Obesity Research & Clinical Practice (2015) 9, 301—304

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RESEARCH LETTER

Improvement in binge eating in non-diabetic obese individuals after 3 months of treatment with liraglutide — A pilot study☆

KEYWORDS
Binge eating;
Obesity;
Glucagon-like peptide-1;
Liraglutide;
Ghrelin

Summary We examined the effects of liraglutide, a glucagon-like peptide-1 analogue on appetite and plasma ghrelin in non-diabetic obese participants with subclinical binge eating (BE). Forty-four obese BE participants (mean age: 34 ± 9 years, BMI: 35.9 ± 4.2 kg/m^2) were randomly assigned to intervention or control groups for 12 weeks. All participants received standard advice for diet and exercise. Binge eating score, ghrelin levels and other anthropometric variables were evaluated at baseline and at the end of the study. Participants who received liraglutide showed significant improvement in binge eating, accompanied by reduction in body weight, BMI, waist circumference, systolic blood pressure, fasting glucose and total cholesterol. Ghrelin levels were significantly increased which may potentially diminish the weight loss effects of liraglutide beyond the intervention.

Introduction

Binge eating has gained much attention because of its importance in influencing weight gain. Effective therapy to reduce binge eating is scarce. A binge episode is characterised by out-of-control eating of large amount of food in a short time period [1]. About 7.5—30% of obese individuals seeking treatment have binge eating disorder (BED) or subclinical binge eating disorder (BE) [2].

Glucagon-like peptide-1 (GLP-1) secreted within the terminal ileum influences appetite by its dual mechanisms of inhibiting appetite centres in the brain and delaying gastric emptying [3]. We postulate that these satiating effects of GLP-1 may potentially reduce binge eating. Liraglutide is an analogue of GLP-1, with 97% similarity in structure [4].

Ghrelin is an appetite-stimulating hormone secreted within the gastric mucosa. Human studies demonstrated increased in hunger and food consumption following the administration of ghrelin in comparison to placebo [5]. In this study, we examined the efficacy of liraglutide on appetite and plasma ghrelin in non-diabetic obese participants with BE. To the best of our knowledge, there are no previous similar studies.

Method

This was a randomised, prospective, controlled trial conducted at a tertiary medical institution. The validated questionnaire, Binge Eating Scale (BES) was

☆ Clinical trial registration: NCT01739049.

http://dx.doi.org/10.1016/j.orcp.2015.03.005

Table 1 BES and other parameters at baseline and after 12 weeks intervention in the two study groups.

	Liraglutide ($n=21$)			Control ($n=21$)		
	Baseline	After 12 weeks	p^*	Baseline	After 12 weeks	p^*
BES	20 (18–27)	11 (7–16)	<0.001*	22 (20–28)	18 (12–22)	<0.001*
Body weight (kg)	94.54 ± 18.14	90.14 ± 19.70	<0.001	92.33 ± 14.68	91.57 ± 16.32	0.343
BMI (kg/m^2)	36.15 ± 3.84	34.40 ± 4.77	<0.001*	35.74 ± 4.55	35.46 ± 5.38	0.329
Waist circumference (cm)	103.91 ± 13.65	100.20 ± 14.02	0.004*	102.29 ± 10.68	102.04 ± 11.27	0.776
Hip circumference (cm)	120.36 ± 8.70	118.01 ± 11.31	0.055	118.96 ± 7.43	119.39 ± 11.20	0.794
Waist to hip ratio	0.86 ± 0.08	0.85 ± 0.06	0.260	0.86 ± 0.07	0.86 ± 0.06	0.699
Systolic BP (mmHg)	130 ± 15	123 ± 17	0.042*	133 ± 17	135 ± 12	0.567
Diastolic BP (mmHg)	76 ± 11	73 ± 10	0.091	78 ± 10	79 ± 12	0.814
Fasting glucose (mmol/L)	5.06 ± 0.52	4.83 ± 0.48	0.027*	5.18 ± 0.43	5.15 ± 0.46	0.796
Total cholesterol (mmol/L)	5.18 ± 0.86	4.93 ± 1.08	0.044*	5.22 ± 0.81	5.37 ± 1.07	0.867
TG (mmol/L)	1.37 ± 0.51	1.42 ± 0.65	0.768	1.30 ± 0.60	1.07 ± 0.37	0.162
LDL (mmol/L)	3.34 ± 0.83	3.21 ± 0.94	0.065	3.40 ± 0.71	3.54 ± 1.01	0.890
HDL (mmol/L)	1.25 ± 0.27	1.23 ± 0.63	0.895	1.28 ± 0.33	1.33 ± 0.32	0.558

* p value of ≤0.05 is considered statistically significant.

used to identify binge eaters [6,7]. BES has been proven to be useful to identify binge eaters and to monitor treatment effectiveness [6]. Based on BES scores, individuals scoring below 18 would be categorised as non-binge.

Forty-four obese binge eaters were randomly assigned to intervention (liraglutide 1.8 mg, diet and exercise) or control (diet and exercise) groups for 12 weeks. Participants were assessed at weeks 1, 6 and 12. BES, ghrelin levels and other anthropometric variables were obtained at baseline and at the end of the study. Participants were excluded if they had a history of taking medications that may affect weight and appetite, contraindications to liraglutide, and any chronic illnesses such as diabetes mellitus, impaired glucose tolerance, and cardiovascular diseases. The study was approved by our institutional review board and conducted in accordance with the Declaration of Helsinki using good clinical practice. Written consent was obtained from all participants.

Data were analysed using SPSS version-19. Independent *T*-test was used to compare between two groups and paired *t*-test within a group. Two-hour area under the curve (AUC) was calculated using trapezoidal method. Repeated measures ANOVA were used to analyse the changes in ghrelin concentration over time between the two groups. Two-tailed $p < .05$ was required for statistical significance.

Results and discussion

Both groups were comparable at baseline. Participants who received liraglutide had significant reductions in BES [20 (IQR 18–27) to 11 (IQR 7–16), $p < 0.001$]), body weight (94.54 ± 18.14 kg to 90.14 ± 19.70 kg, $p < 0.001$), BMI (36.15 ± 3.84 kg/m^2 to 34.40 ± 4.77 kg/m^2, $p < 0.001$), waist circumference (103.9 ± 13.7 cm to 100.2 ± 14.0 cm, $p = 0.004$), systolic blood pressure (130 ± 15 mmHg to 123 ± 17 mmHg, $p = 0.042$), fasting glucose (5.06 ± 0.52 mmol/L to 4.83 ± 0.48 mmol/L, $p = 0.027$) and total cholesterol (5.18 ± 0.86 mmol/L to 4.93 ± 1.08 mmol/L, $p = 0.044$) (see Table 1). 81% ($n = 17/21$) of those receiving liraglutide improved from binge eating to non-binge eating category. There have been