

## **Eating Disorders in children and adolescents with type 1 and type 2 diabetes – prevalence, risk factors, warning signs**

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### **Summary**

Diabetes is associated with increased risk for eating disorders, various dependent on type of diabetes. Binge eating disorder is more common in patient with type 2 diabetes (T2DM). Whereas, intentional omission of insulin doses for the purpose of weight loss occurs mainly in patient with type 1 diabetes (T1DM), however, in some patients with type 2 diabetes omission of oral hypoglycaemic drugs can be present. Risk factors for the development of eating disorders in patients with diabetes include: age, female gender, greater body weight, body image dissatisfaction, history of dieting and history of depression. Poor glycaemic control, recurrent episodes of ketoacidosis or recurrent episodes of hypoglycaemia, secondary to intentional insulin overdose, missed clinical appointments, dietary manipulation and low self-esteem should raise concern. The consequence of eating disorders or disordered eating patterns in patients with diabetes is poor glycaemic control and hence higher possibility of complications such as nephropathy, retinopathy and premature death.

**Key words:** diabetes, eating disorders, disordered eating patterns

### **Introduction**

Clinical and epidemiological observations regarding adolescents with type 1 and type 2 diabetes indicate a possibility of increased risk for development of eating disorders in this group of patients comparing to the general population. Type 1 diabetes is a chronic condition characterised by partial or total damage of beta cells of pancreatic islets, which results in progressive inability to synthesise insulin. Type 2 diabetes is a metabolic disease, primarily characterised by insulin resistance, whereas the body's ability to produce insulin is not completely inhibited. The aim of diabetes treatment

is to control glucose levels (with diet, exercise, drugs that reduce insulin resistance or increasing its secretion and short-or long-acting insulin) and hence ensure the energy supply of cells.

Eating disorders are characterised by the presence of persistent and disordered eating behaviours that cause the modified intake and absorption of foods and significantly impair physical and psychosocial functioning. According to Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association DSM-5 [1] and European classification International Classification of Diseases ICD-10 [2] this category includes inter alia anorexia nervosa, bulimia nervosa or binge eating disorder. Disturbed eating patterns or eating problems not specified in above diagnostic classifications nonetheless present in patients with diabetes include insulin dose reduction or omission (compensatory behaviour also listed in the criteria for bulimia) and diabulimia which is striving to reduce weight gain resulting from above behaviours.

### **Eating disorders and eating problems in patients with type 1 diabetes**

It seems that people with type 1 diabetes can be prone to eating disorders more than healthy people due to the need to follow a diet based on the use of carbohydrate exchangers or risk of weight gain as a result of insulin treatment. Moreover, potential possibility of insulin dose manipulation (skipping a dose or reduction) to obtain weight loss may have a significant importance. Data regarding prevalence of eating problems among adolescents with type 1 diabetes vary. Some studies suggest their more frequent prevalence [3–6] whereas others indicate no differences comparing to peers without diabetes [7]. One of the reasons for such inconsistency may be associated with the type of used methodology. Those available are adapted to assess the eating problems in the general population, and may not be sufficiently accurate for patients with diabetes. For example, they do not include the occurrence of behaviours associated with skipping or reducing doses of insulin. Moreover, due to the nature of the disease, people with diabetes for example need to be focused on their diet, cannot take certain foods, must consume meals even when they are not hungry to avoid hypoglycaemia. The number of diagnostic tools adapted or created for the purpose of the assessment of eating problems in diabetes is low [8–10]. What is more, they cannot be use to make comparisons with groups of healthy people. This situation makes it impossible to draw conclusions.

