

Eating Disorders in Young People with Diabetes (Diabetes Eating Problems Survey - DEPS)

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Abstract

In recent years there has been a growing interest in the co-existence of diabetes and eating disorders (EDs). Diabetes is associated with increased risk of eating disorders, various dependent on type of diabetes. Attention is drawn to a higher incidence of anorexia or bulimia in diabetics, especially in adolescent girls and young women with diabetes type 1.

Eating problems in adolescents with type 1 diabetes can be divided into two groups. The first includes the diagnosed eating disorders, i.e. diseases specifically identified by defined signs and symptoms for which a degree of severity has been established, such as anorexia nervosa, bulimia nervosa, binge-eating disorder, pica and rumination. The second is the group of disordered eating symptoms (DES), which include behaviors such as dieting for weight loss, binge eating, self-induced vomiting, excessive exercise, and laxative or diuretic use; these behaviors cannot be categorized as complete diseases, and, although apparently mild, they must be closely evaluated because they can evolve into true EDs.

Nonspecific disorders (eating disorders not otherwise specified - EDNOS) occur usually earlier and also occur in boys. The simultaneous occurrence of diabetes and eating disorders creates specific diagnostic and therapeutic problems. Keep in mind that eating disorders worsen the metabolic control of diabetes and contribute to the early emergence and rapid development of chronic complications of diabetes.

Keywords: Diabetes, Eating Disorders; Abnormal Eating Patterns; Glycemic Control; Anorexia Nervosa; Bulimia Nervosa

Introduction

Development of civilization, despite numerous benefits, concomitantly brings the danger of detrimental modifications in eating habits, especially within wealthy countries. Easy access to relatively inexpensive food products, omnipresent advertisements together with unfavourable behavioural changes- all those lead to significant predominance of energy consumption over energy expenditure. The consequence is obesity with all related complications. On the other hand, promoted by mass media worship of beautiful or, in other words, very slim silhouette, has impact on many young women, who trying to keep up with models' standards tend to practice restrictive diets, which with time and some mental predispositions may turn into starvation. Authors from Poland has carried a survey study on group of 116 girls, investigating interdependence between sociocultural factors and different types of eating disorders [1]. They stated that environmental conditions play role in occurrence of such disorders among the youth. The group of eating disorders contains anorexia nervosa and bulimia. These medical conditions reveal between age 11 and 25, most often 16 to 20. The first description of „persistent lack of appetite” is dated to 1689, but specific characterization of anorexia nervosa syndrome was provided in the second half of XIX century. Bulimia description is dated to 1979. Diagnostic criteria of both syndromes were established by World Health Organization (WHO). In

either case, lack of one's own body acceptance dominates and while in anorexia- fear of obesity leads to unequivocal refusal to accept food, in bulimia there exists irresistible desire of eating and attempts to prevent gaining weight inducing vomiting, taking laxatives, diuretics or medicines decreasing appetite. EDs develop on psychogenic grounds, a lot of factors play role in revelation of the disorder (conflict in family or school, heartbreak etc.). Patients usually present some typical personal attributes and have difficulties in interacting with others. Their relations within family are disturbed in particular, especially with mothers and older sisters. Eating disorders significantly often-times occur among young patients with type 1 diabetes, but they are also described in type 2 diabetics. Not only EDs occur more often in the population of diabetics, but also the clinical course of these conditions is distinct and much more threatening than typically, therefore overview of this issue is worth attention.

Anorexia (Anorexia Nervosa - AN)

AN is a particularly dangerous disorder; the apex of its revelation is between age 14 and 18 and it affects mostly the girls or young women, but more and more frequently AN is diagnosed among boys and men. The disease begins with body's self-acceptance deficiency. It might be a disagreement with onset of puberty and occurrence of woman's silhouette attributes. In some cases, menarche may be the trigger. Oftentimes, it is the willing to liquidate excessive corpulence that causes the girls to start dieting. The pathogenesis of AN is complex, some authors claim that genetically determined personal characteristics might be involved. The crucial role is played by external factors with influence of habitat and conflicts in family. Within their studies on ED pathogenesis, German authors have recently presented an interesting report [2]. The authors pointed out that physical hyperactivity represents a frequent symptom of anorexia nervosa. They stated that the ghrelin level is positively associated with physical activity among anorexia nervosa patients, suggesting an implication of these peptide hormone in the regulation of physical activity in AN.

