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# Diabetes & Metabolic Syndrome: Clinical Research & Reviews

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## Review

### Eating disorders in type 2 diabetic people: Brief review

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#### ARTICLE INFO

Article history:  
Available online xxx

**Keywords:**  
Eating disorders  
Type 2 diabetes  
Night eating syndrome  
Binge eating disorder

#### ABSTRACT

**Background:** Relationship between type 1 diabetes and Eating disorders is well-known, less information exists on the relationship between type 2 diabetes (T2DM) people and eating disorders.

**Aim:** Review information on the prevalence and impact of type 2 diabetes and eating disorders comorbidity.

**Methods:** Search in Medline and PubMed relevant articles on the aforementioned co-morbidity. Review includes articles on epidemiological, clinical and therapeutics aspects.

**Conclusions:** Disordered eating behaviours may affect around 40% of T2DM people, being the predominant clinical forms: Eating Disorders Non otherwise specified (EDNOS), Night Eating Syndrome (NES) and Binge Eating Disorder (BED), however, population-based estimates of T2DM and ED comorbidity are mandatory to determine the prevalence of ED in T2DM people. The association between both entities has a consequence which is an impairment of metabolic control, associated to increase risk of vascular complications and difficult body weight loss, basis of T2DM treatment.

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#### 1. Introduction

People suffering from any type of chronic disease, need to make minor or major lifestyle adjustments. These adjustments can lead to either successful adherence to medical regimens and control of the disease, or among other things, ineffective or maladaptive coping [1].

Type 2 diabetic people (T2DM) have to adhere to some responsibilities such as: modification of lifestyle (diet, exercise, and weight control), self-monitoring of blood glucose concentrations, foot care, and administration of medications. Difficulties in adhering these tasks can be associated with suboptimum glycaemic control [2]. Psychological problems such as depression, anxiety [3,4] and eating disorders (ED) [5] are common in diabetic people, and are associated with bad metabolic control and diabetes complications.

The association of type 1 diabetes mellitus and Eating disorders are well known [6,7], while information on the association between type 2 diabetes mellitus with abnormal eating attitudes

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is scarce. The present manuscript focuses on the association of T2DM and ED and its consequences.

## 2. Definition and types of eating disorders

Eating disorders are psychiatric diseases characterized by eating behaviours that negatively affect the health and can dominate the patient's life. Such behaviours interfere with the ability to obtain an adequate nutrition. ED typically affect teen and young adults, although can affect other ages [8].

In the present review we have not considered the classification of ED including in the recent published DSM 5 [9], since all articles we have revised using DSM 4 or DSM 4TR to classify their patients. DSM 4TR include as ED: Anorexia Nervosa (AN), Bulimia Nervosa (BN), Eating Disorders Non otherwise specified (EDNOS) includes disorders of eating that do not meet the criteria for any specific eating disorder, and Binge Eating Disorder (BED) and Sub-threshold forms of ED.

## 3. Diagnosis of ED

Diagnosis of well-defined psychiatric diseases requires the use of specific psychological tests for each clinical entity, used mainly as screen method, and a structured or semi-structured interview based on the DSM criteria.

Assessment ED in T2DM patients should include questions about body image and shape, binge eating and purging behaviours. Clinicians should pay particular attention to possible diabetes medication manipulation in patients with T2DM, as well as the reasons for motivation behind changes or non-adherence to medication.

The use of standardized evaluation measures in combination with clinical interviews can facilitate screening for disordered eating behaviours in these patients. The Diabetes Eating Problem Survey is a validate and specific test that permit rapid screening for ED in type 1 diabetic patients [10], unfortunately this type test is not validated for type 2 diabetic people. Meneghini et al. [11], recommend use of nine-item Questionnaire of Eating and Weight Patterns (QEWP) as a quick screening tool to detect abnormal eating habits in T2DM people.

## 4. Epidemiology of disordered eating behaviours in type 2 diabetes people

Remarkably, population-based estimates of the co-prevalence of T2DM and ED from large nationally-representative samples remain to be documented. The co-occurrence of both medical entities was shown to be widely variable from data derived mainly from clinic-based samples. A review of these studies, all of them obviously, basis on diagnosis criteria from DSM IV or previous DSM versions, showed the following results:

Herpertz et al. [12], focuses on the subsample of 321 T2DM patients, 154 males and 168 females, mean age  $54.2 \pm 8.1$  years, 45.9% of those patients required insulin therapy. The observed prevalence of Bulimia Nervosa (BN), BED (Binge Eating Disorders) and Eating Disorders non-otherwise specified (EDNOS) were 0.3%, 3.7% and 2.5% respectively.

