The prevalence of abnormal eating behaviour in a representative sample of the French diabetic population

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Abstract

\textbf{Aim.} – To assess the relationship between abnormal eating behaviour (AEB) and diabetes in a sample of French adult patients with type 1 (T1D) and type 2 (T2D) diabetes.

\textbf{Methods.} – Ninety-four consecutively recruited patients self-completed a series of validated questionnaires.

\textbf{Results.} – Over one-fourth of men with T1D (26\%) or T2D (27\%) and 11\% of female T2D patients reported consistent and pathological overeating or binge-eating during the previous six months. Glycaemic control in these T1D patients was poorer than in T1D patients defined as normal eaters (NORM) (11.9\% versus 9.6\%), but did not reach statistical significance ($P = 0.08$), and no significant difference was observed in the T2D group ($P = 0.61$) either. T2D patients reported being markedly more restrained when eating than did the T1D patients ($P = 0.002$), and their restraint increased along with their BMI ($P < 0.001$). Patients who overate or binged also reported greater general hunger ($P = 0.02$) and disinhibition ($P = 0.003$) than did the NORM patients.

\textbf{Conclusion.} – AEB is present in French diabetic patients at levels that are probably higher than among the general population. These results highlight the need for: (1) greater awareness among diabetes clinicians of the problem; (2) regular screening of diabetic patients for AEB; and (3) adaptation of therapeutic and dietary recommendations for this patient subgroup.

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Résumé

Prévalence des troubles du comportement alimentaire dans un échantillon représentatif de la population des diabétiques français.

\textbf{But.} – Étudier la relation entre les troubles du comportement alimentaires (TCA) et le diabète dans un échantillon de patients adultes français atteints de diabète de type 1 (DT1) et de type 2 (DT2).

\textbf{Méthodes.} – Quatre-vingt quatorze patients recrutés consécutivement ont complété une série d’auto-questionnaires validés.

\textbf{Résultats.} – Plus d’un quart des hommes DT1 (26\%) et DT2 (27\%) et 11\% des femmes DT2 ont rapporté avoir mangé de façon frénétique au cours des six derniers mois. L’HbA1c, de ces patients DT1 ayant un TCA avait une tendance à être augmentée mais de façon non significative ($P = 0.08$), par rapport aux DT1 ayant un comportement alimentaire normal (Norm) (11.9\% versus 9.6\%). Il n’était pas observé de telles différences chez les DT2 ($P = 0.61$). Les DT2 ayant rapporté restreindre de manière plus intense que les DT1 ($P = 0.002$) et le score de restriction alimentaire augmentait linéairement avec l’augmentation de l’IMC ($P < 0.001$). Les patients qui mangeaient de façon frénétique ont également rapporté une sensation de faim généralement plus intense ($P = 0.02$) et une déshinibition augmentée ($P = 0.03$) par rapport aux patients Norm.

\textbf{Conclusion.} – Les TCA sont présents dans la population adulte de diabétiques français vraisemblablement à un niveau plus élevé que dans la population générale. Ces résultats soulignent la nécessité (1) pour le clinicien diabétologue de connaître l’existence de ce problème, (2) de vérifier régulièrement chez le patient diabétique la présence de TCA et (3) d’adapter les soins et les recommandations diététiques pour cette sous-population.

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Keywords: Diabetes; Eating behaviours; Restraint

Mots clés : Diabètes ; Comportement alimentaire ; Restriction alimentaire

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1. Abbreviations

- T1D: type 1 diabetes
- T2D: type 2 diabetes
- AEB: abnormal eating behaviour
- NORM: normal eating behaviour
- BE: binge-eating
- BED: binge-eating disorder
- OV: overeating

2. Introduction

The concomitant presence of abnormal eating behaviour (AEB) and diabetes mellitus has been recognized for decades [1]. AEB, which includes binge-eating (BE), refers to the episodic consumption of a large quantity of food, during which there is a complete loss of intake control. When such control is not completely lost, it is termed “episodic overeating” (OV). AEB patients are frequently reported to have poor glycaemic control [2,3], a higher risk of retinopathy and nephropathy [4–6], and lower self-esteem [7] compared with diabetic counterparts who exhibit normal eating behaviour (NORM). When present, AEB has the potential to hinder the success of dietary advice. However, as diabetes management places much emphasis on strict dietary adherence, this might reinforce preexisting AEB or, indeed, promote it in previously NORM patients [8].

