Eating Disorder in Individuals with Type 1 Diabetes Mellitus: Diabulimia

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Abstract

Diabulimia is an eating disorder seen in patients with T1DM, has drawn the media's attention by the troubles it causes. T1DM, which is mostly seen in adolescents and children, requires individuals to follow a medical nutrition plan. This situation can challenge patients psycologically resulting in some eating disorder behaviors like binge eating, skipping meals and skipping insulin shots. It is critical to detect eating disorder behaviors early in order to prevent undesirable clinical features such as weight loss, poor glycemic control, diabetes complications, etc. Likewise, it is very important that the patient is treated and monitored by a multidisciplinary team. A better understanding and treatment of diabulimia will significantly improve the quality of life of individuals desired by this condition.

Keywords: Diabulimia, glycemic control, type 1 diabetes mellitus, eating disorder.

Tip 1 Diyabet Mellituslu Bireylerde Yeme Bozukluğu: Diabulimia

Öz

Diabulimia, T1DM hastalarında görülen bir yeme bozukluğudur ve neden olduğu sıkıntılarla medyanın dikkatini çekmiştir. Çoğunlukla ergenlerde ve çocuklarda görülen T1DM, bireylerin tıbbi bir beslenme planını takip etmesini gerektirir. Bu durum, hastaları psikolojik olarak zorlayabilir ve aşırı yeme, öğün atlama ve insülin enjeksiyonlarını atlama gibi bazı yeme bozukluğu davranışlarına neden olabilir. Vücut ağırlığı kaybı, zayıf glisemik kontrol, diyabet komplikasyonları vb. gibi istenmeyen klinik özellikleri önlemek için yeme bozukluğu davranışlarını erken tespit etmek kritik öneme sahiptir. Aynı şekilde, hastanın multidisipliner bir ekip tarafından tedavi edilmesi ve izlenmesi çok önemlidir. Diabulimianın daha iyi anlaşılması ve tedavisi, bu durumun arzu ettiği bireylerin yaşam kalitesini önemli ölçüde iyileştirecektir.

Anahtar Sözcükler: Diabulimia, glisemik kontrol, tip 1 diyabet mellitus, yeme bozukluğu.

Introduction

Type 1 Diabetes Mellitus is a chronic autoimmune disease that is weakened by insulin deficiency and resulting hyperglycemia[1]. This type of diabetes statements for approximately 10% of all diabetes cases and is usually seen in children and young children[2]. Type 1 diabetes is believed to result from immune-mediated β-cell destruction leading to insulin deficiency, hyperglycemia. Classical hyperglycemia is rapid in onset, especially in young children, and symptoms of polyuria, polydipsia, body weight loss, abdominal muscles, headaches and ketoacidosis are observed locally[3]. T1DM is slightly more common in boys and adult men, while rates of autoimmune disorders are higher. Tip 1: Seasonal changes in the DM and changes depending on the month of birth are

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observed. Cases were detected in the autumn and winter months, and those born in the spring were collaboratored with a higher risk of T1DM[4].

Subcutaneous exogenous insulin replacement therapy is the cornerstone of diabetes management in order to maintain near-normal glucose concentrations[5]. All patients with T1DM should receive nutritional counseling and personalized nutrition plans should be prepared according to cultural, regional, traditional and seasonal changes[6].

Prepared medical nutrition plans are of great importance for both the physical and mental health of the patient. Because lists and prohibited foods in personal nutrition plans can lead patients to anxiety and cause them to constantly think about food and body weight[7]. In this case, patients with T1DM may skip insulin administration, disrupt meal patterns, etc. to lose body weight. may cause behaviors to occur[8].

Diabulimia is defined as an eating disorder wised by individuals with T1DM and is characterized by intentional restriction of insulin resulting in body weight loss[9]. It is thought that the psychosocial stress brought about by the management of this chronic disease, called diabetes distress, may contribute to the development of diabulimia[10]. Diabulimia, which was awarded to researchers at Kings College London for 5 years of work in 2019 and was included in a section on diabetes for the first time in the NICE guidelines for the treatment of eating disorders, has been a popular research topic in recent years[11,12]. The term 'diabulimia' poses a unique problem as guidelines on how best to treat those with insulin restriction suggest that people with T1DM, eating disorders, particularly those with insulin deficiency, present a unique problem[13]. This review study was planned and carried out to examine diabulimia, an important eating disorder seen in T1DM patients, to draw attention to the issue and to raise awareness.

