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Orange juice may protect against bad effects of high fat meals

By Stephen Daniells, 31-Mar-2010

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Flavonoids from orange juice may neutralise the detrimental effects of consuming a high-fat, high-carbohydrate meal, says a new study from the US.

The compounds were found to exert antioxidant activity and reduce the increase in inflammatory markers produced after consuming a fast-food-type meal, researchers from the University at Buffalo report in the *American Journal of Clinical Nutrition*.

Researchers led by Professor Paresh Dandona linked the apparent benefits of the orange juice to the high content of the flavonoids naringenin and hesperidin.

"Our data show, for the first time to our knowledge, that drinking orange juice with a meal high in fat and carbohydrates prevented the marked increases in reactive oxygen species and other inflammatory agents," said the first author of the study, Husam Ghanim, PhD.

"This did not happen when participants drank water or a sugary drink with the meal," he added. *"These issues of inflammation following a meal are important because the resultant high glucose and high triglycerides are known to be related to the development of cardiovascular events."*

Previous studies have reported that naringenin may prevent cholesterol increases, and changes in insulin sensitivity and glucose metabolism linked to metabolic syndrome (*Diabetes*, 2009, Vol. 58, pp. 2198-2210). Other studies focussing on hesperidin have also reported potential cardiovascular and neurological benefits.

Study details

The Buffalo-based researchers recruited 30 healthy men and women with a normal body weight and aged between 20 and 40 to participate in their study. The participants were randomly assigned to one of three groups, all of whom consumed a high-fat, high-calorie breakfast (900 kcal) following an overnight fast. One group consumed water, the second group consumed "not-from-concentrate" orange juice, while the third group received a glucose drink.

Analysis of blood samples showed that the level of oxygen free radicals increased in all groups, but the increase was significantly less when orange juice was consumed with the meal. Specifically, levels increased by 62 and 63 per cent following consumption of water and the glucose drink, respectively, and by 47 per cent following co-consumption of the orange juice.

In addition, the researchers reported an increase in blood components known as toll-like receptors (TLRs) following consumption of the water and glucose drink, but not the orange juice. TLRs reportedly play an important role in the development of inflammation, atherosclerosis, obesity, insulin resistance, and injury to cardiac cells than can occur after a blocked vessel is reopened.

"These data emphasize that a high-fat, high-carbohydrate meal is profoundly and rapidly proinflammatory, and that this process occurs at the cellular and molecular level," said Prof Dandona.

"In addition, specific proinflammatory genes are activated after the intake of glucose and a high-fat, high-carbohydrate meal, and these changes are observed in mononuclear cells that participate in vascular inflammation and insulin resistance," he added.

Dietary change, not orange juice and burgers

The researchers were quick to emphasise that regular consumption of such high-fat meals may produce permanent inflammation, and that consuming orange juice with a high-fat meal was not a 'get out of jail free' card for heart health .

"The choice of safe foods that are not proinflammatory may provide protection from the unending cycle of postprandial and cumulative inflammation," said Dandona. *"This choice may lower the risk of atherosclerosis and resistance to insulin."*

The research was funded by grants from the Florida Department of Citrus, the National Institutes of Health and the American Diabetes Association.

The topic of flavonoids in human health will be discussed at the upcoming **NutraIngredients Antioxidants 2010 Conference** in Brussels next month. Dr Peter Hollman from RIKILT - Institute of Food Safety and Wageningen University in The Netherlands will discuss *"The latest advances in flavonoids"*. For more information and to register, please click here .

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"Orange juice neutralizes the proinflammatory effect of a high-fat, high-carbohydrate meal and prevents endotoxin increase and Toll-like receptor expression"
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