoring), CGM (constant glucose monitoring), or glucometer. When the patient has a binge episode due to an earlier very strict dietary regime to control glycaemia, and does not take insulin because of fear of gaining body weight and hence needing more insulin in the future, the diagnosis of classical bulimia is not so obvious.

In classic anorexia, distorted body image and loss of body weight are persistent characteristics.

Again, it is possible that the patient simply restricts food intake and reduces the amount of insulin administered accordingly – lowering the insulin dose is secondary to eating restriction. There are also possible (and common) situations when a patient, afraid of gaining weight due to insulin, reduces the amount of food consumed or exercises intensively, while the self-image is disturbed with subsequent insulin injections – the feeling of immediate weight gain. The patient's goal is not to lose weight, but to maintain it (there is a gradual shift of acceptable body weight), and instead of a distorted self-image, it is the fear of gaining weight. There is also a possibility that, being afraid of gaining weight due to insulin therapy, the patient does not take enough insulin with meals. This leads to glucosuria and mild ketoacidosis – with no body weight growth. We also see patients who have problems with accepting the growing doses of insulin, as it is a “drug”, and they have a strong belief that all drugs have some side effects. Due to the fear of unspecified side effects, they would restrict their food intake, so that the daily insulin dose would stay the same. Is it still possible to diagnose anorexia in such cases? Undoubtedly, there is a loss of body weight, although not entirely intentional. The patient is afraid to eat, and the underlying fear comes from psychological reasons, not physical ones (as in the case of gastric ulcers). Nevertheless, no matter how the disease is called, working with such a patient will be much different than in classic anorexia nervosa, as the root causes of the two conditions are different. The main cause of distress is the fear of insulin therapy – and it cannot be eliminated.

### **Role of psychologist and psychiatrist in a comprehensive approach to the treatment of a patient with type I diabetes and coexisting eating disorders**

When anyone from the care team suspects comorbid ED, it is crucial to take a detailed interview to examine the young patient's key beliefs about weight and physical appearance that influence the formation of their personality during the dynamic period of physical maturation. Perfectionism, high standards, and the willingness to follow the ambitions and

requirements of the social mirror are often noticeable (Neale and Hudson, 2020).

Key elements that should be included in the patient's interview:

- eating habits;
- dietary rules;
- weight control (how often meals are eaten, the link between mood and body weight loss);
- avoiding eating in social situations;
- concerns about physical appearance and weight; beliefs about thinness;
- comparing yourself with others;
- impact of nutrition on everyday functioning, mood, and cognitive functions;
- eating pattern in the family.

In some situations, the eating habits questionnaire (Fairburn and Beglin, 1994) may be helpful.

When a patient with a suspected ED is consulted by a psychiatrist without a formal referral from the diabetologist in charge of the patient, the following questions should be asked:

- how the need for insulin has changed over the past few months (there should not be any drastic insulin dose reductions);
- how many doses of insulin the patient takes daily (to confirm or deny the number of meals taken);
- the patient's attitude to insulin; have parents ever voiced the fear of side effects/tried an alternative medicine treatment to reduce the need for insulin;
- how often the patient checks glycaemia;
- in the insulin pump report, it can be seen that the basal flow was stopped with proper glycemia, or the meal bolus was cancelled.

When a patient is diagnosed with an ED comorbid with diabetes, initially it seems most appropriate to include him or her in the process of cognitive-behavioural psychotherapy in Fairburn's transdiagnostic model (Murphy et al., 2010). The length of the protocol depends on the BMI: when it is  $>17.5 \text{ kg/m}^2$ , the protocol consists of 20 treatment sessions, while in patients with  $\text{BMI} <17.5 \text{ kg/m}^2$ , it is 40 meetings. During the first stage, the most important goal is to develop a correct eating pattern and conduct real-time self-monitoring (so-called nutritional diaries in which patients record their meals and additionally their automatic thoughts, emotions, and behaviours that accompany them). An important therapeutic element is the monitoring of the patient's weight at intervals of up to one week. After regulating the eating pattern, attention should be paid to the mechanisms that underlie the ED, such as overestimating the importance of body shape and weight, excessive focus on eating control, dietary restrictions, and being underweight as an indicator of success. Psychoeducational interventions combined with the therapeutic process are also very important.

Although the treatment of ED relies heavily on psychotherapeutic interventions, psychiatric consultation is indicated in some patients to determine whether developing ED is a mask for a mood disorder. In such situations, the initiation

of pharmacotherapy may significantly, by reducing depressive symptoms, improve patient compliance in the context of diabetes treatment. In addition, the inclusion of pharmacotherapy can help reduce the fear of eating, improve the regulation of emotions, and reduce impulsivity (Lutter, 2017).

The most commonly used drugs are antidepressants belonging to the group of selective serotonin reuptake inhibitors (SSRI) (Flament et al., 2012). In children and adolescents, based on the age criterion, sertraline (from 6 years of age in doses of 50–200 mg/d) and fluoxetine (from 8 years of age in doses of 10–60 mg/d) can be used (Mayer and Walsh, 1998).

It should be emphasised that the approach to every diabetic patient with comorbid ED should be holistic. The crucial thing is the vigilance of the diabetologist, who, most often, has the first contact with the patient. Next – the awareness of the importance of psychotherapeutic work, which leads to an improvement of cooperation with the patient, which in turn, contributes to better therapeutic effects of treatment.

It is, therefore, clear that the mere presence of T1D in a patient with an ED affects how he or she is treated. It is necessary to take into account the wider possibilities of misleading the attending physician – such as unfastening the infusion set so that the insulin given for a meal is not injected under the skin, but saved in the pump memory; squeezing the administered insulin dose from under the skin so that blood glucose levels do not drop and the patient has an argument for reducing the insulin dose at the next meal; intentional falling into ketoacidosis to lose weight – regardless of whether or not the emergence of an ED is related to T1D.

The psychiatrist needs to ask the diabetologist about changes in the patient's insulin therapy patterns. The diabetologist needs to be watchful for the possibility of occurrence of an ED. To improve the quality of psychiatric care in diabetic patients, it is necessary to conduct appropriate psychiatric training for diabetes teams. A screening program for psychiatric diseases in diabetic patients would also be beneficial. Close cooperation between mental health and diabetes professionals is essential.

### Conflict of interest

*The authors do not report any financial or personal connections with other persons or organisations that could adversely affect the content of the publication or claim the right to this publication.*

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