

# Serum leptin, adiponectin and ghrelin concentrations in post-menopausal women: is there an association with bone mineral density?

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## Background

Adipokines and ghrelin exert well-documented effects on energy expenditure and glucose metabolism. Experimental data also support a role in bone metabolism, although data from clinical studies are conflicting.

## Aims

The purpose of this cross-sectional study was to investigate the association of serum concentrations of leptin, adiponectin and ghrelin with bone mineral density (BMD) in post-menopausal women.

## Materials and Methods

BMD in lumbar spine and femoral neck, and circulating leptin, adiponectin and ghrelin concentrations were measured in 110 healthy post-menopausal women. Patients with secondary causes of osteoporosis were excluded.

## Results

- Osteoporosis was diagnosed in 30 (27%) women and osteopenia in 54 (49%).
- **Leptin**: positive correlation with lumbar spine ( $r = 0.343$ ,  $p < 0.01$ ) and femoral neck BMD ( $r = 0.370$ ,  $p < 0.01$ ).
- **Adiponectin**: negative correlation with lumbar spine ( $r = -0.321$ ,  $p < 0.01$ ) and femoral neck BMD ( $r = -0.448$ ,  $p < 0.01$ ).
- **Ghrelin**: no significant correlation with BMD.
- Women with osteoporosis had lower body weight, body mass index (BMI) and leptin concentrations, but higher adiponectin concentrations compared with women without osteoporosis.
- In multivariate stepwise regression analysis, the association of adiponectin concentrations with BMD remained significant only for femoral neck, after body weight and BMI adjustments.

## References

Mpalaris V, et al. *Obes Rev* 2015;16:225-33, Richards JB, et al. *J Clin Endocrinol Metab* 2007;92:1517-23, Biver E, et al. *J Clin Endocrinol Metab* 2011;96:2703-2713

**Table 1.** Patients' characteristics.

Parameter	Mean $\pm$ SD / Median (IQR)	Range
Age (years)	60 (55 - 68)	46 - 80
Age at menopause onset (years)	49 (46 - 52)	40 - 59
Years since menopause	10 (6 - 21)	1 - 35
Height (m)	1.58 $\pm$ 0.06	1.43 - 1.74
Weight (kg)	74.8 $\pm$ 13.7	43.9 - 110.5
BMI (kg/m <sup>2</sup> )	29.8 $\pm$ 4.9	17.6 - 42.4
Waist circumference (cm)	94.5 (83.5 - 102.0)	67 - 118
Hip circumference (cm)	111.0 (100.0 - 119.0)	90 - 138
Waist to hip ratio	0.84 $\pm$ 0.05	0.70 - 0.95
Leptin (ng/ml)	26.4 (18.5 - 35.1)	3.9 - 74.7
Adiponectin ( $\mu$ g/ml)	10.2 (6.8 - 15.2)	1.2 - 29.3
Ghrelin (pg/ml)	335.0 (200.9 - 396.5)	126.6 - 920.7
Insulin ( $\mu$ IU/ml)	10.3 $\pm$ 4.8	1.2 - 25.4
Estradiol (pg/ml)	38.8 $\pm$ 13.1	12.5 - 77.1
LS BMD (g/cm <sup>2</sup> )	0.944 $\pm$ 0.164	0.565 - 1.418
FN BMD (g/cm <sup>2</sup> )	0.763 $\pm$ 0.096	0.506 - 0.939

**Table 2.** Associations between BMD and studied parameters.

Parameter	LS BMD (g/cm <sup>2</sup> )	FN BMD (g/cm <sup>2</sup> )
BMI	0.481 <sup>b</sup>	0.563 <sup>b</sup>
Body weight	0.485 <sup>b</sup>	0.566 <sup>b</sup>
Waist circumference	0.497 <sup>b</sup>	0.563 <sup>b</sup>
Hip circumference	0.460 <sup>b</sup>	0.533 <sup>b</sup>
WHR	0.238 <sup>a</sup>	0.314 <sup>b</sup>
Leptin	0.343 <sup>b</sup>	0.370 <sup>b</sup>
Adiponectin	-0.321 <sup>b</sup>	-0.448 <sup>b</sup>
Insulin	0.192 <sup>a</sup>	0.357 <sup>b</sup>
Ghrelin	NS	NS
Estradiol	NS	NS

## Conclusions

An inverse association between adiponectin and femoral neck BMD was found in post-menopausal women, independently of body weight. The positive association between leptin and BMD was dependent on body weight, whereas no effect of ghrelin on BMD was evident.