

Inflammation, Body Fat, Weight Gain and Blood Cholesterol - All Lower In Rats Fed Cherries

Tart cherries - frequently sold dried, frozen or in juice - may have more than just good taste and bright red color going for them, according to new animal research from the University of Michigan Cardiovascular Center.

Rats that received whole tart cherry powder mixed into a high-fat diet didn't gain as much weight or build up as much body fat as rats that didn't receive cherries. And their blood showed much lower levels of molecules that indicate the kind of inflammation that has been linked to heart disease and diabetes. In addition, they had significantly lower blood levels of cholesterol and triglycerides than the other rats.

The results, which were seen in both lean and obese rats that were bred to have a predisposition to obesity and insulin resistance, were presented Sunday at the Experimental Biology 2008 meeting in San Diego, CA by a team from the U-M Cardioprotection Research Laboratory.

In addition, the obese rats that received cherry powder were less likely to build up fat in their bellies - another factor linked to cardiovascular disease. All the measures on which the two groups of animals differed are linked to cardiovascular disease and Type 2 diabetes.

The new findings build on results that were reported last year at the same meeting by the U-M team. Those data came from experiments involving lean rats that were prone to high blood pressure, high cholesterol and impaired glucose tolerance, but that received a low-fat diet with or without cherries. In that case, cherry-fed rats had lower total cholesterol, lower blood sugar, less fat storage in the liver and lower oxidative stress. However, it was unknown if these benefits would be observed in obesity-prone animals, or in animals fed a higher fat, western-style diet containing elevated saturated fat and cholesterol.

While it's still far too early to know whether tart cherries will have the same effect in humans, U-M researchers are preparing to launch a pilot-phase clinical trial later this spring. They note that if a human wanted to eat as many tart cherries as the rats in the new study did, they would have to consume 1.5 cups every day.

"These new findings are very encouraging, especially in light of what is becoming known about the interplay between inflammation, blood lipids, obesity and body composition in cardiovascular disease and diabetes," says Steven Bolling, M.D., a U-M cardiac surgeon and the laboratory's director. "The fact that these factors decreased despite the rats' predisposition to obesity, and despite their high-fat 'American-style' diet, is especially interesting."

The results were presented by E. Mitchell Seymour, M.S., a U-M research associate and the senior scientist on the project. "It was recently shown in humans that regular intake of darkly pigmented fruits like cherries is associated with reduced mortality from cardiovascular disease and coronary heart disease," says Seymour. "The heart-health benefits of these colorful fruits were sustained even when corrected for age and other health conditions. We're now invested in exploring the specific mechanisms of these benefits."

The experiments are funded by an unrestricted grant from the Cherry Marketing Institute, a trade association for the cherry industry. CMI has no influence on the design, conduct or analysis of any U-M research it funds.

The correlation between cherry intake and significant changes in cardiovascular risk factors suggests - but does not directly demonstrate - a positive effect from the high concentrations of antioxidant compounds called anthocyanins that are found in tart cherries. The anthocyanins are responsible for the color of these and of other darkly pigmented fruits.

The potential for protective effects from antioxidant-rich foods and food extracts is a promising area of research, says Bolling, who is the Gayle Halperin Kahn Professor of Integrative Medicine at U-M.

The team performed the study using 48 obesity-prone rats, half of which were obese, and a diet in which 45 percent of calories came from fat and 35 percent came from carbohydrates. All the rats were six weeks old when study began. For the next 90 days they were fed either a cherry-enriched diet in which cherries made up 1 percent by weight, or a diet that contained an equivalent number of carbohydrates and calories.

At the end of the study, the rats had blood tests for glucose, cholesterol and triglyceride levels, received DEXA scans to measure their body fat and to see where the fat had collected, and had tests for two plasma inflammation markers: TNF-alpha and interleukin-6.

These two molecules are related to the level of vascular inflammation, or immune-system reaction to blood-vessel walls, that is often seen in people and animals with cardiovascular disease. While inflammation is a normal process the body uses to fight off infection or injury, according to recent science, a chronic state of inflammation may increase the risk for a number of diseases.

The cherries were Montmorency tart cherries grown in Michigan, which is the nation's largest producer of tart cherries. They are different from the sweet Bing cherries that are often eaten fresh. Tart cherries have higher concentrations of antioxidant anthocyanins than sweet cherries.

By the end of the study, the rats that received the cherries had lower body weight, fat mass, total cholesterol, triglyceride, TNF-alpha and IL-6 than the rats that did not receive cherries. In all, TNF-alpha was reduced by 50 percent in the lean rats and 40 percent in the obese rats and IL-6 was lowered by 31 percent in the obese rats and 38 percent in the lean rats.

The obese rats that received cherries also had lower-weight retroperitoneal fat, a type of belly fat that has been associated with especially high cardiovascular risk and inflammation in humans.

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