Eating Disorders and Type 1 DM

The term “Diabulimia” (Eating Disorder-Diabetes Mellitus Type 1-ED-DM1) is described as an eating behavior disorder that restricts insulin use as a purifying behavior in order to lose body weight, usually seen in adolescents or young adults, predominantly female patients. This behavior is also associated with binge eating and disordered eating behaviors[14]. Diabulimia is not currently assigned a specific diagnostic code in DSM-5, but is described in the literature[15]. Due to the severe consequences experienced by young people suffering from this condition, diabulimia has attracted the attention of the media and has even been pictured as "the world's most hazardous eating disorder"[16]. Eating disorders in diabetics, which were first seen in the 1970s, are more common in individuals with T1DM than in the general population[7]. Women with type 1 diabetes are twice as likely to develop an eating disorder as women without diabetes. In a study, eating disorder behaviors were observed in 20% of 33 male patients with Type 1 DM who participated in the study[17]. In another study conducted with adolescent and young adult individuals with T1DM, the incidence of eating disorders was found to be 21.2%[18].

Although eating disorders in T1DM have recently been heard under the term "Diabulimia", in fact, this term is not sufficient, does not cover the wide range of concurrent eating disorders and T1DM, and may potentially lead to individuals with T1DM not being recognized for diagnosis and falling within this category[19]. Individuals with diabetes may encounter many complex medical and psychosocial problems[20]. The

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concept of "eating disorder" encompasses mild and extreme dieting behaviors, binge eating, and compensatory behaviors for body weight control. Compensatory behaviors for body weight control include self-induced vomiting. Individuals demonstrate non-draining behaviors such as starvation, abuse of diet pills, and excessive and strenuous exercise to control body weight[7]. Patients with bad eating habits stay away from sugar and fat, restrict the foods they eat, and skip meals to lose weight. On the other hand, they often eat large amounts of food, limit their insulin, or skip meals because they feel guilty. These patients appear to rapidly develop one of the most serious acute complications of diabetes. In this situation, individuals may experience increased blood sugar, insulin deficiency, and increased levels of hormones that inhibit the effect of insulin. It causes conditions to occur and the development of diabetic ketoacidosis[21]. In a study conducted with 143 adolescents with type 1 diabetes, it was found that 10.3% of girls skipped their insulin and 7.4% applied less insulin to control their body weight[22]. In another 4-year follow-up study, noncompliance with the diet was initially observed in 38%, binge eating in 45%, insulin neglect in 14%, self-induced vomiting in 8%[23]. In general, it is estimated that 30-40% of adolescents, young adults with diabetes skip insulin administration after meals to lose body weight[8].

Physiopathology

Individuals with type 1 DM discover the anabolic properties of insulin at a very early age. In addition, before the diagnosis of diabetes is made, body weight is lost as a result of insulin deficiency in the body, and with the start of insulin treatment, patients begin to regain body weight. Failure to comply with nutrition plans and dissatisfaction with body weight leads to limiting or skipping insulin use, and this exposes them to serious complications when they decide to gradually reduce their insulin dose[14]. Blood sugar levels increase with limiting or skipping insulin use, and glycosuria and energy loss occur rapidly[18]. The eating disorder may exist before diabetes, or diabetes may detent an eating disorder. At the first diagnosis of diabetes, body weight loss is usually papered by the individual and/or family members[24]. The individual may have received positive feedback from those around him regarding the body weight loss that occurred before the diagnosis of diabetes[14].

Diabulimia patients present disordered eating behaviors. And also they abstain sweets and fats, restrict the foods they eat and skip meals, losing body weight, and on the other hand, they often consume large amounts of food and feel guilty, then limit or skip insulin[18]. It is known that the fear of gaining body weight is a key component in the occurrence of insulin underdosing[9]. Individuals believe they have a "secret trick" for body weight loss and feel in control of their bodies. Individuals are often unaware of the long-term results of insulin neglect until they experience important complications. In this way, patients experience a feeling of extreme control over their own bodies and think that they have discovered how to control their weight without being detected by others[14]. Diabetes can be a fertile ground for the development of eating disorders due to the need to follow an incorrect eating plan with strict dietary restrictions that require limiting certain types of food and paying attention to limited daily food, energy and nutrient intake[14]. In a study conducted with 45 individuals with type 1 diabetes and a history of insulin misuse, when the patients were asked why they cut down on insulin, 35 said the main reason was body