In the Crow et al. [13] study, 43 (23 females) T2DM individuals were assessed using a structured clinical interview based on DSM IV. Eleven subjects (25.6%) were diagnosed of BED.

Kenardy et al. study [14], included 215 women with T2DM, mean age: 58.9 years, mean body mass index (BMI)  $33.5 \text{ kg/m}^2$ . Measurements included a structured clinical interview for disordered eating (Eating Disorder Examination, EDE), self-report measures of psychological functioning. Forty-five (20.9%) were binge eating regularly.

In the Mannucci et al. study [15], three samples of individuals were studied: a series of 156 (80 female) overweight and obese type 2 diabetic patients, aged 30–65 years, with a BMI  $> 28 \text{ kg/m}^2$ ; a series of 192 (172 female) obese (BMI  $> 30 \text{ kg/m}^2$ ) non-diabetic patients aged 30–65 years seeking treatment for weight loss; and a non-clinical sample of 48 (26 female) obese BMI  $> 30 \text{ kg/m}^2$  subjects aged 30–65 years selected from the lists of two general practices. Eating behaviour was assessed using the EDE 12.0D. The prevalence of BED was lower than 5% in all the three samples.

Meneghini et al. [11] conducted a study to assess BED and its association with obesity in a tri-ethnic (37% Hispanic, 40% Non-Hispanic white and 19% African American) population; they used the nine-item Questionnaire of Eating and Weight Patterns (QEWP), the binge eating scale (BES) and the Beck Depression Inventory (BDI) to assess their sample of subjects. Abnormal eating was 40% overall. Logistic regression analysis showed that age  $< 60$  years and African American ethnicity were independently associated with abnormal eating using QEWP.

In the Today Study [16], 678 subjects (64.9% girls) mean age 14 years, completed a self-report measure of eating disorder symptoms and were categorized as non-overeaters, overeaters, subclinical binge eaters and clinical binge eaters. Prevalence of clinical and subclinical binge eaters were 6% and 20% respectively.

In the Allison et al. study [17], 845 (female 59.9%) subjects with T2DM, aged 45–75 years, with a BMI  $\geq 25 \text{ kg/m}^2$ , authors used Eating Disorder Examination Questionnaire (EDE-Q), Eating Disorder Examination (EDE) 14.4 version, Night Eating Questionnaire (NEQ) and Night Eating Syndrome History Inventory (NESHI) to assess eating anomalies in the study subjects. Night Eating Syndrome (NES) and BED prevalence were 3.8% and 1.4% respectively.

Hood et al. [18] assess the presence of night eating symptoms to 192 adults with T2DM. Seven per cent of participants met criteria for NES.

Nicolau et al. [19] recruit randomly 320 T2DM people. All participants were evaluated for the presence of ED by Eating Attitude Test-26 (EAT-26) and QEWP-R. BED has a frequency of 12.2%, being the most prevalent form of ED.

In a Case-control study by our group in Spain [20], the prevalence of BN, EDNOS, BED, NES were 0.3%, 3.5%; 3.1% and 3.9% respectively, being the prevalence of BED and NES significant high in comparison with the non diabetes control group.

The objective of these studies was to determine the prevalence of ED in T2DM people; however, they have methodological differences that make the comparison difficult.

Conversely the following study aimed to determine the prevalence of T2DM in patients with ED. Raevuori et al. [21] studied the prevalence of T2DM in 2342 (911 with AN, 1260 with BN and 171 with BED) patients treated at the Eating Disorder Unit at Helsinki University Central Hospital. Prevalence of T2DM in those groups of patients were 0.9%, 2% and 4% for the groups of patients with AN, BN and BED respectively.

In resume the overall prevalence of ED in these clinical sample of T2DM patients are from 12.2% to 40%, being the most prevalent forms of ED, BED 5% to 25.6%, Subclinical form of BED 20% and NES 3.9% (Table 1).

## 5. Inter-relationship between ED with type 2 diabetes

The relationship between both ED and type 2 diabetes mellitus are double, first, type 2 diabetic patients under dietary regimens and those with overweight or obesity have an increase risk to development ED [11,13,14,22,23]. Second, ED in T2DM patients induces gain in body weight that increases the risk to develop type 2 diabetes mellitus [24].

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