

Eating disorders and insulin misuse in people with type 1 diabetes

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Article points

1. Diagnosis of eating disorders may be missed or significantly delayed in people with type 1 diabetes.
2. Young women with type 1 diabetes have the destructive option of omitting insulin in attempts to lose weight.
3. Omission is not the only form of insulin manipulation.

Key words

- Anorexia nervosa
- Eating disorders
- Insulin omission
- Mental health

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The prevalence of eating disorders among people with type 1 diabetes is widely debated. The rapid weight loss that can be achieved through manipulation of insulin regimens can result in life-threatening diabetic ketoacidosis and accelerates the onset of long-term diabetic complications. The complex nature of diabetes, coupled with the biopsychosocial ramifications of eating disorders, means management of this comorbidity requires a cohesive multidisciplinary team that can tackle physical, psychological, social and legal issues. It is, for this reason, that insulin omission to achieve weight loss among people with type 1 diabetes is becoming an increasingly recognised problem. This article reviews the results and limitations of three studies about the prevalence of eating disorders in adolescent females with type 1 diabetes.

Eating disorders are described by NICE (2004) as comprising:

“a range of syndromes encompassing physical, psychological and social features. While the acute physical complications of these disorders may provoke great concern in family members and health service staff, anorexia nervosa and bulimia nervosa are frequently chronic conditions with substantial long-term physical and social sequelae, from which recovery is difficult.”

It is thought that approximately one in 250 women will have an eating disorder, with the most common stage of onset being adolescence (NICE, 2004). This means that their onset can have significant consequences for physical, social and emotional development as this is a pivotal time in a person’s development. Risk factors for the development of eating disorders

are recognised as (but not exclusively) traumatic events, stress, obsessive personality, anxiety, external pressure to be a certain body shape and poor family relationships (NHS, 2011).

Unfortunately, the often divisive behaviour of those with eating disorders, coupled with stigma surrounding the subject, means that diagnosis is often missed or significantly delayed. Treatment can be managed in the community or in secondary care depending on the severity and requires a multidisciplinary approach. This often involves cognitive behavioural therapy, family therapy and consultations with dietitians, all of which rely on compliance and benefit from family support. The cognitions exhibited by people with eating disorders can override logical thought, so in severe cases, people may be deemed not to have capacity. In addition, sectioning under the Mental Health Act, or restraint, may be necessary.

Page points

1. It is vitally important that eating disorders are recognised and treated, as their consequences can be devastating, not only resulting in social isolation and failure to thrive, but leading to physical effects such as organ failure, infertility and even death.
2. Weight fluctuations around diagnosis of diabetes, introduction of insulin therapy, and the fact that management requires constant monitoring of diet are each considered possible reasons why a diagnosis of type 1 diabetes in adolescence can predispose young people to develop disturbed eating behaviour.
3. Omission of insulin undoubtedly results in rapid weight loss but it can also induce life-threatening ketoacidosis and accelerate the onset of serious long-term complications, such as peripheral neuropathy and vascular problems.

It is vitally important that eating disorders are recognised and treated, as their consequences can be devastating, not only resulting in social isolation and failure to thrive, but leading to physical effects such as organ failure, infertility and even death in two in 100 000 cases (NICE, 2004).

Diabetes and eating disorders

Weight fluctuations around diagnosis of diabetes, introduction of insulin therapy, and the fact that management requires constant monitoring of diet are each considered possible reasons why a diagnosis of type 1 diabetes in adolescence can predispose young people to develop disturbed eating behaviours, such as anorexia nervosa (*Box 1*). While diuretics, excessive exercise, purging, laxatives and fasting are methods commonly utilised to achieve weight loss by people with eating disorders, those with type 1 diabetes have a much more efficient method of weight loss at their disposal – insulin omission.

Omission of insulin undoubtedly results in rapid weight loss but it can also induce life-threatening ketoacidosis and accelerate the onset of serious long-term complications, such as peripheral neuropathy and vascular problems (*Table 1*). For these reasons early identification, alongside multidisciplinary cooperation, is essential in the effective management of people who are omitting insulin.

Method of review

Databases (Scopus, Medline, PubMed,

Table 1. Average medical measurements in 43 people with diabetes who omitted insulin in relation to weight (Polonsky, 1994)

Weight-related omitters	
Mean HbA _{1c} (mmol/mol, %)	110.9 (12.3)
Recent hospitalisations	1
Recent emergency room visits	0.9
Neuropathy (%)	46.5
Retinopathy (%)	72.1
Hypoglycaemic events in past month	8.1 ± 9.6

PsycINFO) were searched for articles published since 1990 about adolescent females with type 1 diabetes and an eating disorder, or restricted or omitted use of insulin, in order to lose and control weight. Specifically, the search terms used were:

- Insulin misuse
- Eating disorders and diabetes
- Insulin omission and type 1 diabetes
- Insulin restriction.

These search terms produced a wide range of results that were manually excluded based on themes. Studies were then selected dependent on their study size, date of publication, methods and limitations. The various characteristics of the studies were tabulated in order to allow for easy comparison, exclusion and analysis.

