ORIGINAL ARTICLE

Quitting a weight loss program is associated with anhedonia: preliminary findings of the Lifestyle Intervention Treatment Evaluation Study in northern Finland

Tuomas Komulainen 1, Anna-Maria Keränen 2,3, Elsi Rasinaaho 1, Helinä Hakko 4, Markku J. Savolainen 2, Mona-Lisa Kujari 5, Annakaisa Reponen 2, Sari Lindeman 1,5

1 University of Oulu, Institute of Clinical Medicine, Psychiatry, Oulu, Finland
2 University of Oulu, Institute of Clinical Medicine, Internal Medicine, Oulu, Finland
3 Oulu University Hospital, Clinical Research Center, Oulu, Finland
4 Oulu University Hospital, Department of Psychiatry, Oulu, Finland
5 University of Oulu, Institute of Clinical Medicine, Physical Medicine and Rehabilitation, Oulu, Finland

Received 13 October 2009; Accepted 28 September 2010

ABSTRACT

Objectives. To examine whether a diagnosis for major depression, chronic depression or specific symptoms of depression is associated with the risk of quitting a weight loss program.

Study design. The study involved 82 overweight adults participating in the Lifestyle Intervention Treatment Evaluation (LITE) follow-up study at Oulu University Hospital in northern Finland.

Methods. Psychiatric diagnostic assessments were based on the Structured Clinical Interview for DSM-IV disorders (SCID-I) conducted by a clinical psychiatrist. Anhedonia (lack of pleasure) was assessed as one of the core symptoms of major depression and chronic depression (dysthymia). Anhedonia was defined to be present if the participants reported having suffered a major loss of interest during the previous month.

Results. Twenty participants (24.4%) quit during the 6-month intervention period. Anhedonia put individuals at risk of quitting the weight loss program (bivariate analysis OR 3.1, 95% CI 0.8-11.6, p=0.091, multivariate analysis OR 6.5, 95% CI 1.1-38.2, p=0.038). However, a diagnosis for major depression or chronic depression did not predict quitting.

Conclusions. Individual assessments of obesity and overweight should also include an assessment for subthreshold depression, mainly anhedonia.

(Int J Circumpolar Health 2011; 70(1):72-78)

Keywords: weight management, weight loss, obesity, depression, anhedonia, drop-out
INTRODUCTION

An association between obesity and depression has been established repeatedly. Obesity has been found to increase the risk of depression, and depression has been found to be predictive of developing obesity (1). In general, it is difficult to determine whether obesity and its comorbidities contribute to depression or vice versa. In their systematic review, Atlantis and Baker (2) found a weak level of evidence in support of the hypothesis that obesity would increase the incidence of depression. On the other hand, in a recent prospective British cohort study, the direction of the association between common mental disorders and obesity was from common mental disorder to increased future risk of obesity (3).

One of the major causes of failure in weight loss programs targeted at obese patients is dropping out: the drop-out rate seems to vary from 10–80% (4). However, there are very few research reports describing predictors of completion or drop-outs from weight loss programs and the results are ambiguous with respect to depression (5,6).

The aim of this study was to examine whether a diagnosis for major depression, chronic depression or specific symptoms of depression were associated with putting an individual at risk of quitting a weight management program. Our hypothesis was that quitting would be more common among participants who suffered from depressive symptoms or depressive disorders.

MATERIAL AND METHODS

Lifestyle Intervention Treatment Evaluation (hereafter LITE), a randomized follow-up study being conducted in the Oulu University Hospital, Finland, was organized by the Department of Internal Medicine in collaboration with the Department of Psychiatry and the Department of Physical Medicine and Rehabilitation. The LITE study lasted 18 months, including screening (0-month visit) and 3 follow-up visits at 6,12 and 18 months after the screening visit. The Ethics Committee of the Oulu University Hospital approved the study (11.11.2002, nr: 135/2002). A more detailed description of the study design has been published previously (7).