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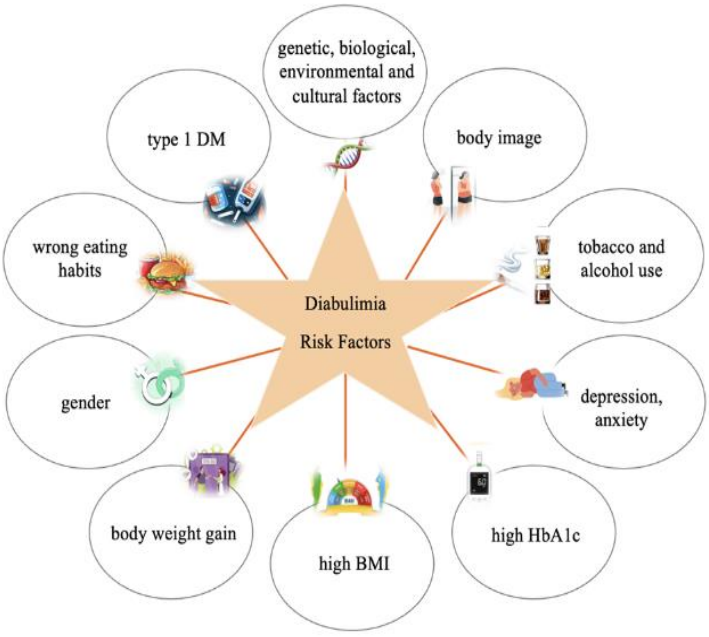
weight loss, 8 said they hated diabetes and wanted to regain control. 2 of them stated that it was self-harming[9].

Risk Factors

Although the etiology of eating disorders is still not fully understood, it is known to involve a combination of genetic, biological, environmental and cultural factors[25,26]. Common denominators in the emergence of eating disorders in T1DM can be listed as gender, especially women, increased body weight, body dissatisfaction, nutrition and history of depression[26]. In a systematic review study, it was reported that depression and poor diabetes management are mutual causes of each other, and depression leads to worse management of diabetes and poor diabetes management leads to increased levels of depression[27]. Sociocultural causes for eating disorders The "Western" culture's ideal of female beauty, extreme thinness, and objectification of the female body are considered specific risk factors for the emergence of eating disorders[28]. For this reason, eating disorders can be seen more frequently in women and young girls[20]. Risk factors for diabulimia are presented in figure 1.

Figure 1. Risk factors for diabulimia



In a study conducted with young people aged 20 and under, eating disorder behaviors were observed in two-thirds of the girls, 71% of whom had T1DM[20]. In another study conducted with adolescents, it was found that 10.3% of girls skipped insulin administration and 7.4% took less insulin for body weight loss, while this situation was only 1.4% in boys[29]. Adolescence brings numerous cognitive and physical changes, as well as unsafe sexual behavior, tobacco and alcohol use and unhealthy eating habits, etc.[25]. In another study conducted with young people who were followed for 5 years during the transition from childhood to adolescence, body dissatisfaction was found to be a significant predictor in determining eating disorders[30]. In another study conducted on

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adult individuals with T1DM, it was found that the HbA1c value and BMI were slightly higher in individuals with eating disorders[17].

In some studies, it was found that the HbA1c level of those at risk of diabulimia was significantly higher[31,32]. In a study conducted by Doyle et al. with individuals with diabetes, it was found that patients with high Diabetes Eating Problems Questionnaire-Revised (DEPS-R) score had significantly higher HbA1c levels than those with low scores[17]. In a study conducted with 100 adolescents with diabetes in India, the relationship between diabetes-specific impaired eating behavior and glycemic control was examined. According to the DEPS-R score, the average HbA1c level of diabetic individuals with impaired eating behavior was found to be significantly higher than those without risk of impaired eating behavior[33]. However, similar studies indicate that insulin omission in order to lose weight is observed more frequently in girls and the average DEPS-R score is higher[34,35]. It is thought that the risk of diabulimia is becoming increasingly common in men and is an important problem in both male and female genders[36].

In another study conducted with adolescent girls with Type 1 DM, eating disorder was associated with high BMI value[37]. Another factor may be the structure of the family meal and the habits of the family. It has been found that the likelihood of eating disordered behaviors is higher in adolescent girls with T1DM in families that rarely eat family meals, have lower household income, and whose parents are less educated[38]. In two studies conducted with young people with T1DM, eating disorders were associated with poor glycemic control of the participants[20,39]. In another study, youth at risk for eating disorders were 59.1% versus 31.8% more likely to be overweight/obese than those at low risk, and the at-risk group had lower diet quality and higher total fat and saturated fat intake than the low-risk group. It has been determined that they have[40].