Young et al. meta-analysis (2013) of 13 studies regarding prevalence of eating disorders in type 1 diabetes [5], indicate more frequent occurrence of eating disorders in adolescents with diabetes comparing to healthy peers. Eating problems were found in 39.3% of people with type 1 diabetes comparing to 32.5% of people without diabetes, whereas eating disorders in 7.0% and 2.8% respectively. Authors emphasize the issue of the proportion of diagnoses stability in people without diabetes and its relationship to the type of diagnostic methods used in the population with diabetes. Taking into consideration the assessment methods adapted to the nature of the disorder, the prevalence of eating disorders is more frequent (but not significantly) among people with

type 1 diabetes compared with healthy peers. On the other hand, the use of methods suitable for the general population may overestimate prevalence, therefore the authors have questioned the legitimacy of making such comparisons. Despite limitations described above, meta-analysis of 8 studies from 2005 [3], which involved a group of 748 women with diabetes and 1,587 healthy women is worth mentioning at this point. In this study higher prevalence of bulimia among people with type 1 diabetes compared with the control group (1.73% vs. 0.69%) was found and there was no difference in the prevalence of anorexia nervosa.

Another problem associated with eating problems concerning patients with type 1 diabetes is the use of different methods to reduce weight gain, especially insulin doses manipulation. In the study conducted by Lawrence et al. [11] with the participation of 1,742 females and 1,615 males aged 10–21 years with type 1 or type 2 diabetes, 85% of which were people with type 1 diabetes, it has been demonstrated that 5.3% of girls/women omitted the insulin dose, 2.6% used laxatives or provoke vomiting, 8% used diet pills, and 6.2% starved themselves. Among boys/men these percentages were respectively 1.3%, 0.7%, 2.8% and 5.3%. Whereas, in study conducted by Colton et al. [12] 2% out of 101 girls aged 9–13 years with type 1 diabetes omitted insulin doses to obtain weight loss. Even higher percentages were obtained in the study conducted by Jones et al. [13] – 11% out of 361 girls aged 12–19 years.

### **Eating disorders and eating problems in patient with type 2 diabetes**

There has been a significant increase in the incidence of type 2 diabetes among adolescents and young adults in the recent years [14]. More frequent occurrence of overweight and obesity in this group of patients is an additional problem – average BMI (Body Mass Index) of adolescents with type 2 diabetes is in the range of 35–39 kg/m<sup>2</sup> (more than 30% have the BMI > 40 kg/m<sup>2</sup>, approx. 17% have BMI > 45 kg/m<sup>2</sup>) [15]. Due to the fact that binge eating disorder (BED) is often associated with obesity [16] it can be expected that it will occur more often in people with type 2 diabetes. In a randomised, multicentre study conducted by TODAY group, published in 2011, [17] it has been demonstrated that 6% out of the 678 adolescents with type 2 diabetes met the criteria for BED, while 20% were classified as subclinical group. The group with an established diagnosis included people who reported four or more episodes of binge eating in the past 28 days and who reported a sense of loss of control during eating episode. The inclusion criteria for subclinical group was the appearance of 1 but not more than 4 episodes of binge eating in the past 28 days. Overeaters who constitute 24% of the study group were defined as those who reported one or more objective overeating episodes but did not report loss of control. In the group of people meeting the criteria for BED higher severity of depressive symptoms than in the other groups were found.

Another issue is skipping the doses of oral antidiabetic agents or insulin by people with type 2 diabetes as methods of weight control. Study of Adeyemi et al.

[18] on patients compliance in a group of 3,109 adolescents with type 2 diabetes, aged 10–18 years showed that the average MPR (Medication Possession Ratio; the ratio of the amount of accepted drugs and all of the recommended days of their admission ) was low and reached 44.7% ( $\pm$  27.1%). Better compliance was found in Caucasian men and children aged 12 years and below. However, in the study of TODAY group [19] on 699 adolescents with type 2 diabetes aged 10–17 years the compliance measured with MPR was rated at 84% in 8 months of the study and in 60 month at only 57%. Groups defined as ‘cooperating’ and as ‘non-cooperating’ did not differ significantly in terms of age, gender, race, BMI (Body Mass Index) and glycosylated haemoglobin levels.

