

Plasma glucagon-like peptide 1 and body fat mass among young and healthy adults

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Purpose

Glucagon-like peptide 1 (GLP-1) receptor agonists have been shown to reduce bodyweight in overweight and/or diabetic individuals. We aimed to evaluate the relationship between intrinsic GLP-1 levels and body fat mass in young and healthy adults.

Methods

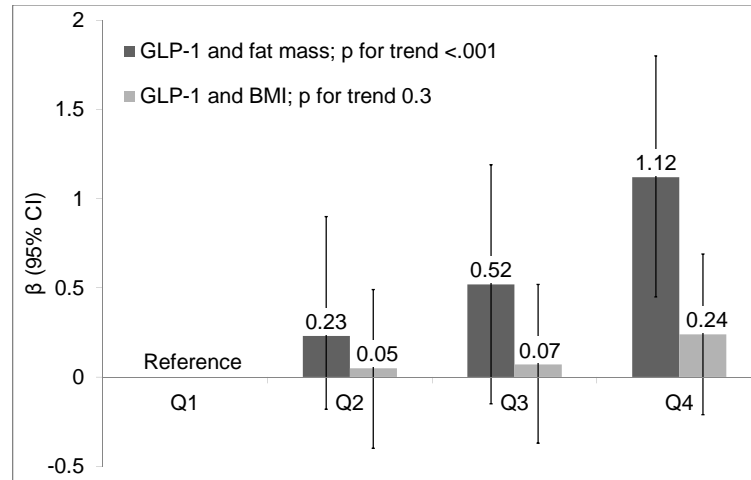
Our population-based study in the Principality of Liechtenstein included healthy individuals aged 25 to 41 years. In the current analysis, we included 1520 individuals who had GLP-1 levels and body fat mass data available. Exclusion criteria were prevalent cardiovascular disease, diabetes or a body mass index (BMI) >35 kg/m². GLP-1 was determined with a research-use-only single molecule counting technology assay. Body fat mass was obtained by bioelectrical impedance analysis. Multivariable linear regression analyses were used to model the relationships of GLP-1 with body fat mass and BMI.

Table 1. Baseline characteristics across GLP-1 quartiles

	Q 1 n = 380	Q 2 n = 380	Q 3 n = 380	Q 4 n = 380	p-value
GLP-1 range, pg/ml	< 24.21	24.21-32.08	32.08-43.49	> 43.49	
Bio fat mass	25.0 (19.8; 29.1)	24.0 (19.6; 29.4)	25.4 (20.4; 29.3)	25.5 (20.4; 31.0)	0.12
BMI, kg/m ²	23.6 (21.5; 26.5)	24.3 (22.1; 26.8)	24.4 (22.0; 27.4)	24.5 (22.4; 27.6)	0.002
Age, years	38.4 (33.0; 40.9)	38.9 (33.7; 40.9)	37.3 (32.5; 40.6)	37.5 (31.9; 40.6)	0.006
Female sex	222 (58)	194 (51)	198 (52)	187 (49)	0.06
Current smokers	56 (15)	81 (21)	81 (21)	96 (25)	0.004
HbA1c	5.4 (5.3; 5.7)	5.5 (5.2; 5.7)	5.5 (5.2; 5.7)	5.5 (5.3; 5.7)	0.71
24h systolic BP, mmHg	120 (113;128)	122 (115;130)	123 (115;132)	124 (117;133)	<0.0001
HDL-C	1.53 (1.30; 1.84)	1.50 (1.24; 1.76)	1.50 (1.22; 1.76)	1.45 (1.17; 1.74)	0.004
LDL-C	2.76 (2.28; 3.35)	3.03 (2.49; 3.61)	2.94 (2.42; 3.54)	2.98 (2.43; 3.65)	0.0003

GLP-1 = glucagon-like peptide 1; BMI = body mass index; LDL-C = low density lipoprotein cholesterol; HDL-C = high density lipoprotein cholesterol; HbA1c = hemoglobin A1c; BP = blood pressure

Figure 1. Relationships of GLP-1 quartiles with fat mass or BMI



Data are beta coefficients adjusted for sex, age, smoking status, education level, systolic BP, eGFR (CKD-EPI-formula), LDL-C, HDL-C, HbA1c, high sensitivity CRP, physical activity, alcohol consumption and fruit/vegetable consumption

Results

Baseline characteristics stratified by GLP-1 quartiles are shown in Table 1. Median age of our population was 38 years, median BMI 24.18 kg/m², median body fat 25.11%. A strong positive correlation could be observed between GLP-1 levels and fat mass in simple adjusted as well as fully adjusted models including BMI as a covariate (Table 2). The relationship between GLP-1 levels and BMI was only significant in the simple adjusted model. There was a significant increase of body fat mass but not BMI across quartiles of GLP-1 (Figure 1).

Table 2. GLP-1 and body fat mass or BMI (multivariable linear regression analysis)

Glucagon-like peptide 1 with body fat mass			
	β	(95% CI)	p-value
Sex, age adjusted	1.42	0.86; 1.99	<.0001
Multivariable model 1	0.94	0.40; 1.47	0.0006
Multivariable model 2	0.67	0.25; 1.08	0.0016
Glucagon-like peptide 1 with BMI			
	β	(95% CI)	p-value
Sex, age adjusted	0.81	0.41; 1.20	<.0001
Multivariable model 1	0.28	-0.07; 0.64	0.12
Multivariable model 2	-0.11	-0.39; 0.16	0.42

Model 1 is adjusted for sex, age, smoking, education, systolic BP, eGFR, LDL-C, HDL-C, HbA1c, hs-CRP, physical activity, alcohol consumption and fruit/vegetable consumption

Model 2 is additionally adjusted for BMI or fat mass as appropriate

Conclusion

Plasma levels of GLP-1 show a strong and independent linear relationship with body fat mass but not BMI among young and healthy adults. These results support the hypothesis that GLP-1 impacts body fat mass regulation.