Tablo 1. Diabulima risk factors identified in some studies on diabulimia and scales applied in these studies

Reference	Study design	Risk Factors	Diagnostic Scale
(41)	105 adolescents aged between 12-20	Female gender, concern about insulin, age, disease perception	The Child Eating Disorder Examination (ChEDE)
(42)	234 women aged between 24 and 72	Diabetes complications, diabetes stress, psychological problems in general, fear of hypoglycemia	64-item Eating Disorders Inventory, 36-item Bulimia Test-Revised
(43)	138 children aged 8-19	Female gender, age, BMI, duration of disease	CHEAT, EAT-26
(44)	52,215 patients aged between 8-30	Female gender, duration of disease, age, immigration status	DSM-IV criteria
(45)	178 adolescents aged between 13-17	Female gender, duration of disease, educational level of parents, BMI, poor glycemic control, depressive symptoms	DEPS-R

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(46)	163 adolescents aged between 11-20	High BMI, low physical activity, low socioeconomic status, poor glycemic control	DEPS-R (Italian version)
(47)	183 adolescents between the ages of 13 and 18	Female gender, BMI, HbA1C (in women), body image issues, duration of disease (in men), media pressure (in women)	DEPS-R, EDI-3RF
(48)	770 children and adolescents aged 11-19	Female gender, age, high BMI, high HbA1C (poor metabolic control)	DEPS-R
(49)	300 adolescents and adults aged 16-28	Female gender, high BMI, high HbA1C	DEPS-R
(34)	477 adolescents aged between 13-19	Female gender, age (in women), high BMI, high HbA1C, body dissatisfaction	DEPS-R
(20)	2156 young people with an average age of 18	Female gender, high BMI, age, low income level, parents' education level, insulin sensitivity, high HbA1C (poor glycemic control), DKA, depressive symptoms, low quality of life	DEPS-R
(32)	192 children and adolescents aged 11-19	Age, disease duration, high BMI, high HbA1C, FBG, TG	DEPS-R
(50)	136 children and adolescents with an average age of 14	Poor glycemic control, poor diabetes management	DEPS-R
(51)	31556 people aged between 6 months and 23 years	Late pubertal age, not using a pump, no history of migration, high HbA1c, frequency of DKA and hypoglycemia	DSM-IV criteria
(52)	Children and adolescents between the ages of 10-15	Age, high HbA1C, high BMI	PEBEQ
(53)	151 young people aged between 13-18	Female gender, low priority on family meals, parental lack of a good model for healthy eating, more food restrictions at home, family conflict	DEPS-R
(54)	83 adults ages 18-68	Negative interaction before eating, not following the diet, feeling guilty about eating, feeling sorry for one's illness/trying not to think about one's illness	DEPS-R

Clinical Features of Diabulimia

Early identification of the presence of an eating disorder is important to reduce the risk of long-term morbidity. However, subclinical or clinical eating disorders are not easily diagnosed because these behaviors are often well hidden. When the presence of an eating disorder is suspected, it is crucial to pay attention to and follow subtle warning signs for

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adequate evaluation. Such symptoms can be seen as low self-esteem, body dissatisfaction, anxiety, dietary manipulation[26]. Symptoms seen in eating disorders: body weight loss or fluctuating high HbA1c values, body weight, frequent diabetic ketoacidosis, symptomatic hyperglycemia early onset of diabetes complications, concealed insulin injection or evasion of injections, refusal to be weighed in clinic, limited monitoring of glucose/unwillingness to self-monitor, symptoms of depression or anxiety, changes in appetite, obsessive energy counting, failure to perform general activities, unusual eating patterns/eating habits[55]. In a study conducted in Canada with 79 adolescents with T1DM, desired ideal weight, social physique anxiety, low diabetes quality of life and low self-esteem were found to be significant determinants of eating disorders, and 34%, 51%, 57% and 64% of the youth, respectively, had behaviors have been found to be associated with these models[56].