Symptoms typical for AN are as follows: determined refusal of food intake, lowering of body mass either below 85% of proper value or with BMI (body mass index) below 17,5, pubertal delay or amenorrhoea more than 3 months. Two types of AN are distinguished- one is restrictive, manifested by refusal of food intake, the other one is bulimic-restrictive which contains over usage of laxatives, diuretics or provoking of vomiting. Initially, a loss of body mass affects adipose tissue, but when the fat reservoir is drained- the catabolism of systemic proteins appears. The consequence is aggravation of cachexia symptoms, reduction of body mass below 75% of adequate, occurrence of hypothermia, hypotension, heart rate below 35 beats per minute. At first, laboratory tests do not indicate any abnormalities, afterwards however, fluid and electrolyte imbalances occur. Such aberrations may be specially dramatic among juvenile patients. Thereafter, hormonal disturbances reveal. Skeletal ossification processes might be perturbed as well. There are multiple nonspecific changes on the electrocardiogram of patients with AN. Echocardiography may reveal mitral valve prolapse, which is reversible with weight gain. Fluid, electrolyte and acid-base imbalances appear, endocrine abnormalities escalate. Patients with anorexia have severe- but reversible- hypercholesterolemia. Later in the disease, there may be elevation of serum aminotransferase, which signals a critical, life-threatening condition with multiorgan failure and requires urgent calorie repletion. Despite accretion of symptoms (cachexia, body temperature lowering, hypotension, absence of period etc.) afflicted girls usually preserve intellectual and physical efficiency for a long time.

Bulimia (Bulimia Nervosa, BN)

Bulimia is more frequent than anorexia nervosa. Symptoms typical for this ED contain food issue single-mindedness, excessive food intake with provoking vomiting afterwards, attempts to prevent obesity by emesis or taking such medicaments as diuretics, laxatives or thyroid hormones. Quite often so-called night-eating syndrome (NES) exists- sick person consumes excessive amounts of food at night and refuses to eat during the day. The mechanism leading to development of BN might be diversified. Laboratory outcomes reveal fluid and electrolyte disturbances. About 50% of patients have serum abnormalities, most commonly hypochloremic metabolic alkalosis and hypokalemia, due to vomiting.

Eating disorders in diabetics

The first descriptions of EDs among diabetics are dated 1973. Eating problems in adolescents with type 1 diabetes can be divided into two groups. The first one includes the diagnosed eating disorders (EDs) such as anorexia nervosa, bulimia nervosa, binge-eating

disorder, pica and rumination. The second one is the group of disordered eating symptoms (DES) which include behaviors such as dieting for weight loss, binge eating, self-induced vomiting, excessive exercise and laxative or diuretic use; these behaviors cannot be categorized as complete diseases and, although apparently mild, they must be closely evaluated because they can evolve into true EDs [3-6]. Recently, there have been conducted a lot of studies, pointing to more precise classification of EDs [16,17].

Outcomes of registry-based surveys on this subject, conducted in different countries, have been lately presented. Extensive discussion of eating disorders among patients with diabetes type 1, based on literature and personal observations, has been submitted by Pinhas-Hamiel, *et al.* [7] also De Paoli et Rogers discussed this issue on the basis of literature [8]. Authors emphasized the fact that such disorders are specially threatening in patients taking insulin, as there may quickly occur significant deterioration of metabolic control leading to decompensating process. An interesting issue of reduction in insulin ingestion as a consequence of disordered eating behavior in patients with type 1 diabetes, was presented by De Paoli et Rogers, with reference to current literature [9]. Among patients with type 1 diabetes there may occur different types of eating disorders. Lately, Moskovich, *et al.* have pictured the analysis of OBE (objective binge eating) prevalence in the group of 83 adults, mainly women with insulin-dependent diabetes [9]. Results from this surveys indicate that emotional condition may have some impact on occurrence of OBE and also may lead to increase of postprandial glucose level. German authors have recently presented analysis of 31 556 girls with type 1 diabetes. In this group there were 155 (0.49%) girls with anorexia nervosa, 85 (0.27%) girls with bulimia nervosa, 45 (0.14%) girls with binge eating disorder, and 229 (0.73%) girls with eating disorders not otherwise specified [10]. Authors claim, that there is a number of indicators coming out soon after diagnosis of diabetes that should prompt screening tests for eating disorders. Among diabetics, the trigger of eating disorder is often a quick gain of weight soon after beginning the insulin therapy. Markowitz, *et al.* devoted attention to the occurrence of the band DEP especially related to insulin manipulation in youth after initiation of insulin pump therapy [15]. The authors stated that initiation of insulin pump therapy was associated with diminished endorsement of disordered eating behaviors in youth with type 1 diabetes. As long as great attention is being paid to the issue of EDs among patients with type 1 diabetes, less often is it considered in patients suffering from type 2 diabetes. Recently however, it has gathered more commitment. Due to Spanish authors, eating disorders may apply to 40% of patients with diabetes type 2 and the risk of vascular complications is much bigger in this population [11]. Connection between eating abnormalities and type 2 diabetes mellitus was presented by Nieto-Martínez, *et al* [12]. The analysis indicated enlarged risk of diabetes type 2 in patients with BN, while the risk was diminished in patients with AN. Another analysis was submitted by scientists from Sweden who studied frequency of type 2 diabetes onset among patients suffering from anorexia. On the basis of over 17 thousands population with AN, authors state that significant restriction of food consumption contributes to lower rate of diabetes type 2 cases [13]. It was concluded, that there is a need for further observations if average restriction in food intake in general population might reduce such high rate of diabetes type 2 occurrence. Lately, a vast report on EDs among patients with non-insulin dependent diabetes was presented by Polish researchers [14]. The assessment was conducted on the basis of medical documentation. Authors highlighted the necessity of creating procedures which enable prompt diagnosis of eating disorders and therefore rapid therapeutic interventions.