The Oulu University Hospital serves the population of the City of Oulu, with its 120,000 inhabitants, and the surrounding region. The primary catchment area consists of 35 municipalities with a total population of approximately 365,000 inhabitants. The Oulu University Hospital is responsible for organizing specialized medical care for the whole of northern Finland.

Participants were solicited by means of a newspaper article advertising an obesity drug trial. Of the 239 participants who responded, only 161 could enrol in that drug trial. Those who could not participate in the drug trial received formal invitations to the LITE study. In all, 87 participants expressed interested in participating in the LITE study and they were invited to a screening visit. All participants provided written informed consent. Five individuals were excluded; 1 was simultaneously participating in another weight loss program, 3 had abnormal laboratory values (thyroid stimulating hormone or creatinine) and 1 had a clinically significant illness with contraindication for weight loss or physical activity. These 5 individuals who were excluded from participating in the LITE study (n=5) were referred to normal health care systems.

In all, 82 individuals (23 males and 59 females) fulfilled the inclusion criteria (i.e., age 18–65 years and body mass index [BMI] over 27 kg/m²). Their BMI ranged from 28 to 52 kg/m², the mean
Weight management and depression

BMI was 35±5 kg/m² (±SD). The mean age was 49±9 years. All participants were natives of the catchment area of Oulu University Hospital. A more detailed description of the study subjects has been published previously (7). They were randomized either to an intensive counselling group (intervention group) or to a short-term counselling group (control group). The subjects were assigned to these groups by simple randomization without blocking, that is, the random sampling numbers were unknown to any of the investigators, study nurses or nutritionists and were contained in a set of sealed envelopes, each bearing only the number on the outside. After the patient was accepted by the physician, the appropriately numbered sealed envelope was opened by the study nurse.

The intervention group (n=35) received intensive counselling, and the control group (n=47) was given short-term counselling. The intensive counselling included 10 individual or group visits every second week that were guided by a clinical nutritionist. The short-term counselling included 2 individual visits (at a 2-week interval) that were guided by nurse. The main focus of the intensive counselling was to help subjects recognize and solve their problems related to diet, eating habits and eating behaviour (mainly stress-related eating). The first 2 visits included individual dietary counselling and were similar to the visits arranged for short-term counselling. The intensive counselling improved weight loss in the short-term (6 months) but there was no difference in the maintained (18 months) weight loss between the counselling groups. A more detailed description of the intervention and the results of the LITE study have been published in the study of Keränen et al. (7).

All LITE participants, regardless of whether allocated to the intervention or control group, were interviewed 3 times by specialists in physical medicine and psychiatry (at 0, 6 and 12 months) during one year (2003–2004). In addition, a specialist in internal medicine examined the participants, and the participants’ weight, height, waist circumference and blood pressure were measured and blood samples were taken at every visit (0, 6, 12 and 18 months). Participants kept food diaries and filled out several questionnaires during those visits.

The main outcome measure of this study was the number of participants who quit the LITE study during the first 6 months. The term “quitters” refers to those participants who left the study before their 6-month follow-up visit. The assessment of depression was based on the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) Axis I Disorders (hereafter SCID-I) conducted by a clinical psychiatrist (S.L.). The interview was conducted 3 times at follow-up visits (at 0 month, 6 months and 12 months). The values of the first interview were used in the statistical analyses since it was hypothesized that pre-existing depression might be associated with discontinuation. The psychiatrist (S.L.) was specially trained in the use of SCID-I, having attended a 24-hours course that included discussion of the theory of personality disorders and hands-on interviewing practice with real patients. The SCID-I course was organized by Oulu University Hospital, Department of Psychiatry. The SCID-I result was recorded as the presence or absence of any of these disorders and as a current episode (past month). In addition, each diagnostic criterion for major depression and dysthymia was analyzed separately: (1) depressed mood most of the day, (2) anhedonia (loss of interest or pleasure), (3) loss/increase in appetite, (4) insomnia or hypersomnia, (5) psychomotor agitation or retardation, (6) fatigue.
or loss of energy, (7) feelings of worthlessness or inappropriate guilt, (8) diminished ability to think or concentrate and (9) recurrent thoughts of death. Among those individuals reporting depressive symptoms, recent bereavement was also questioned. A diagnosis for current major depression was defined to be present if at least 5 symptoms existed. A diagnosis for dysthymia required that the symptoms had lasted for at least 2 years.

