Appetite 96 (2016) 160–165

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

Intuitive eating is associated with glycaemic control in adolescents with type I diabetes mellitus

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ARTICLE INFO

Article history:
Received 19 December 2014
Received in revised form
28 July 2015
Accepted 13 September 2015
Available online 25 September 2015

Keywords:
Type 1 diabetes mellitus
Adolescent
Intuitive eating
Glycaemic control

ABSTRACT

Background: While there have been considerable advances in the medical management of type 1 diabetes mellitus (T1DM), for many, glycaemic control remains substandard. Nutrition and eating behaviour are important additional factors to consider with regards to T1DM management and outcomes. Intuitive eating is one such factor, and has not previously been investigated in T1DM. With this in mind, we undertook a study examining the relationship between intuitive eating and glycaemic control in adolescents with T1DM.

Methods: A case-control study of adolescents with established T1DM, and age/sex matched controls was conducted. Demographic information, the Intuitive Eating Scale (IES), and HbA_1c were collected. Statistical analysis was undertaken to explore associations between the IES and HbA1c as a marker of glycaemic control.

Results: Data on 38 adolescents with T1DM, and 39 age/sex matched controls were obtained. Those with T1DM had significantly lower (by 0.5 SD) IES scores compared to controls ($p = 0.009$). Higher values of both total IES and the Eating for physical rather than emotional reasons subscale were associated with lower HbA1c: HbA1c 22% lower/whole unit increase in total IES mean score, HbA1c 11% lower/whole unit increase in Eating for physical rather than emotional reasons mean score, $p = 0.017$ and $p = 0.009$ respectively.

Conclusion: In adolescents with T1DM, there appears to be a strong association between intuitive eating, in particular the effect of emotion on eating, and glycaemic control. In addition, those with T1DM have lower scores for their intuitive eating behaviour compared to controls. Emotional eating could be a future target for screening and potentially intervening in those with T1DM, as part of a wider treatment package to improve glycaemic control. Continuing efforts are needed to fully understand the important dynamics of diabetes, adolescence, diet, emotion, and how these factors affect long term outcomes in those with T1DM.

1. Introduction

Type 1 diabetes mellitus (T1DM) is a lifelong, metabolic disorder, typically arising in childhood and adolescence. In recent years, the principles of diabetes care have been much influenced by the findings of the Diabetes Control and Complications Trial (DCCT): a landmark study which showed that good glycaemic control, achieved through an intensified insulin regimen, can delay and/or prevent the onset of diabetes complications (Nathan et al., 2005; The Diabetes Control and Complications Trial Research Group, 1993). However, in many individuals, especially in the adolescent population, diabetes control remains substandard (The Diabetes Control and Complications Trial Research Group, 1994). This is despite recent improvements in diabetes management, particularly related to blood glucose monitoring, insulin development, and insulin delivery technology. It is clear that to adequately address this

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http://dx.doi.org/10.1016/j.appet.2015.09.016
0195-6663/

problem, it is necessary to consider the global picture, taking into account diet, exercise, patient education/support, as well as individual/family psychological and social factors.

Intuitive Eating (IE) is a relatively recent concept that looks at the degree to which individuals rely on innate signals/satiety cues to determine when, what, and how much to eat (Hawks, Merrill, & Madanat, 2004; Tylka, 2006). These innate satiety signals relate to hunger, fullness, and taste. IE relies on the process of tuning into and trusting "internal wisdom" around to these signals to guide ones eating behaviour (Mathieu, 2009; Tylka, 2006). This can be measured using the Intuitive Eating Scale (IES), a 21 item questionnaire, originally validated in university age women aged 17 years and older (Tylka, 2006), but also subsequently in younger male and female children/adolescents (Dockendorff, Petrie, Greenleaf, & Martin, 2012). The three key components of IE are as follows: Unconditional permission to eat when hungry, which assesses whether an individual purposefully tries to ignore hunger and satiety signals, or categorises certain foods e.g. as "good", "bad" or "forbidden"; the second component, Eating for physical rather than emotional reasons, assesses how much eating is affected by emotional responses, e.g. not using food to cope with emotional experiences, or not using food to satisfy emotional needs; the third and final factor Internal hunger and satiety cues (innate signals) assesses the extent to which individuals are aware and able to trust internal signals rather than relying on external rules/cues (Tylka, 2006).