Eating disorders are based on the diagnostic criteria proposed by the Diagnostic and Statistical Manual for Mental Disorders (DSM) panel of the American Psychiatric Association [9]. Binge-eating disorder (BED) is one such disorder. It can be distinguished from bulimia nervosa by the absence of frequent inappropriate compensatory behaviour such as purging (vomiting, excess laxative and diuretic use), or excessive exercise or intentional fasting, all of which are characteristic of bulimia [10]. Reported prevalences of OV, BE and BED in the general French population is low–10. 2 and 0.7%, respectively [11].

BE behaviour has been identified in type 1 (T1D) and type 2 (T2D) diabetic populations [3,6,12–16]. In T2D cohorts, reported BE has ranged from 5 and 21% [3,17], and the percentage of patients meeting full BED criteria has ranged from 1.5 to 26% [3,17–19]. In France, adolescent T1D cohorts have displayed bingeing behaviour [20,21], but no equivalent information is available for the French adult diabetic population. Moreover, inferring the probable prevalence from other populations is difficult, given the wide variety of measuring systems used across studies. One tool that does incorporate all BED diagnostic criteria as proposed by the DSM-IV panel [9] is the revised questionnaire for eating and weight patterns, which has also been validated in the French population [11].

To date, the prevalence of AEB, and its metabolic and psychological consequences, in the French adult diabetic population is unknown. We have, therefore, aimed to provide an initial assessment (by self-completed questionnaire) of its prevalence in a sample of 94 patients considered to be representative of the French T1D and T2D populations. The contribution of other dietary factors to the prevalences observed was also investigated.

3. Patients and methods

3.1. Patients and study design

Between March and June 2004, all diabetic patients aged 18–70 years and attending our department were invited to participate in a study investigating dietary behaviour. Patients excluded from entry were those who had, or were suspected of having, diabetes secondary to another disease (such as pancreatitis or endocrine disorder), those taking medications likely to affect food intake (appetite suppressants, anti-epileptics), those with diseases known to affect eating behaviour (untreated thyroid disorders, gastrointestinal disease) and mental disorders (schizophrenia, substance or alcohol dependence, mental retardation). All patients self-completed a series of questionnaires to evaluate eating behaviour and self-esteem between meals, and gave their oral informed consent to participate.

3.2. Questionnaires

The Questionnaire of Eating and Weight Patterns-Revised (QEWP-R) by Spitzer et al. [22] was used to assess BED and subthreshold BED (OV/BE). BED was diagnosed in patients who had:

- greater or equal to 2 BE episodes per week over the past six months;
- had ≥ 3 of the following symptoms: eating more rapidly than usual; eating until uncomfortably full; eating large amounts of food when not hungry; eating alone through embarrassment and guilt; disgust or depression following the episode;
- felt significant distress associated with their eating habits;
- and did not regularly use (≥ 2 times/week) inappropriate compensatory behaviour (diuretic or laxative use, vomiting, intentional fasting and intensive exercise) following a bingeing episode in an attempt to lose or maintain body weight.

Patients exhibiting none of these behaviours were considered to have NORM.

A French-translated version of the Three-Factor Eating Questionnaire (TFEQ) [23], comprising 51 items, was used to assess dietary restraint (score range 0–21), disinhibition (score range 0–16) and hunger (score range 0–14). Item responses are scored as either 0 or 1 and added up for a total score. The higher the score, the higher the level of that aspect of eating behaviour. Dietary restraint refers to the patient’s intention to restrict and control food intake to attain or maintain a desirable body weight. It is assessed by questions such as “I often stop eating before being fully satisfied in order to control the amount of food I eat”. Disinhibition refers to a loss of control during eating, leading to OV, and is addressed by questions such as “sometimes what I’m eating is so good I continue on eating even if I’m not hungry”. Hunger refers to perceived hunger sensations and is assessed by questions such as “I cannot go on a diet for the simple reason that I get too hungry”. Item responses are scored as either 0 or 1 and then added together.
Table 1
Characteristics of type 1 (T1D) and type 2 (T2D) diabetes patients, according to NORM and AEB

