



Embargoed until 00.01 BST Friday 21 October 2011

New research links metabolic hormone to depression

A new study has for the first time in humans linked levels of leptin, a hormone produced by fat cells, with symptoms of depression and anxiety independent of weight. The study, published in the journal *Clinical Endocrinology* and led by Dr Elizabeth Lawson from Harvard Medical School and Massachusetts General Hospital, USA, suggests that leptin levels may be related to depressive and anxiety symptoms in women regardless of weight or body fat.

Lawson and her team studied 64 women in four groups: 15 with anorexia nervosa, 20 normal weight and healthy, 17 overweight or obese, and 12 normal weight with hypothalamic amenorrhoea (women with this condition do not menstruate and have low leptin levels, but unlike anorexic women their fat levels do not differ from healthy controls). They measured fasting blood leptin levels, weight, and total body fat, and administered tests for depression and anxiety symptoms, and levels of experienced stress (HAM-D, HAM-A and Perceived Stress Scale respectively; higher scores signify increased symptoms).

Women with lower symptoms of depression and anxiety exhibited higher leptin levels and *vice-versa*. HAM-D and HAM-A scores across the groups were negatively correlated with leptin levels (HAM-D: $r = -0.43$, $P = 0.0004$; HAM-A: $r = -0.34$, $P = 0.006$). This remained significant after controlling for both fat mass and body weight. Perceived Stress Scale scores were also negatively correlated with leptin levels ($r = -0.35$, $P = 0.007$), although this did not remain significant after controlling for fat mass or body weight. Women in all groups who scored above eight (a standard cutoff signifying depression) on the HAM-D score exhibited lower leptin levels than those scoring below the cutoff. This also remained significant after controlling for fat mass and body weight.

These findings show for the first time in humans that levels of the hormone leptin (known to be one of the group of hormones involved in appetite regulation) and symptoms of depression and anxiety are negatively correlated, independently of fat mass or body weight. This independence strengthens the link because it controls for confounding relationships between fat mass and leptin. Further studies with larger sample sizes are now needed to determine exactly how leptin and depressive and anxiety symptoms interact.

Lead researcher Dr Elizabeth Lawson from Massachusetts General Hospital and Harvard Medical School, USA said:

“To find that leptin levels and symptoms of depression and anxiety are linked in humans, independent of body fat, is very interesting, as animal studies suggest that leptin has anti-depressant and anti-anxiety properties.”

“Our findings place leptin on a growing list of hormones that are correlated with psychiatric symptoms. Whether leptin influences depression or vice versa, and whether the relationship is direct or mediated by a third as yet unknown factor needs to be investigated.

“Further studies administering leptin to patients will be important in determining whether this hormone has a potential role in the treatment of depression and/or anxiety.”

-----Ends-----

Notes for editors:

This paper is published online in *Clinical Endocrinology* ([doi: 10.1111/j.1365-2265.2011.04182.x](https://doi.org/10.1111/j.1365-2265.2011.04182.x)). *Clinical Endocrinology* is the official clinical journal of the Society for Endocrinology. Visit *Clinical Endocrinology* online [here](#).

The Society for Endocrinology is UK's largest national organisation promoting endocrinology and hormone awareness. For general information, please visit our website: www.endocrinology.org

Please mention *Clinical Endocrinology* in any story

For more information: please contact the Society for Endocrinology press office

Toby Stead

Public and Media Relations Assistant

Tel: 01454 642 252

Email: toby.stead@endocrinology.org

Jennie Evans

Public and Media Relations Officer

Tel: 01454 642 230

Email: jennie.evans@endocrinology.org

For information on hormones and endocrine conditions, please visit You & Your Hormones (www.yourhormones.info), the Society for Endocrinology's public information website.

ABSTRACT

Title: Leptin levels are associated with decreased depressive symptoms in women across the weight spectrum, independent of body fat

Authors: Elizabeth A. Lawson*, Karen K. Miller*, Justine I. Blum*, Erinne Meenaghan*, Madhusmita Misra*, Kamryn T. Eddy†, David B. Herzog† and Anne Klibanski*

*Affiliations: *Neuroendocrine Unit and †Department of Psychiatry Massachusetts General Hospital and Harvard Medical School, Boston, MA, USA*

Objective Leptin is anorexigenic, and levels are markedly decreased in women with low body weight and high in women with obesity. Ghrelin opposes leptin effects on appetite and is negatively associated with body mass index. These appetite-regulating hormones may have opposing effects on mood and stress pathways. Women with anorexia nervosa (AN), hypothalamic amenorrhoea (HA) and obesity are at increased risk of depression and anxiety. It is unknown whether dysregulation of leptin or ghrelin contributes to the development of depression and/or anxiety in these disorders. We investigated the relationship between leptin and ghrelin levels and symptoms of depression, anxiety and perceived stress in women across the weight spectrum.

Design Cross-sectional. Patients 64 women: 15 with AN, 12 normal-weight with HA, 17 overweight or obese (OB) and 20 normal-weight in good health (HC).

Measurements Fasting serum leptin and plasma ghrelin levels were measured. Hamilton Rating Scales for Depression (HAM-D) and Anxiety (HAM-A) and the Perceived Stress Scale were administered.

Results Leptin levels were inversely associated with HAM-D, HAM-A and Perceived Stress scores. The negative relationships between leptin and severity of symptoms of both depression and anxiety remained significant after controlling for body fat or weight. There was no relationship between ghrelin and

symptoms of depression or anxiety. Although ghrelin levels were positively associated with the degree of perceived stress, this relationship was not significant after controlling for body fat or weight.

Conclusions Leptin may mediate depressive symptoms across the weight spectrum. Further investigation of the role of leptin in modulating mood will be important.