

# Transition from Orthorexic Eating Behavior to Anorexia Nervosa and the Role of Chronic Illness

## Olgu Sunumu: Ortoreksik Yeme Davranışından Anoreksiya Nervozaya Geçiş ve Kronik Hastalığın Rolü

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### Abstract

We present a case of a 15-year-old female with severe malnutrition (BMI =11.25 m<sup>2</sup>/kg) caused by avoiding high-carbohydrate foods after being misdiagnosed with Type 1 Diabetes Mellitus and later diagnosed with Maturity Onset Diabetes of the Young (MODY) type 2, which led to anorexia nervosa (AN) subsequently. The report aims to examine the possible transitions between different types of disordered eating and eating disorders (EDs) and to stress the importance of further counseling for patients with chronic illnesses, particularly in cases where daily dietary habits could be significantly impacted.

### Öz

Bu yazıda, gençlerde görülen erişkin tipi diyabet (MODY) tip 2 tanısı yerine konulması yanlışlıkla Tip 1 Diabetes Mellitus tanısı konulan sonrasında yüksek karbonhidratlı gıdalardan kaçınma nedeniyle ciddi beslenme bozukluğu (BMI=11,25 m<sup>2</sup>/kg) yaşayan ve Anoreksiya Nervoz (AN) ile sonuçlanan 15 yaşında bir kız olgu sunulmuştur. Rapor, farklı düzensiz yeme türleri ve yeme bozuklukları (YB) arasındaki olası geçişleri incelemeyi ve özellikle günlük beslenme alışkanlıklarının önemli ölçüde etkilenebileceği durumlarda, kronik hastalığı olan hastalara daha fazla danışmanlık verilmesinin önemini vurgulamayı amaçlamaktadır.

### Keywords

Adolescent, case report, disordered eating, maturity onset diabetes of the young, anorexia nervosa

### Anahtar kelimeler

Ergen, vaka sunumu, bozulmuş yeme, gençlerde görülen erişkin tipi diyabet, anoreksiya nervoz

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### Introduction

Chronic diseases like diabetes mellitus (DM) demand profound adjustments in one's lifestyle, particularly regarding daily dietary choices (1). Beyond the physical transition, there is a pressing need for emotional, psychological, and social adaptability, and without the proper emotional scaffolding, this emotional weight may be overwhelming (2). The diagnosis of DM can be distressing and lead to a sense of loss of control over one's body, driving some individuals towards behaviors that provide a sense of control. Individuals with DM, especially Type 1 DM, must pay close attention to their diet, carbohydrate counting, and meal planning to manage their blood sugar (3,4). This focus on food could potentially highlight or exacerbate underlying eating disorders



(EDs) or disordered eating behaviors DEBs (5). On the other hand, during adolescence, a period marked by profound transformations and increased body image anxieties, individuals diagnosed with Type 1 DM face a heightened susceptibility to developing eating disorders (6).

Given the focus on diet and health, some individuals with DM might become overly preoccupied with eating only “clean” or “healthy” foods, leading to orthorexic behaviors (7). Orthorexic behaviors refer to tendencies that align with an excessive focus on eating “healthy” or “clean” foods and avoiding those perceived as “unhealthy”. They might be occasional or temporary and can be part of a broader interest in health without significantly impacting daily life. On the other hand, orthorexia, often termed orthorexia nervosa (ON), is an extreme and pathological extension of these behaviors (8,9). It denotes a chronic and pervasive obsession with dietary purity, where one’s dietary rules become increasingly rigid. ON can lead to significant interference in daily life, including social isolation, emotional distress, and potential health complications (10,11). In short, while orthorexic behaviors highlight an unhealthy emphasis on “clean” eating, ON engulfs one’s identity and self-worth in the pursuit of a “pure” diet. ON is not formally recognized as a distinct eating disorder diagnosis in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) (12). The difference between ON and other EDs is the motivation behind the restrictive behavior. While anorexia nervosa (AN) or bulimia nervosa (BN) focuses on the quantity of food and weight control, ON is about the quality of food and its perceived health benefits or potential harms (13,14). On the other hand, orthorexic behaviors can transition into or coexist with AN, though they are distinct conditions with different primary motivations (14). Both ON and AN may have underlying vulnerabilities like a need for control, perfectionism, or anxiety (13,15). While orthorexic behaviors initially stem from a concern about the purity or healthfulness of food over time, this focus can evolve, transitioning from an emphasis on food quality to its quantity and shifting from health considerations to concerns about weight and body shape (16).