Available Scanning Tools

Tools for early diagnosis of diabulimia require first the recognition of clinical signs suggestive of a suspected diagnosis. One of these involves a combination of possible cues, such as those resulting from manipulation of insulin therapy, and other cues resulting from the perception of body image. Conditions such as distorted body image, loss of body weight or refusal to be weighed in practice, changes in regular activities and eating patterns, changes in appetite or obsessive energy counting are frequently encountered in individuals with diabulimia[57].

Many different questionnaires, both general and specific to diabetics, are used in studies to detect eating disorders. Of these, the most commonly used for diabetics is DEPS-R. The DEPS-R is a 16-item questionnaire that assesses general and diabetes-specific eating disorder behaviors, such as body weight loss, food restriction, insulin misuse, and vomiting[58]. In the study conducted by Altınok et al., it was accepted as a valid screening tool for eating disorder behaviors in Type 1 diabetes and was stated to be potentially important for early detection[59]. Another most frequently used questionnaire for eating disorders, is the SCOFF Questionnaire. The original SCOFF questionnaire is a validated screening tool in the general population and consists of five items for eating disorders. A score ≥2 on this screening tool requires further evaluation for an eating disorder[58,60,61]. In the study of Calcaterra et al. examining unbalanced eating behaviors in young people with T1DM, a modified SCOFF questionnaire was administered to the patients in the first screening stage, and the DEPS-R questionnaire, with 4 subscales added, was administered to the children with a score of 2 points or above in the second stage. A positive correlation was found between the results of the SCOFF survey and both the new and original subscales of the DEPS-R survey[62]. Skipping meals is a very common behavior in individuals with T1DM[63]. In a study, 28% of female adolescents with T1DM and 7% of male adolescents skip meals[64]. In another study, it was stated that female adolescents with type 1 DM consumed breakfast at a lower rate than males. In men, less food intake at lunch and dinner is associated with body shape concern and energy restriction[65]. EDI –3RC, which takes approximately 5 minutes to complete. EDI-3RC includes three diabetes-related subheadings: body dissatisfaction, thinness drive, and bulimia[58]. In the study of d'Emden et al. in which they examined the eating disorder behaviors of Australian adolescents with T1DM, this questionnaire was used by

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preserving its original scoring and including the insulin abuse subscale in order to be suitable for T1DM[66]. EDE-Q contains specific questions about the presence and frequency of eating disorder behaviors and body-related thoughts and feelings over the past 28 days. This 41-item self-report survey additionally includes the EDE-Q, 6 items used to assess specific behaviors related to eating disorders. Four of these items are related to dietary restriction, eating anxiety, weight gain anxiety, and shape anxiety[56]. In their study, Powers et al. examined the effect of T1DM on the answers given to the questions in the screening tools, and EDE-Q and EDI-3 questionnaires were used for this, and patients with and without diabetes completed the survey in two groups. It was found that 50.0% of the items on the EDE-Q were likely to be interpreted differently depending on whether the respondent had diabetes, compared to 6.6% on the EDI-3. This is attributed to the fact that the EDE-Q items focus specifically on eating, body weight and shape concerns, while the EDI-3 evaluates a wider range of eating disorders and concerns that are not specific to eating, body weight and shape[67]. YEDEQ is the version of the EDE-Q designed specifically for children and adolescents. It takes approximately 15-20 minutes to complete. In addition to four subscales and the overall score, it also includes specific questions about the presence and frequency of eating disorder behaviors such as restricting, binge eating, self-induced vomiting, diuretic or laxative use, and exercise for body weight loss. In a study by d'Emden et al. with adolescents with T1DM, the YEDEQ and EDI-R3 scales were compared with the chEDE screening tool. In the study, questions about incorrect insulin use for body weight control were added, without changing the original scoring of the YEDEQ questionnaire, and were similarly rated as eating disorder behavior. Analysis across both surveys demonstrated excellent internal consistency and high concurrent validity when correlating with the chEDE, which remained consistent when stratified by gender (female), younger age (13–15 years), and older adolescents (16–18 years)[45]. The Child Eating Disorder Examination (ChEDE) represents a modified child-friendly version of the EDE-Q, the gold standard diagnostic interview for eating disorders, and is approved for use in children ages 8 to 14 years[68]. It has the same four subscales as YEDEQ[68]. SEEDS was developed to identify eating disorder behaviors in those with T1DM. It is a 20-item screening tool that takes about 5 minutes to complete. Individuals are classified as having a probable subthreshold eating disorder or not having an eating disorder according to DSM-5. In their study, Powers and colleagues reported high levels of convergent validity and validity for the SEEDS tool, Diabetes Distress Screening Scale, EDE-Q, and Rosenberg Self-Esteem Scale in adolescent boys and girls[58].