Three studies were chosen for review. These studies vary slightly in their aims and methods used to collect data and, therefore, in this respect, are not directly comparable. However, the papers were chosen in order to offer the widest breadth of information possible whilst carrying out a comprehensive comparison of the studies.

The three articles selected for review recruited individuals from medical centres and diabetes clinics, and documented self-reported results. Whilst this is, undoubtedly, an efficient method of accessing the study population,

Box 1. How does type 1 diabetes predispose to eating disorders?

- Fluctuations of weight around diagnosis and start of insulin replacement.
- Management involves constant monitoring of diet and carbohydrate intake.
- Gastroparesis resulting from high blood glucose levels causing damage to nerves supplying gastric lining can result in delayed gastric emptying and consequently a decreased appetite and weight loss.

it also increases the probability of medical surveillance bias occurring. People who omit insulin may attend clinics more regularly owing to consequent adverse events or, conversely, may avoid appointments in order to disguise their behaviour. Self-reported results are of reduced reliability due to the possibility of recall or response bias. This may be due to unintentional misinformation or intentional falsification, a practice that may be more prevalent among people with eating disorders, due to fear of intervention. Therefore, the subjective nature of the information initially collected means that the number of adolescents considered at risk of an eating disorder may be unrepresentative.

Study 1: Eating disorders in female adolescents

In this cross-sectional, case-led study by Jones et al (2000), 70% of potential candidates were included, which reduced the possibility of selection bias. Partial interviewer blindness was achieved through referral to diagnostic interview of 15% of adolescents not deemed to be “at risk” during initial assessment. Complete blindness was not possible because questions specific to insulin misuse, such as HbA_{1c} levels, were included in the interview. This analysis, coupled with narrow confidence intervals, found females with diabetes to be 2.4 (95% confidence interval [CI] 1.5–3.7, $P < 0.001$) and 1.9 (95% CI 1.3–2.8, $P < 0.001$) times more likely to develop a DSM-IV (*Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*) classified eating disorder and sub-threshold eating disorder, respectively, than people without diabetes.

Use of HbA_{1c}, which is undoubtedly an effective indication of glycaemic control over a short time period, may produce a false average in people who experience extreme fluctuations between hyper- and hypoglycaemia due to poor insulin control or deliberate misuse.

Endeavours to maximise the accuracy and reliability of these results, despite the unavoidable margin of bias, mean that the data produced, which suggest 11% of adolescent females with type 1 diabetes omit insulin to achieve weight loss, can be appreciated to be

of statistical significance. In addition, findings that these women are at high risk of severe macro- and microvascular complications emphasises the clinical relevance of the study.

Study 2: Intentional under- and over-dosing of insulin in adolescents

The study by Schober et al (2011) showed that 24% of the study participants deliberately omitted insulin, of whom 15.5% intended to lose weight.

Two hundred and forty-one participants completed the two stages of the study and there was a significant drop-out rate of 81 participants. This raises concerns with regards to selection bias and holds a caveat for the application of results to a larger population. In addition, the multi-site nature of the study suggests that there could be discrepancies in socioeconomic status and access to services between locations, further confounding the application of the results. The extent to which participants can be reliably compared between studies is reduced as these inconsistencies

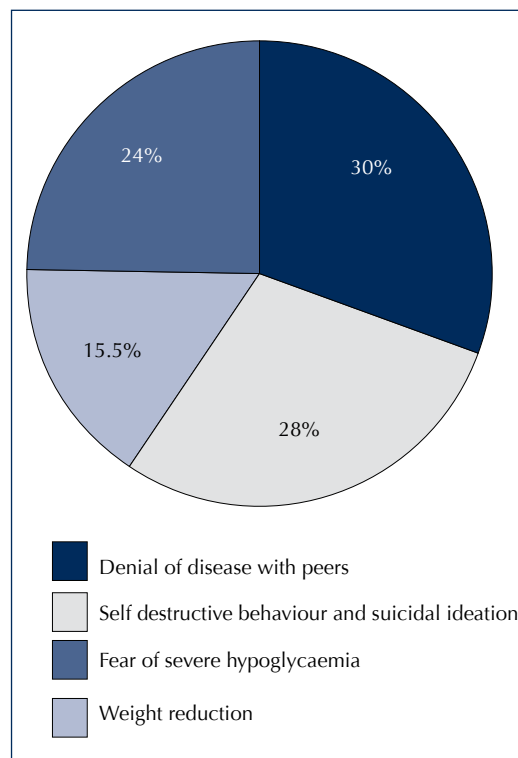


Figure 1. Reasons for deliberate insulin omission (adapted from Schober et al, 2011).

Page points

1. Results of a cross-sectional study by Jones et al (2000) suggest that 11% of female adolescents with type 1 diabetes omit insulin in efforts to lose weight.
2. A cross-sectional study of 241 people with type 1 diabetes by Schober et al (2011) showed that 24% of the study participants purposefully omitted insulin, of whom 15.5% were attempting to lose weight.