We present a 15-year-old female who, influenced by family members’ traumatic diabetes complications, avoided high-carbohydrate foods, leading to AN. The

goal is to enhance disordered eating, facilitating early detection of EDs in patients with chronic conditions.

### Case Report

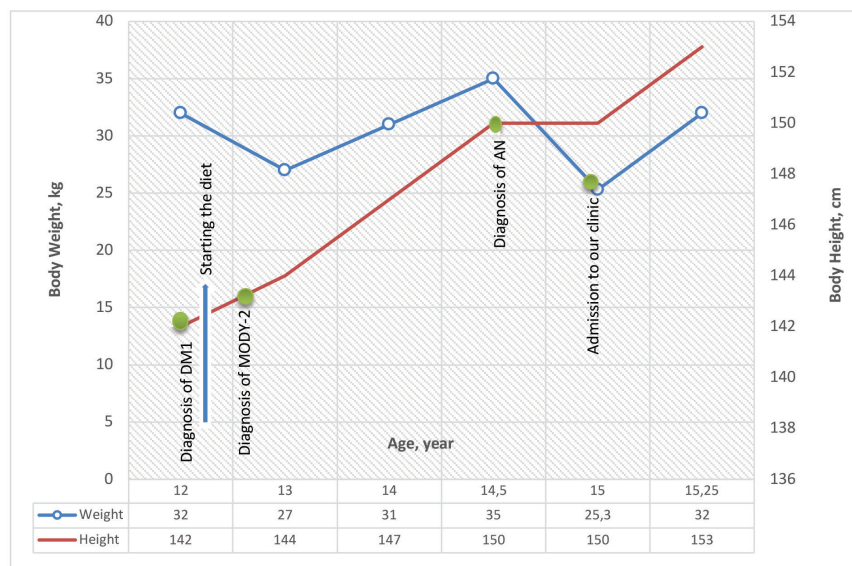
The patient is a fifteen-year-old female admitted to an adolescent medicine service with malnutrition (body mass index of 11.25 m<sup>2</sup>/kg, SDS; 8.03, weight for height; 57.65%). It was learned that during routine blood assessments at the age of 12, hyperglycemia was identified, accompanied by an HbA1c value at the upper threshold, leading to a provisional diagnosis of Type 1 DM in the honeymoon phase. Following this diagnosis, she was prescribed a dietary regimen under the guidance of a clinical dietitian to maintain optimal blood glucose levels. After adhering to a stringent DM dietary regimen for one year, she experienced a weight loss of 6 kg over ten months. Since there was no need for insulin treatment during follow-ups, at the age of 13, the patient had a genetic test that revealed a heterozygous mutation in the glucokinase gene (GCK), confirming a diagnosis of Maturity Onset Diabetes of the Young type 2 (MODY2). She was informed that strict dietary adherence was unnecessary. However, after a noticeable decline in her interest in food and eating patterns, she sought evaluation at another medical facility, where she was diagnosed with AN. As a result, a therapeutic regimen of fluoxetine (1x20 mg/day) and aripiprazole (1x5 mg/day) was prescribed. Figure 1 illustrates the patient’s weight changes and diagnoses over time.

In the preceding six months, she has been administered levothyroxine (LT4) at a dosage of 25 mcg/day, with the last administration occurring two days prior. It was learned that this therapeutic intervention was in response to a diagnosis of euthyroid sick syndrome (ESS), which was evident from the diminished serum concentrations of triiodothyronine (T3) and thyroxine (T4), notwithstanding the preservation of thyroid-stimulating hormone (TSH) levels. She was premenarchal, and her family history revealed that her grandmother and aunt were diagnosed with type 2 DM and experienced vascular complications. The records indicate that the patient resided in an alternate city and visited our locality for vacation. During her stay, she sought a consultation at the adolescent health department of our institution for routine monitoring.