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Table 2. Scales used and applied groups in detecting diabulimia

Scale	Applied Group
Diabetes Eating Problems Survey-Revised (DEPS-R)	General population
SCOFF Questionnaire	General population
Eating Disorder Inventory –3 Risk Composite (EDI - 3RC)	General population
Eating Disorder Examination Questionnaire (EDE-Q)	General population
Youth Eating Disorder Examination-Questionnaire (YEDE-Q)	Children and adolescents
Child Eating Disorder Examination Questionnaire (ChEDE-Q)	Children and adolescents aged 8-14
Screen for Early Eating Disorder Signs (SEEDS)	General population
Problematic Eating Behavior Questionnaire (PEBEQ)	Children and adolescents
Eating Attitudes Test-26 (EAT-26)	Adults
Children's Eating Attitudes Test (ChEAT)	Children

Treatment of Diabuimia

Further examinations are performed when an eating disorder is suspected in an individual with type 1 diabetes. The first step towards screening and treatment is consultation and referral to mental health services. For success in eating disorder treatment, nutritional counseling, cognitive-behavioral therapy and family therapy are recommended[25]. A multidisciplinary approach with a team consisting of an endocrinologist, dietitian, psychologist and social worker is the best treatment for type 1 diabetic patients with eating disorders[8]. The intensity and complexity of the treatment are thought to have an impact on the effect of the treatment. Inpatient treatment appears to be more effective than outpatient treatment and is associated with a modest change in HbA1c results, whereas only small effects were found for outpatient psychoeducational interventions. Inpatient treatment is a complex intervention that includes multiple components, including psychoeducation, cognitive behavioral therapy, and family work. Family support can also make a significant contribution to reducing eating disorder symptoms[69]. Treatment protocols developed for anorexia and bulimia nervosa in patients with type 1 diabetes are generally ineffective[70]. Self-compassion is an approach that will improve self-management and improve psychological health for adolescents with type 1 DM. Self-compassion has been characterized as self-care and self-understanding, taking an active role in existence and accepting that imperfection and pain are part of being human[71]. In their study, Eisenberg and colleagues examined the potential interaction of controlled motivation with self-efficacy and found that directly changing controlled motivation or reducing the effect of controlled motivation on eating disorder behaviors by increasing self-efficacy are two potential ways to reduce these behaviors for individuals with T1DM with eating disorders stated[72].

Dietitians have challenging tasks in this regard, such as educating patients about diabetes and eating disorders, preparing nutrition plans, and determining desired body weight targets for patients and families. When the patient's daily energy intake increases, insulin doses need to be adjusted according to the amount of food consumed to prevent hypergliemia. Multiple daily injections using insulin/carbohydrate ratios allow greater flexibility in food amounts and meal times. However, it requires more blood sugar

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monitoring and insulin injections. As an individual's physical and psychological health improves, it may be beneficial to plan their diet more flexibly. All healthcare professionals should be aware of concerns and changes in body weight in adolescents with T1DM. It should also be known that body weight loss may be related to glycemic control[8]. The lack of a consensus among healthcare professionals regarding the diagnostic criteria of diabulimia and the society's lack of knowledge and awareness about diabulimia negatively affect the treatment[73]. Since diabulimia is common in patients with T1DM, diagnosis is delayed, regular screening of these patients for the risk of depression, anxiety and eating disorders can provide early diagnosis[74].

Conclusion and Recommendations

Eating disorder behaviors may be seen more frequently in patients with T1DM, especially in women, than in patients without diabetes. These behaviors significantly impact the physical and emotional health of individuals with diabetes and are associated with an increased risk of medical complications, including impaired metabolic control and higher mortality rates. Treatment methods are not definitive and studies still need to be done. Diabulimia is a significant health problem that is a combination of T1DM and eating disorders. Significant developments in the diagnosis and treatment of diabulimia are expected to occur in the future. Diabulimia screening is important for early diagnosis and treatment due to the fatal complications that diabulimia can cause in diabetic patients. The patient must be treated with a multidisciplinary team work. Important risk factors such as body weight loss, glycemic control and psychological status should be monitored. For this reason, it is of great importance to educate the patient's family and himself about this issue. Patients should be ensured to go for regular check-ups. Awareness about this issue should be increased.

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