<table>
<thead>
<tr>
<th></th>
<th>NORM</th>
<th></th>
<th>AEB</th>
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<tbody>
<tr>
<td></td>
<td>T1D</td>
<td>T2D</td>
<td>T1D</td>
<td>T2D</td>
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<tr>
<td>n</td>
<td>36</td>
<td>40</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Overeaters (n)</td>
<td></td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Binge-eaters (n)</td>
<td></td>
<td></td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Gender (M/F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)a</td>
<td></td>
<td></td>
<td>38.3±2.2</td>
<td>58.8±1.9</td>
</tr>
<tr>
<td>BMI (kg.m⁻²)a</td>
<td></td>
<td></td>
<td>23.9±0.8</td>
<td>33.9±1.1</td>
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<tr>
<td>HbA₁c (%)a</td>
<td></td>
<td></td>
<td>9.6±0.4</td>
<td>8.5±0.3</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)a</td>
<td></td>
<td></td>
<td>123.8±3.3</td>
<td>138.2±2.9</td>
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<tr>
<td>Diastolic blood pressure (mmHg)</td>
<td></td>
<td></td>
<td>71.8±1.8</td>
<td>77.1±2.1</td>
</tr>
<tr>
<td>Duration of diabetes (years)</td>
<td>11.6±2.1</td>
<td>11.1±1.6</td>
<td>38.4±6.3</td>
<td>35.2±6</td>
</tr>
<tr>
<td>Behaviour scores (% maximum)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Dietary disinhibitionb</td>
<td>20.8±1.9</td>
<td>26.4±2.8</td>
<td>38.4±6.3</td>
<td>35.2±6</td>
</tr>
<tr>
<td>Hungerb</td>
<td>23.0±3.2</td>
<td>22.5±3.6</td>
<td>33.7±6.2</td>
<td>37.0±8.3</td>
</tr>
<tr>
<td>Dietary restrainta</td>
<td>34.8±2.4</td>
<td>48.9±3.1</td>
<td>38.8±8.3</td>
<td>44.2±7.3</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>81.9±2.3</td>
<td>77.8±1.7</td>
<td>76.2±7.5</td>
<td>77.9±5.5</td>
</tr>
<tr>
<td>Co-morbidities (n [% of group])</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ocular</td>
<td>2 (5.6)</td>
<td>4 (10)</td>
<td>1 (14.3)</td>
<td>2 (18.2)</td>
</tr>
<tr>
<td>Neurological</td>
<td>3 (8.3)</td>
<td>8 (20)</td>
<td>1 (14.3)</td>
<td>3 (27.3)</td>
</tr>
<tr>
<td>Renal</td>
<td>4 (11.1)</td>
<td>1 (2.5)</td>
<td>1 (14.3)</td>
<td>(0)</td>
</tr>
</tbody>
</table>

Note: There was no significant effect of gender, or interaction between diabetes type (T1D/T2D) and eating behaviour (NORM/AEB), in any of the variables tested.

a Significantly different, T1D versus T2D patients.
b Significantly different, NORM versus AEB patients.

The French-Canadian validated version [24] of the Rosenberg Self-Esteem Scale (RSE) [25] was used to measure global self-esteem. This unidimensional 10-item scale includes a range of statements that are positively or negatively worded to assess feelings of self-worth and self-acceptance, such as “I am able to do things as well as the majority of people” and “sometimes I feel really useless”. Item responses are given on a 4-point scale ranging from “strongly agree” to “strongly disagree” and added up, so that the minimum score is 10 and the maximum is 40: the higher the score, the better the self-esteem.

3.3. Clinical and biological measurements

The study patients’ weight was measured to the nearest 0.1 kg (SECA 930, Hamburg, Germany) and height to the nearest 0.2 cm (SECA). Body mass index (BMI) was calculated by dividing weight (kg) by squared height (m²). Glycaemic control (HbA₁c) was determined by high-performance liquid chromatography (HPLC; Variant II, Bio-Rad, CA, USA). Systolic and diastolic blood pressures (mmHg) were measured on the day of the assessment.

3.4. Statistical analysis

Analysis of variance (ANOVA) was used to assess the significance of the differences in continuous variables between categories such as diabetes type, gender, antidiabetic treatment (insulin, oral, combined insulin and oral, diet), diabetes status (“newly diagnosed” = diagnosis made ≤ 1 year ago and “previously diagnosed” = diagnosis > 1 year ago) and marital status (single, married, divorced, widowed). Two-way ANOVA assessed the effects of the type of diabetes (T1D, T2D) and eating behaviour (AEB, NORM), and their interaction on patients’ characteristics and behaviour scores. Linear-regression analyses assessed the relationship between patients’ characteristics (glycaemic control, BMI, age) and dietary restraint, disinhibition, hunger and self-esteem. A Chi-squared ($\chi^2$) test compared the percentages between categories. A $P$ value < 0.05 was considered significant in all statistical comparisons. Analyses were performed using StatView statistical software (Version 4.0, Abacus Concepts, CA, USA). Results are expressed as either means ± SEM or percentages.