Upon initial examination, the patient appeared extremely malnourished. Hair presentation was thin and desiccated, and while the skin was parched, lanugo was observed on both the facial and dorsal regions. She had acrocyanosis and was not hypothermic. Her heart rate was elevated at 130-140 beats/min, and her blood pressure measurements bordered on hypotension. She experienced no prior episodes of dizziness or syncope. During the consultation, the patient revealed that although she initially had no concerns about body size, shape, or weight when her condition began, the background of having family members suffering major complications of diabetes and subsequent weight loss as an achievement for her occasionally triggered fixations on these factors, leading to mixed feelings about her body weight. She did not report any obsessive-compulsive behaviors in other areas of her life.

The patient was admitted for comprehensive assessment and therapeutic intervention. She had tachycardic values, and weight gain could not be achieved despite the calorie increase. Laboratory evaluations, comprising a complete blood count, hepatic and renal function tests, and serum biochemistry, all yielded results within the normal range. Electrocardiogram and echocardiogram evaluations were normal. Results from thyroid function tests were within normal ranges. The anti-thyroid peroxidase antibodies (AntiTPO) and

thyroglobulin antibodies (TgAb) were negative. Anti-transglutaminase antibodies were negative. Fasting and postprandial blood glucose concentrations ranged between 75 and 115 mg/dl, with the HbA1C level at 5.9%. During the patient's hospitalization, daily caloric intake was regulated. Given that a MODY2 diagnosis does not carry the same risk of complications as Type 1 or Type 2 DM, there was no blood glucose monitoring, and her diet did not incorporate techniques like carbohydrate counting to mitigate hypo- or hyperglycemia. She did not want to eat certain foods that contained carbohydrates and was angry when presented with them in the early stages of the stay. Thorough guidance and counseling were offered on both MODY2 and issues related to disordered eating, encompassing eating disorders. Based on the decision to monitor thyroid tests during a follow-up, LT4 treatment was discontinued. On the fifteenth day, weight gain was commenced once the patient's pulse readings stabilized within the normal parameters. Following a 1-kilogram weight increment observed over a one-week hospitalization period, the patient was discharged with a structured daily monitoring regimen. This weight trajectory was sustained during subsequent outpatient evaluations. Subsequent thyroid function tests were within normal limits. The patient expressed an improved mood with the weight gain, although she preferred her body weight to remain below 40 kilograms. After seven weeks post-discharge,



**Figure 1.** The follow-up of the patient's anthropometrics

the patient's weight has reached 33 kilograms, and she remains under consistent monitoring with an aripiprazole and fluoxetine regimen. Concurrently, there is notable progress in her physical and emotional well-being.

## Discussion

Maturity Onset Diabetes of the Young Type 2 (MODY2) results from mutations in the glucokinase (*GCK*) gene and is a subtype of monogenic diabetes (17). This variant typically manifests as mild, non-progressive hyperglycemia, often detected in childhood or adolescence without the usual high blood sugar symptoms (18). Diagnosed through genetic testing, its presence hints at a hereditary pattern, with blood glucose levels often resting between 100 mg/dL (5.5 mmol/L) and 144 mg/dL (8.0 mmol/L). While lifestyle modifications usually manage MODY2, insulin or other diabetes medications are generally not required. Due to its mild nature, MODY2 carries a lower risk of diabetes-related complications than typical type 1 or 2 diabetes (17). Proper diagnosis is crucial to ensure appropriate care and prevent unnecessary treatments. Awareness of MODY2 is important because its management and prognosis can differ significantly from the more common type 1 or type 2 diabetes. Specific disordered eating habits have not been directly linked to MODY2 in the scientific literature in the same way they have been associated with type 1 or type 2 diabetes mellitus (19,20). However, introducing dietary implications or required changes from such diagnoses can be overwhelming, potentially leading to anxiety about food choices and avoiding specific foods. As for our case, the records indicate that following the honeymoon stage of type 1 DM diagnosis, the patient commenced a dietary regimen under the supervision of a registered dietitian. Due to a delayed diagnosis of GCK-MODY, unnecessary dietary interventions, and a familial antecedent of Type 2 DM with concomitant severe complications, the case developed orthorexic behaviors. There has not been specific literature directly linking orthorexic behaviors with MODY. Orthorexic tendencies often begin with a genuine intent to eat healthily, emphasizing organic or "clean" foods. Over time, this preference can intensify into strict rules, with more foods labeled "unhealthy" and eliminated (8). As this behavior becomes rigid,