In the statistical analyses, we aimed to examine the association of major depression, chronic depression and specific symptoms of depression with quitting a weight loss program before the 6 months follow-up. All the information used in the analysis originated from the 0-month visit (i.e., baseline) and counselling groups combined. Before combining the counselling groups, possible differences between them for anhedonia were assessed by Pearson’s chi-square, but no difference was detected ($p=0.74$). Statistical significance of differences between the study groups (quitters, continuers) in the categorical variables was assessed with the Pearson chi-square test, or Fisher’s exact test. The association between quitting and a diagnosis for major depression and dysthymia as well as individual symptoms of depression was evaluated using odds ratios with 95% confidence intervals from a logistic regression model. The potential correlates for quitting were as follows: age at screening, gender, marital status (single, married/co-habiting, divorced, widowed), employment (employed, unemployed, sick leave or disability, retired, other), work capacity (good, moderate, poor), basic education (primary school, comprehensive school, high school, undergraduate), occupational education (school of further education, college of further education, other occupational education, university, none), regular smoking (no, yes), use of alcohol (none or less than once a week, more than once a week), use of psychoactive drugs (no, yes), physical exercise (regularly, occasionally, rarely, never), diseases of musculoskeletal system (no symptoms, with last month, within last 3 months, over 6 months), BMI ($\text{kg/m}^2$), waist circumference (cm), waist to hip ratio and counselling group (intervention, control).

In the further analyses, the logistic regression model was adjusted for those correlates of the study subjects which, in the preliminary bivariate analyses, had revealed a statistically significant association to quitting. The limit for the statistical significance was set at $p=0.05$. The statistical software used was SPSS for Windows, version 13.

**RESULTS**

Of the 82 participants (23 men, 59 women), a total of 20 (24.4%) (7 men, 13 women) dropped out from the LITE study during the first 6 months. The only statistically significant difference in the correlates between quitters and continuers was seen in physical exercise: 50.0% of the quitters had reported taking physical exercise rarely or not at all compared to 19.0% of continuers ($\chi^2$, $df=2$, $p=0.033$).

Of all quitters, at 0-months, 25% were suffering from depressive mood, anhedonia and tiredness. Those subjects with anhedonia were found to be at the highest risk for quitting, a result which showed a trend towards statistical significance (Table I).

Moreover, when all 9 symptoms of major depression were entered into a stepwise logistic regression model, anhedonia (OR 6.5, 95% CI 1.1–38.2, $p=0.038$) had a statistically significant association with quitting.
DISCUSSION

The main finding of our study was that anhedonia, regardless of whether the participant received a diagnosis of major depression or dysthymia, was significantly associated with quitting the LITE study – a factor which probably contributed to the poorer outcome achieved in the weight loss program (7). The comparison of our findings to earlier reports is not straightforward due to differences in study designs and in definitions for depression, obesity and dropping out. In obesity studies where depressive symptoms have been measured with the Beck Depression Inventory, the prevalence of depression at baseline has been higher among non-completers than completers (5,8). An opposite finding was reported by Inelmen and colleagues (6), who observed that a depressive syndrome assessed with the operational criteria of the DSM-IV was less common in dropouts than completers. In the present study, we also found no associa-

Table 1. Prevalence of depressive symptoms and DSM-IV diagnosis for major depression and chronic depression (dysthymia) among quitters and those who continued the Lifestyle Intervention Treatment Evaluation (LITE).