In the above-mentioned SEARCH study of Lawrence et al. [11] (1,742 females and 1,615 males aged 10–21 years; people with type 1 diabetes – 85% of the group; people with type 2 diabetes – 15% of the group) 43% of subjects were overweight or obese; 37% of girls/women and 32% of boys/men with overweight/obesity had type 2 diabetes. 40% of all patients with overweight/obesity undertook various attempts to reduce body weight. Used methods were divided into ‘healthy’ (adequate diet and exercise) and ‘unhealthy’ (not taking food for more than 24 hours, the use of weight loss agents without doctor’s recommendation, inducing vomiting, use of laxatives, omitting insulin doses). It has been shown that people with type 2 diabetes applied the ‘unhealthy’ methods to reduce weight more often than those with type 1 diabetes. 9.3% of girls/women omitted the insulin dose, 4.1% used laxatives or provoked vomiting, 13.2% used diet pills, and 17.6% starved themselves. Among male patients, these percentages were respectively: 2%, 2%, 8.5% and 13.1%. The consequence of these methods was poor glycaemic control in a group of girls/women.

### **Risk factors of developing eating disorders in patients with type 1 and type 2 diabetes**

According to the results of the conducted studies several risk factors for eating disorders in patients with type 1 diabetes were defined including: female gender [20], large fluctuations in body weight, such as reduction of weight at the beginning of the disease and its increase due to insulin therapy [12], higher body mass index BMI [21], dietary restrictions associated with glycaemic control and skipping or reducing insulin doses used as a method of weight control [22]. Depressed mood, low self-esteem, and excessive focus on the weight issue and appearance as predictors of problems with food in diabetic patients were shown in studies of Olmsted and Colton [12, 23]. Goebel-Fabbri et al. [20, 24] emphasise similar associations. Poor self-esteem and depressed mood are also a risk factor for the occurrence of binge eating disorder in people with type 2 diabetes [25], the depressive episodes are found more frequently in people with type 2 diabetes compared with people with type 1 diabetes and healthy peers [26–28]. Appearance and body shape dissatisfaction occurring more frequent in teenagers with diabetes who use abnormal eating patterns is another risk factor [6, 29]. The regularity

of meals is at importance – lower regularity increases the chances of the emergence of abnormal eating patterns in people with diabetes [30]. It is also believed that a greater risk of developing an eating disorder refers to those patients whose diabetes was diagnosed at the age of 7–18 years, compared with the group diagnosed before 7 or after 18 years of age [31].

### **Clinical signs of developing eating disorders in patients with diabetes**

The occurrence of eating disorders in people with diabetes increases the risk of serious complications including retinopathy, nephropathy and premature death [32, 33]. Therefore, it is extremely important to react to warning signals and consider the possible causes in co-occurring eating disorders. The first of them is poor glycaemic control – high level of HbA1c should raise suspicion not only of poor compliance in the treatment of diabetes in general terms, but also of potential episodes of binge eating [34]. Another sign is recurrent hypoglycaemia, which may affect patients provoking vomiting, overeating or intentionally overdose insulin for consumption of sweets [35]. On the other hand recurrent ketoacidosis (associated with intentional insulin doses omitting in order to reduce body weight) should arouse concern [36, 37], as well as irregular medical appointments [36]. Particular attention should be paid to symptoms of depressed mood, poor self-esteem, as well as the typical clinical signs of eating disorders such as dietary restrictions or eating excessive amounts of food, denial of weighing, counting calories, use of laxatives, induced vomiting, excessive physical activity or excessive focus on their appearance and weight.

### **Recapitulation**

Adolescents with diabetes are at increased risk of eating disorders. The diagnosis of eating disorders in this population is often difficult and requires the involvement of a multidisciplinary team consisting of an endocrinologist/diabetologist, a psychologist and a psychiatrist. Early diagnosis is crucial in view of prognosis and the development of complications. Physicians dealing with diabetes should always consider poor compliance shown as poor glycaemic control, weight fluctuations, recurrent episodes of hypoglycaemia and diabetic ketoacidosis as the possibility of co-occurrence of diabetes and eating disorders. In addition, the interview should focus on the incidence of vomiting episodes, binge eating, use of laxatives, as well as typical clinical symptoms of eating disorders.

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