Eating disorders may be dangerous for generally healthy people- those not revealing any serious organic diseases, but they are a special threat for patients suffering from diabetes, mostly if they are treated by insulin. In the case of such patients, almost every metabolic homeostasis imbalance may result in life-threatening acute diabetic complications and in acceleration of chronic complications occurrence [18,19].

A lot of research programmes about existence of EDs among diabetics have been developed, which indicates seriousness of this issue [20]. The prevalence of disordered eating in people with Type 1 diabetes mellitus is twice as big as in their counterparts without diabetes and is associated with worse biomedical outcomes and greater mortality [21]. Araja, *et al.* have checked the results of research carried out in Australia [23]. The authors stated that disordered eating behaviors (DEB) and body dissatisfaction in female youth with type 1 diabetes appear more often in comparison with their peers without diabetes.

Patients with diabetes much more frequently experience eating disorders not otherwise specified (EDNOS) than classic disorders such as AN or BN. Eating disorders in this population typically appear earlier and affect boys as well. Recently, Norwegian authors, on the basis

of their own experiences and literature analysis, have presented the issue of EDs occurrence among juvenile patients suffering from type 1 diabetes, including some differences related to the sex of subjects. Significant gender differences were demonstrated in the pattern of correlates of eating disorder pathology [22]. The authors believe that greater clinical awareness of illness perceptions, attitudes toward insulin and insulin restriction may potentially decrease the risk of developing eating disorders among female adolescents with type 1 diabetes, and the subsequent increased morbidity and mortality associated with comorbid type 1 diabetes and eating disorders.

Diaborexia

This is the term proposed for the determination of eating disorder with emotional basis in adolescents with diabetes. Numerous reports, which appeared in recent years, require attention to the possibility of occurrence of incomplete forms of eating disorders.

The research is mainly devoted to juvenile patients with type 1 diabetes [24]. Young, *et al.* presented a meta-analysis of the literature, which shows that eating disorders in juvenile diabetic patients are much more common than in healthy peers [25]. Such was also recently presented by Polish authors [26]. Italian authors have recently presented a comprehensive discussion of the occurrence of eating disorders in insulin-treated diabetic patients, with type 1 or type 2 diabetes aged from 13 to 55 years, based on literature data and own observations [27].

According to the authors, although literature data relating to ED and DEB in diabetic patients focuses largely on subjects with type 1 diabetes, ED would seem to impinge heavily also on subjects with type 2 diabetes. At the same time, although these disorders are manifested largely during adolescence, they frequently persist, particularly if left untreated, into adulthood [28].