| Symptoms of depression: | Quitters (n=20) | Continuers (n=62) | Likelihood for quitting a weight management program |
|-------------------------|----------------|------------------|---------------------------------------------------|
| 1. Depressed mood most of the day | 5 (25.0%) | 11 (17.7%) | 1.54, 0.46–5.15, 0.478 |
| 2. Anhedonia (loss of interest or pleasure) | 5 (25.0%) | 6 (9.7%) | 3.11, 0.83–11.61, 0.091 |
| 3. Loss/increase in appetite | 2 (10.0%) | 3 (4.8%) | 2.18, 0.34–14.11, 0.411 |
| 4. Insomnia or hypersomnia | 3 (15.0%) | 10 (16.1%) | 0.92, 0.23–3.73, 0.904 |
| 5. Psychomotor agitation or retardation | 0 (0%) | 7 (11.3%) | not estimated |
| 6. Fatigue or loss of energy | 5 (25.0%) | 10 (16.1%) | 1.73, 0.51–5.86, 0.376 |
| 7. Feelings of worthlessness or inappropriate guilt | 3 (15.0%) | 5 (8.1%) | 2.01, 0.44–9.27, 0.371 |
| 8. Diminished ability to think or concentrate | 2 (10.0%) | 8 (12.9%) | 0.75, 0.15–3.86, 0.731 |
| 9. Recurrent thoughts of death | 1 (5.0%) | 2 (3.2%) | 1.58, 0.14–18.39, 0.715 |
| DSM-IV diagnoses | | | |
| Major depression | 2 (10.0%) | 7 (11.3%) | 1.15, 0.67–4.59, 0.873 |
| Chronic depression (dysthymia) | 4 (6.5%) | 2 (10.0%) | 1.61, 0.27–9.53, 0.599 |

Table 2. The association between dropping out of the Lifestyle Intervention Treatment Evaluation (LITE) and depression.

| Likelihood for quitting the weight management program | 95% CI | p-value |
|-----------------------------------------------------|--------|---------|
| Core symptoms of major depression and chronic depression<sup>a</sup> | | |
| Anhedonia | 6.51 | 1.11–38.18 | 0.038 |
| DSM-IV diagnosis<sup>b</sup> | | |
| Major depression | 1.29 | 0.18–9.14 | 0.802 |
| Chronic depression (dysthymia) | 0.75 | 0.14–4.06 | 0.742 |

<sup>a</sup>A logistic regression model with forward stepwise selection method predicting the quitting the weight management program with 9 symptoms of depression. Table II shows only the statistically significant associations.

<sup>b</sup>A logistic regression model predicting whether an individual will quit with a diagnosis for major depression and dysthymia, separately, after adjusting for a statistically significant covariate (physical exercise).
tion between a diagnosis of major depression or dysthymia and quitting a weight management program. We propose that it is possible that persons with diagnosed depressive syndrome prefer to continue with a weight reduction program since they are pleased to receive this attention and they may even consider it to be some kind of treatment for their depressive symptoms.

Our interesting and not previously published finding was that quitting and anhedonia were associated. However, it is difficult to determine the direction of this association, since we do not know how long these participants had been suffering from anhedonia.

We conclude that persons lacking the ability to feel pleasure may drop out of a weight loss program because they are told that they should change their eating habits and behaviour but the presence of anhedonia makes this more difficult than normal. One could argue that the subjects with anhedonia would have needed more profound counselling than was provided by the LITE study. The counselling could have included elements of psychoeducation or even psychotherapeutic interventions in order to achieve the needed behavioural changes in eating. A motivational interview (9) may be the method of choice for helping patients to resolve their ambivalence and hence change their behaviour. The lack of effective counselling might also have affected their motivation, because, although not directly comparable to our finding, the lack of motivation has been proposed as being the single most important reason for attrition in the treatment of obesity (10,11). In the LITE study, we did not measure the participants’ self-motivation and adherence to lifestyle changes, for example, by using the Self-Motivation Inventory (12), since this would need to first be translated for and then validated in our population.

The strengths of our study were the use of properly administered and evaluated psychiatric assessments by using a valid DSM-IV based diagnostic instrument and the use of multivariable statistical methods to control for potential confounders. Before one can fully interpret our findings, however, it is important to address several limitations. First, most of the study participants were not morbidly overweight, instead they were moderately obese and somatically rather healthy. On the other hand, these types of subjects represent the average population better than clinical patients, which add to the generalizability of our study findings. The second limitation is that the number of subjects who did not complete the regimen was small, possibly leading to an underpowered study (i.e., Type II error). Thus, further studies are needed to confirm our findings. However, the occurrence of discontinuation in this study was about the same as that reported in other similar weight loss programs both individually and in groups.