4. Results

4.1. Patients

Table 1 summarizes the characteristics of the T1D (27 male [M], 16 female [F]) and T2D (33 M, 18 F) patients according to normal and AEB. T2D patients were older ($P < 0.0001$) and had higher BMI ($P < 0.0001$) than T1D patients. Fifteen (35%) T1D and 12 (24%) T2D patients were newly diagnosed, and were younger ($P = 0.02$) and had lower BMI ($P < 0.0001$) than previously diagnosed patients—but only in the T1D group. Glycaemic control was generally poorer in T1D than in T2D patients ($P = 0.009$), and was poorest ($P < 0.0001$) in the newly diagnosed. All T1D patients were treated with insulin only whereas, in the T2D group, the majority (43%) were taking oral antidiabetic agents only. Only three (6%) patients were being treated by diet alone.
4.2. Questionnaires

Fig. 1 shows the percentage of T1D and T2D M and F patients with OV and BE, as assessed by the QEWP-R; Cronbach’s alpha value was calculated as 0.71 (95% CI: 0.62–0.79) for the entire cohort. No T1D or T2D patient of either gender met the full criteria for a BED diagnosis. However, over one-fourth of the men with T1D (26%) or T2D (27%), and 11% of the women with T2D, had an eating disorder—either OV or BE. Rates were significantly (P = 0.02) higher in men in the T1D group, whereas all the women were NORM. Of all patients exhibiting disordered eating, four (22%) reported occasionally fasting or exercising excessively to lose weight, although such episodes were infrequent and considered to be normal behaviour.

As shown in Table 1, AEB patients were similar to NORM patients in terms of BMI (P = 0.76), age (P = 0.43), antidiabetic treatment (P = 0.09), socioeconomic status (P = 0.80) and marital status (P = 0.84). T2D patients reported being significantly more restrained when eating than did the T1D patients. However, no differences in restraint were observed between AEB and NORM patients in either diabetic group (P = 0.97). Restraint was found to increase along with BMI (r = 0.31, P = 0.002). Dietary disinhibition scores were generally low and similar between the diabetic groups (23.7% [T1D] versus 28.3% [T2D], P = 0.18), as were the scores for hunger (24.7% [T1D] versus 25.6% [T2D], P = 0.85). Nevertheless, within the T1D group, the mean hunger score was higher (P = 0.01) among the newly diagnosed. It is also interesting that both diabetes groups reported significantly higher disinhibition and hunger in patients with AEB than in those without (P = 0.003 and P = 0.02, respectively). Finally, self-esteem was similar (P = 0.58) between AEB and NORM patients, and mean levels were unexpectedly high in both groups—78 and 80%, respectively (P = 0.58).

5. Discussion

The present study investigated an issue of potential importance that has so far gone unrecognized in the French adult diabetic population. We discovered that:

- over a quarter of diabetic men, whether T1D or T2D, displayed BE behaviour;
- the rates of AEB were higher in men than in women;
- T2D patients were the more controlled eaters, which may be either the cause or consequence of their higher BMI;
- and eating disorders, when present, were associated with other dietary behaviour such as increased disinhibition and hunger.

BED appears to be unusual in the French general, non-diabetic population [11], with the highest rates observed in obese individuals [11,26]. Consequently, it is reasonable to expect a higher prevalence of AEB in T2D patients, as they are generally overweight compared with T1D patients, who are usually lean. This, however, was not observed in the present study. Given that both diabetic groups in this study included both normal and overweight patients, it is reasonable to assume that any effect of BMI on rates was “diluted” as a result. In addition, this may explain why T2D patients had lower OV and BE rates than those observed in overweight non-diabetic French people with similar mean BMI [11].

Furthermore, the observation that AEB levels were similar between newly and previously diagnosed patients leads us to speculate that disordered behaviour may have been present prior to the diabetes in these patients. Goodwin et al. [8], in their assessment of 3000 primary-care patients, observed that an eating disorder (based on DSM-IV criteria) was the only psychological condition associated with an increased diabetes risk. However, as diabetes management promotes strict dietary adherence and maintenance of correct body weight for optimal glycaemic control, the increased pressure to diet and overeating may be unintended consequences [10,27,28]. Interestingly, in the Goodwin et al. study [8], diabetes was the only one of the seven most common diseases evaluated that carried significantly increased odds of developing an eating disorder. Such findings lead us to wonder which is the chicken and which is the egg.