emotional responses intensify; eating "pure" foods may bring feelings of virtue, while deviations cause guilt. Eventually, these behaviors may dominate daily life, leading to avoiding social situations involving food, nutritional deficiencies from a narrowing list of "acceptable" foods, and significant distress (13).

On the other hand, prolonged restriction in any context about foods may lead to psychological changes. Over time, our case might have derived satisfaction from this condition's pronounced and reinforcing effects. Orthorexic behaviors, driven by an obsession with "pure" or "healthy" food, can potentially evolve into AN, characterized by a fear of weight gain and a distorted body image. Shared underlying traits like a need for control or perfectionism can predispose individuals to both disorders (13). Over time, dietary restrictions associated with orthorexia can lead to significant weight loss, and the resulting body changes might shift concerns to weight and shape, hallmarks of AN. Additionally, societal pressures emphasizing thinness or considering weight loss as success may exacerbate this transition. While there is potential for progression from orthorexic behaviors to anorexia, it is not universal (21).

Another feature that needs to be emphasized in our case is initiating levothyroxine (LT4) treatment because of euthyroid sick syndrome (ESS) due to weight loss (22). It is characterized by low circulating triiodothyronine (T3) levels, increased reverse T3, and normal or low levels of thyroxine (T4). Serum thyroid-stimulating hormone (TSH) may be low, normal, or slightly elevated. These alterations are considered adaptive and beneficial during acute illness but might contribute to prolonged illness in chronic conditions. While the ESS is the most common thyroid alteration in that situation, primary hypothyroidism can also be seen, although it is less common in this context. It is important to note that the symptoms of hypothyroidism, including fatigue, cold intolerance, dry skin, and constipation, may be similar to those of AN (23). The reason for the development of primary hypothyroidism in individuals with AN is not entirely clear. It might be linked to extreme nutritional deficiencies or autoimmune processes. Some studies suggest a higher prevalence of autoimmune disorders in AN, which might predispose to autoimmune thyroid diseases, such as Hashimoto's thyroiditis (24). Our patient was evaluated in this respect, and antithyroid



antibodies were negative. However, selenium and iodine levels could not be evaluated. Notably, most of these thyroid abnormalities resolve as the patient gains weight and recovers from AN (22). Given that many people with AN have an impaired physiological state, starting with a lower dose and increasing it gradually may be prudent. The patient in this report was initially prescribed LT4 to manage ESS resulting from AN. However, due to tachycardic episodes and an inability to achieve adequate weight gain, the LT4 treatment was discontinued. After discontinuing LT4, tachycardia typically improves within days to a few weeks. This timeline can vary based on factors such as the drug's half-life, previous dose, individual metabolism, coexisting medical conditions, and concurrent medications. Upon follow-up, tachycardic values showed improvement, and appropriate weight gain was noted. Concurrently, thyroid functions remained within normal limits.

## Conclusion

Addressing chronic conditions requires an understanding that challenges are not limited to the physiological realm. There is a deep-seated symbiosis between the psyche and the body, especially when managing diseases that permeate daily life and self-worth. Putting much emphasis on dietary shifting may lead to high-risk thoughts arising in an obsessive focus on foods. Extending psychological counseling can alleviate mental burdens and pave the way for holistic well-being and adept disease management.

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## Footnotes

*Conflict of Interest:* The authors reported no potential conflict of interest.

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