To the best of our knowledge, this is the first study to report an association between anhedonia and quitting a weight management program. Since discontinuation in weight loss programs is a common problem, more information about preventive factors is needed. Our findings highlight the association of anhedonia (loss of interest or pleasure) and quitting. Anhedonia, as well as the other symptoms of depression, can be assessed before the beginning of the weight loss program, and counselling should be developed further. It seems that those subjects with anhedonia would need a different type of counselling than subjects without this distressing symptom.

In future analyses we would like to evaluate what differentiates “successful” from “unsuc-
successful" participants. In particular, analysing what factors predict their behaviour in a way that is similar to the work of Phelan and colleagues in their recent study (13).

Conflict of interests
The authors declare no conflicts of interest.

REFERENCES

1. Luppino FS, de Wit LM, Bouvy PF, Stijnen T, Cuijpers P, Penninx BW, et al. Overweight, obesity, and depression: a systematic review and meta-analysis of longitudinal studies. Arch Gen Psychiatry 2010;67(3):220–229.
2. Atlantis E, Baker M. Obesity effects on depression: systematic review of epidemiological studies. Int J Obes (Lond). 2008;32(6):881–891.
3. Kivimäki M, Lawlor DA, Singh-Manoux A, Batty GD, Ferrie JE, Shipley MJ, et al. Common mental disorder and obesity: insight from four repeat measures over 19 years: prospective Whitehall II cohort study. BMJ. 2009;339:b3765. doi: 10.1136/bmj.b3765
4. Richman R, Burns CM, Steinbeck K, Caterson L. Factors influencing completion and attrition in a weight control programme. In: Ailhaud G, Guy-Grand B, Lafontan M, Ricquier D, editors. Obesity in Europe 91. John Libbey: London, 1992. p. 167–171.
5. Clark MM, Niaura R, King TK, Pera V. Depression, smoking, activity level, and health status: pretreatment predictors of attrition in obesity treatment. Addict Behav 1996;21(4):509–513.
6. Inelmen EM, Toffanello ED, Enzi G, Gasparini G, Miotto F, Sergi G, et al. Predictors of drop-out in overweight and obese outpatients. Int J Obes (Lond.) 2005;29(1):122–128.
7. Kirseen AM, Savolainen MJ, Reponen AK, Kujari ML, Lindeman SM, Bloigu RS, et al. The effect of eating behavior on weight loss and maintenance during a lifestyle intervention. Prev Med 2009;49(1):32–38.
8. Teixeira PJ, Going SB, Houtkooper LB, Cussler EC, Metcalfe LL, Blew RM, et al. Exercise motivation, eating, and body image variables as predictors of weight control. Med Sci Sports Exerc 2006;38(1):179–188.
9. Rollnick S, Miller WR. What is motivational interviewing? Behav Cogn Psychother 1995;23:325–334.
10. Butler P, Mellor D. Role of personal factors in women's self-reported weight management behaviour. Public Health 2006;120(5):383–392.
11. Grossi E, Dalle Grave R, Mannucci E, Molinari E, Compare A, Cuzzolaro M, et al. Complexity of attrition in the treatment of obesity: clues from a structured telephone interview. Int J Obesity 2006;30(7):1132–1137.
12. Dishman RK, Ickes W. Self-motivation and adherence to therapeutic exercise. J Behav Med 1981;4(4):421–438.
13. Phelan S, Lang W, Jordan D, Wing RR. Use of artificial sweeteners and fat-modified foods in weight loss maintainers and always-normal weight individuals. Int J Obes (Lond.) 2009;33(10):1183–1190. doi:10.1038/ijo.2009.147.

Adjunct Prof Sari Lindeman
Institute of Clinical Medicine, Psychiatry
P.O. Box 26, FI-90029 OYS
FINLAND
Email: sari.lindeman@oulu.fi