As mentioned before, the pathogenesis of disturbed eating behaviors (DEB), encompasses mild as well as more extreme dieting behavior, binge eating attacks, and compensatory behavior for weight control is complex and multifactorial [29]. These disorders, as already mentioned, are often associated with insulin therapy. Markowitz in study on a group of 43 patients of ages 10 - 17 years who were on insulin pump therapy, reported that participants who were overweight or obese scored higher on DEPS-R (Diabetes Eating Problem Survey-Revised) than those who were of normal weight [15]. Omitting or giving less insulin than required is a unique tool to reduce weight in type 1 diabetes [30]. When insulin is omitted, the catabolism of lipids and the induced glycosuria results in excretion of calories with urine and contributes to weight loss [31]. Most studies on eating disorders in patients with type 1 diabetes concern adolescents. According to recent published research, among adolescents with type 1 diabetes, irregular or infrequent meal consumption appears to signal potential ED pathology, as well as being associated with poorer metabolic control [32]. According to the authors, this suggests the importance of routine assessment of eating patterns in adolescents with type 1 diabetes in order to improve detection of ED pathology and to facilitate improved metabolic control and the associated risk of somatic complications. Recently however, there have been reports of disordered eating behaviors in adult men and women with type 1 diabetes - especially overweight patients with poor glycemic control. Such studies have been presented by American authors, who paid attention to the need to assess the occurrence DEB in both male and female emerging adults with type 1 diabetes, especially in overweight patients with poor glycemic control [33]. The Portuguese authors drew attention to the importance of research on DE in the population with diabetes, particularly to insulin omission as a compensatory behavior that is inappropriate and harmful to health [34].

Treatment of eating disorders in patients with diabetes

Extensive discussion of literature concerning prevention of eating abnormalities in the groups of high risk, including patients with type 1 diabetes, was recently submitted by Levine [35].

Treatment of persons who suffer from both an eating disorder and diabetes must include control of glycaemia and regular meals in combination with psychological treatment.

The Norwegian authors have presented their observations on usefulness of psychological therapy in women who both binge eat and have diabetes type 2 and in women with subclinical disordered eating and type 1 diabetes [36].

The treatment of such disorders in diabetic patients is particularly difficult. The main task of a dietician is to design a menu that provides the right amount of calories needed to gain weight and is accepted by the patient. In diabetic patients, it is also necessary to provide metabolic control. In such cases, one of the factors leading to eating disorders may be excessive perfection in the calorie calculation of meals. Sometimes patients drastically limit food, and all their attention is focused on the calculation of meal calories and the amount they are allowed to consume. This often leads to depression. People with eating disorders and diabetes no longer see food as just food, but often as something forbidden or dangerous.

Treatment is carried out both by changing the way of nutrition and psychotherapy.

In extreme situations, it is necessary to start treatment with parenteral nutrition. In most cases, if the therapy has not been started too late, oral administration of the food is successful [36].

The process should start very carefully so as not to cause the so-called refeeding syndrome. The supply of calories should be increased with caution. It usually starts from about 500 kcal, increasing the amount in the following days, so as to get a gradual increase in body weight. Meals should be varied and have an attractive appearance, encouraging to eat. The meal program should be arranged with the participation of the patient and taking into account their dietary preferences. Meals should be served five to six times a day. The rhythm of insulin therapy should be adjusted to this. For patients treated with a continuous subcutaneous insulin infusion, it is necessary to plan the basal insulin infusion program and boluses administered.

When planning the realimentation in these patients, it is also necessary to consider the system of food exchanges. A high-energy and high-protein diet is recommended. The goal of the treatment is not only to gain body weight and metabolic control of diabetes, but also to normalize and restore the patterns of proper nutrition. Combining all these dietary recommendations with proper planning of insulin therapy to maintain good metabolic compensation requires the help of experienced dietitian who is an important member of the therapeutic team. Often, the help of an experienced psychologist is also necessary.

Most recently, an interesting report on efforts to modulate microflora was published. In the opinion of authors, such procedure may become an addition to AN treatment as part of nutritional or psychobiotic intervention [37].

Conclusions

Eating disorders should be suspected in patients with recurrent diabetic ketoacidosis or poor glycemic control that are resistant to attempts of improvement. Special attention should be paid to young people in adolescence [3].

World Health Organization statistics show that risk for an eating disorder (Eating Disorder Risk Inventory-3 Risk Composite) was 12.7%, whereas approximately 36.0% had disturbed eating behaviors [38]. Routine psychosocial screening and management of people with diabetes is recommended. Rancourt, *et al.* after analysing medical documentation of the youth and adolescent patients, discussed usability of different models of recognition and interventions in prevention of DEB (disordered eating behaviors) in type 1 diabetes mellitus [39]. Treatment includes decreasing dietary restraint, promoting healthy eating, and either psychiatric counseling or psychological intervention, or both.

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