When comparing the AEB prevalence in the present study with that of the general French population [11], the rates of OV and the lack of BED appear to be similar. However, BE prevalence was five or six times higher in our cohort although, given the modest number of individuals involved, these rates may not apply to the French diabetic population in general. Nevertheless, the observed OV and BE rates in our study are similar to those observed in other European diabetic populations [3,15], and may well be lower than rates observed in the US [16,19]. Yet, given the different measuring tools used across such studies, comparing results may not be meaningful. Likewise, the observation of a higher prevalence of AEB in men versus women cannot be easily compared with the findings of other studies not only...
because of the different tools used, but also because the majority of studies have only included women [4,14]. The possibility of such a gender effect, however, warrants further exploration in a larger patient cohort.

Diabetic patients with AEB are often shown to have poorer glycaemic control, and more retinopathy and nephropathy, than diabetic patients defined as normal eaters [2,3]. Although the difference in glycaemic control is not always statistically significant [12,14], as was the case in the present study, it does suggest that, as long as an eating disorder is present, glycaemic control cannot be improved. Given that AEB has been observed in both mildly controlled [14] and poorly controlled patients [4], there is little likelihood of a fixed HbA1c threshold above which AEB is increased.

In the present study, dietary restraint increased along with the patient’s BMI, but the relevance of this to AEB cannot be determined by cross-sectional analyses. Also, no differences in dietary restraint were observed between AEB and NORM patients in the present study, which may have been due to the modest levels of reported restraint in each group. Although dietary restraint is not regarded as an AEB per se, the restraint theory proposes that increased restraint can facilitate the development of unusual eating habits as a result of stress incurred by the need to control body weight. In diabetic patients, any food intake may be considered to be a result of the “balance between their desire to eat and their wish to diet” [29]. A lapse in this self-control (a disinhibition effect) – for whatever reason – can result in overeating. As discussed by Le Barzic [30], in contrast to “normal” eaters, who are influenced by a sophisticated internal regulatory system that modulates external factors such as smell to initiate or end food intake, restrained eaters try to dominate all external factors. As a result, the food intake of restrained eaters becomes uncontrolled and unrelated to either their appetite or nutritional requirements. This situation, with its eventual subsequent disinhibition, could result in periods of significant overeating. Golay et al. [31] emphasized the importance of using food diaries to reveal patients’ eating habits as well as the need to help them to understand what a meal is and to reestablish a regular eating pattern. In the present study, higher levels of disinhibition were observed in patients with eating disorders compared with those who had normal eating habits.

Although the modest size of the present cohort is an acknowledged possible limitation, it does provide a complete dataset. Moreover, regardless of the prevalence rates, the results offer evidence of AEB in patients who are truly representative of those seen daily in French diabetes clinics. This leads us to also question the possible presence of other behaviour such as bulimia and anorexia nervosa, which may not be accurately identified by the present investigative tools. Our conclusions are based on the results of self-reported questionnaires, which may be criticized because of their subjectivity. However, all of the questionnaires used in this study have been validated and applied in the French general population. Moreover, the QEW-R, used to assess the main objective of the present study, proved to have good internal validity in our cohort.

What may be questioned – and should always be questioned in studies using self-reported measures – is whether or not the findings are likely to be accurate. Recent studies in our department have revealed dietary underreporting to be a significant problem among French diabetic patients [32,33]. However, the potential for underreporting binging episodes, to our knowledge, has not been explored. Given that our patients, as with many other studies, were not completing the questionnaires anonymously, they may have been more likely to give more “socially acceptable” answers. Such an hypothesis cannot be ruled out, as higher levels of underreporting of items such as weight have also been observed in patients who binge compared with those who do not [34].

In conclusion, our study shows that AEB is present in French diabetic patients, which highlights the need for diabetes healthcare professionals to remain alert to the problem especially in their overweight male patients. Routine screening using self-reported questionnaires can help to identify those patients who have, or are at risk of having, an eating disorder and who, therefore, may have difficulty in complying with conventional diabetic dietary advice. The presence of such behaviour has implications for the validity of food-intake measures in this population, and suggests that treating the physical and psychological aspects of the eating problem is essential before attempting to implement any sort of weight-loss or maintenance programme. Psychosocial treatments, such as cognitive behavioural therapy, have shown promising results in T2D patients who binge-eat by not only decreasing the quantity and severity of the bingeing episodes, but also by improving their eating-related beliefs and mood as well as their weight-loss attempts and glycaemic control [35]. As the latter study involved only women, a more comprehensive study to investigate the benefits in both male and female diabetic patients would more fully evaluate the practicality of such therapy for routine use in diabetic patients.

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