

## **New research shows limiting carbs to dinner-time increases satiety, reduces risk for diabetes, cardiovascular disease**

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(Medical Xpress)—An experimental diet with carbohydrates eaten mostly at dinner could benefit people suffering from severe and morbid obesity, according to new research at the Hebrew University of Jerusalem.

The diet influences secretion patterns of hormones responsible for hunger and satiety, as well as hormones associated with metabolic syndrome. In this way the diet can help dieters persist over the long run, and reduce risk factors for diabetes and cardiovascular disease.

The research was carried out by research student Sigal Sofer under the auspices of Prof. (Emeritus) Zecharia Madar, at the Institute of Biochemistry, Food Science and Nutrition at the Hebrew University's Robert H. Smith Faculty of Agriculture, Food and Environment. (Prof. Madar is now Chief Scientist at Israel's Ministry of Education.)

Sofer randomly assigned 78 police officers to either the experimental diet (carbohydrates at dinner) or a control weight loss diet (carbohydrates throughout the day). 63 subjects finished the six-month program.

The researchers examined the experimental diet's effect on the secretion of three hormones: leptin, considered to be the satiety hormone, whose level in the blood is usually low during the day and high during the night;

ghrelin, considered the hunger hormone, whose level in the blood is usually high during the day and low during the night; and adiponectin, considered the link between obesity, insulin resistance and the metabolic syndrome, whose curve is low and flat in obese people.

"The idea came about from studies on Muslims during Ramadan, when they fast during the day and eat high-carbohydrate meals in the evening, that showed the secretion curve of leptin was changed," explained Prof. Madar.

The researchers found that the innovative dietary manipulation led to changes in daylight hormonal profiles in favor of the dieters: the satiety [hormone leptin](#)'s secretion curve became convex during daylight hours with a nadir in the late day; the hunger hormone ghrelin's secretion curve became concave, peaking only in the evening hours; and the curve of adiponectin, considered the link between obesity, [insulin resistance](#) and the [metabolic syndrome](#), was elevated. At the same time this dietary pattern led to lower hunger scores, and better anthropometric (weight, abdominal circumference and body fat), biochemical (blood sugar, blood lipids) and inflammatory outcomes compared to the control group.

The findings suggest there is an advantage in concentrating carbohydrate intake in the evening, especially for people at risk of developing diabetes or cardiovascular disease due to obesity. "The findings lay the basis for a more appropriate dietary alternative for those people who have difficulty persisting in diets over time," said Prof. Madar. "The next step is to understand the mechanisms that led to the results obtained."

The study was published in two continuous papers: "[Greater weight loss and hormonal changes after 6 months diet with carbohydrates eaten mostly at dinner](#)" (published in *Obesity*) and "[Changes in daily leptin, ghrelin and adiponectin profiles following a diet with carbohydrates eaten at dinner in obese subjects](#)" (published in *Nutrition, Metabolism &*

*Cardiovascular Diseases*).

Provided by Hebrew University of Jerusalem

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