Page points

1. The Schober et al study demonstrates that insulin omission is not the only form of deliberate insulin manipulation. Insulin overdose is not uncommon.
2. People omit insulin for reasons other than weight control, such as injection pain avoidance, the stigma of diabetes and a refusal to accept the diagnosis.
3. The study by Peveler et al (1992) showed that 61% of people with type 1 diabetes with a history of disordered eating later omitted insulin. This supports the theory that diabetes simply provides an alternative means to develop an eating disorder.

were not further explored and no attempts to minimise confounders were undertaken.

As there was no control group (people without diabetes, and age and gender matched) it is not possible to conclude with certainty whether type 1 diabetes predisposes to eating disorders or whether they would develop regardless. It must also be noted that the small sample size ($n=16$) means the risk that it may be an ecological fallacy must be considered. An ecological fallacy is when conclusions are drawn, often incorrectly, based solely on analysis of group data.

Nevertheless, given increasing evidence that insulin omission is used as a method for weight loss, it is interesting to note that the subgroup analysis found this not to be the primary reason given for omission. The reasons given for deliberate omission, the largest of which was denial of disease in situations with peers (see *Figure 1*), are informative and have implications for clinical practice.

Study 3: Disordered eating habits and attitudes and clinical outcomes

The Peveler et al (2005) cohort study showed increased diagnoses of eating disorders and of insulin misuse at follow-up. However, as age at diagnosis was not available, it was not possible to confirm a relationship between the two factors. Sixty-one per cent of the women with type 1 diabetes and with a history of disordered eating went on to omit insulin, supporting the argument that diabetes does not predispose to insulin omission but merely provides alternate means for development of an eating disorder.

In comparison with the other two trials, this cohort study is disadvantaged by its relatively small study size, indicated by wide confidence intervals. However, it has the advantage over the other two studies of providing perspective on the development of eating disorders over time. Where losses to follow-up are inevitable in a prospective study, in this case the likely relationship between drop-out and disordered eating habits (due to severe illness or death) means that they may provide falsely positive results.

While it is difficult to predict or prevent

drop-out rates, having an initially larger study population would reduce their impact. This study, which claims to be the first of its kind, arguably has a study size so small that it cannot be applied to a population; however, it undoubtedly indicates an area for further research.

Discussion

There is much debate surrounding whether there is a higher prevalence of eating disorders among people with type 1 diabetes. The fact that eating disorders and diabetes both occur relatively frequently within the population (0.4% [NICE, 2004] and 4.6% [Jones et al, 2000], respectively), suggests that it is statistically likely that the two will be seen to be comorbid.

Previous studies that have produced negative findings (Fairburn et al, 1991; Mannucci et al, 1995) are now being discounted due to their small study populations and replaced by more modern, comprehensive studies with larger study populations. The DSM-IV criteria used in the majority of the studies reviewed is largely considered the gold standard for diagnosis, and is of huge advantage because it enables direct comparison between the trials.

Where the studies reviewed show that there is a correlation between diabetes and eating disorders – a finding that is concerning and consequently of huge clinical relevance – it is important to remember that omission is not the only form of deliberate insulin manipulation. The Schoeber et al (2011) study highlights that insulin overdose is not uncommon, nor without its own dangerous consequences, and this should also be considered by healthcare professionals.

In addition, it should be noted that insulin omission is not always a sign of disordered eating and is, on the contrary, thought to be practiced by over 50% of people with type 1 diabetes (Peyrot et al, 2010). Peyrot et al (2010) suggest that this is due to the pain associated with injection, perceived stigma of diabetes and a refusal to accept the diagnosis.

Where studies differ in the prevalence of eating disorders among people with type 1

“It is vitally important that medical professionals emphasise the dangers of insulin misuse.”

diabetes, growing evidence analysed within this review emphasises that while eating disorders are not to be expected in every person with type 1 diabetes, they are by no means rare and should be under high levels of clinical surveillance due to their devastating consequences.

Clinical implications

The most significant implication of these studies is the increasing recognition among healthcare professionals of the high prevalence of eating disorders in type 1 diabetes. Where current NICE guidelines emphasise the need for regular monitoring of people with diabetes who show signs of an eating disorder, there is no comprehensive guideline detailing methods of treatment. This would be beneficial in supporting professionals due to the loss of capacity and need for sectioning often associated with such cases. A case series developed by secondary care facilities that receive such people may be the first step in developing such a document.

Information on how to achieve weight loss through insulin misuse is readily available through a range of media sources and control of this is unrealistic and unachievable. It is vitally important that medical professionals emphasise the dangers of insulin misuse at diagnosis and regularly thereafter as it has been demonstrated that, once developed, eating disorders associated with diabetes are incredibly complex to manage and treat.

Philpott (2013) gives a helpful overview of the clinical implications of eating disorders and describes how best to manage this life-threatening comorbidity. ■

Further resources

- **Beating eating disorders:**
www.b-eat.co.uk
- **Diabetics with eating disorders:**
www.dwed.org.uk

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