IE and the IES have not previously been studied in the T1DM, and existing literature in the wider adolescent population remains scarce. However, in the non-T1DM population, higher levels of intuitive eating have been associated with a range of positive findings, including: lower weight (Hawks et al., 2004); fewer disordered eating behaviours; an increased pleasure in consuming food; and fewer food anxieties (Denny, Neumark-Sztainer, Loth, & Eisenberg, 2012; Smith & Hawks, 2006). This makes IE potentially relevant to the T1DM population; who are at risk of developing certain chronic eating disorders/behaviours (Colton, Olmsted, Daneman, Rydall, & Rodin, 2004; Mannucci et al., 2005), that in turn have been negatively associated with adherence and glycaemic control (Affenito & Adams, 2001; Rodin et al., 2002).

However, the possible relationship between IE and T1DM is clearly complex. In particular, T1DM requires individuals to exert more cognitive control over eating, at times irrespective of current innate satiety cues (e.g. taking into account blood glucose values, sensitivity to insulin/exercise, or carbohydrate ratios), and to eat in response to, or to prevent, hypoglycemia (and/or hyperglycemia). Thus, it is both sensible that IE would be disrupted, but also that it might be important to include IE skills in nutrition counselling for T1DM, if poorer IE was associated with unhealthier glycaemic control.

Considering all the above factors, and the importance of nutrition and eating habits in the day to day management of T1DM, we undertook a study examining the relationship between IE and glycaemic control in adolescents with T1DM.

2. Methods

Excluding outreach, the diabetes team at the Southern District Health Board (SDHB) cares for approximately 160 children and adolescents with diabetes. Inclusion criteria were: 1) under the clinical care of the first author (B.J.W.) at commencement of the study (92 patients); 2) those with T1DM only (12 excluded with non-T1DM); 3) age < 18 years (one excluded as ≥18 years). Specific exclusion criteria were: 1) those in the early stages (honeymoon phase) of T1DM (defined as taking < 0.5 units of insulin/kg/day and/or a diabetes duration of <12 months) – five excluded; 2) reading age <12 years - given that previous studies using the Intuitive Eating Scale (IES) assessed predominantly adult populations, we undertook a reading age assessment (Kincaid, Fishburne, Rogers, & Chissom, 1975) to ascertain at which age we could ensure adequate reading and comprehension. This indicated suitability for use in children ≥12 years of age. Based on this, an additional 32 children aged <12 years were excluded. Taking into account all of the above, this gave 42 potential participants for inclusion.

The second author (M.C.) recruited all participants. The consent process conformed to New Zealand Central Ethics Committee guidelines and included both verbal and detailed written information, followed by signed consent for participation by participants and their parents (in a small number of cases the participant, as a young adult, attended clinic alone and was aged ≥16 years, in these cases only the participant initially consented, but permission was given to nevertheless involve and consent the parent at a later date). Recruitment occurred in the diabetes clinic waiting room both before and after clinic appointments. All were asked to complete an IES, with one adaptation. The original IES consists of a 21 item questionnaire, using a five-point likert scale (where 5 represents greater IE across the three domains, and 1 lower levels of IE). We omitted Question 21 (see Appendix 1): "I don't keep certain foods in my house/apartment because I think that I may lose control", as it was deemed irrelevant, and potentially confusing, to children and adolescents living with parents; particularly as parental decisions were likely to govern the types of food found in the household. Item 21 is a component of both the total score and the unconditional permission to eat when hungry subscale. However, as the overall IES and sub-scale scores are the mean of the different items in each scale, it was felt this would not compromise the integrity of the final results. The internal consistency of the resulting modified scale and subscales were examined as described below.

Control families were recruited in two different methods: First, participants with T1DM were asked to recruit an age/sex matched friend. Control families with any member affected by diabetes were excluded. In a minority of cases where the participant did not provide a control, the University of Otago, Department of Psychology Participant Database was accessed as a means to facilitate recruitment of age and sex matched controls. This consists of members of the public who have previously consented to be contacted for research studies conducted by the Department of Psychology.

Baseline demographic characteristics were obtained by questionnaire, and a review of medical records (for those with T1DM), including the Dunedin Public Hospital's diabetes database. The NZ Deprivation Index (NZDep2006) (Salmond, Crampton, & Atkinson, 2007) was used as an index of social deprivation based on the participant's address at baseline. The index range is 1–10, with 1 representing areas of least deprivation, and 10, areas of highest deprivation. HbA1c, a measure of glycaemic control, was measured using a DCA Vantage Analyzer by Siemans.

2.1. Data analyses

All questionnaires were formatted and reproduced via Teleform™ software and data entered via scanner, a technique referred to as Optical Character Recognition (OCR). This method of data entering has been shown in previous studies to be significantly faster and more accurate than manual data entry (Jinks, Jordan, & Croft, 2003).

Only the 77 participants with intuitive eating scores available were included in the analyses presented here (T1DM n = 38; control n = 39). Descriptive statistics are presented for all variables of interest (means and SDs for normally distributed continuous