



The Effects of Mango on Glucose and Lipid Parameters in High Fat Diet-Induced Obesity

The Big Picture:

Obesity is a growing concern worldwide that can lead to a variety of health problems. Cardiovascular disease, a group of negative conditions affecting the heart and circulatory system, is the number one killer of men and women in the U.S., and the development of type 2 (adult onset) diabetes is also a growing concern. Because eating a high-fat diet can increase one's chance of developing cardiovascular disease and diabetes, incorporating more fruits and vegetables into the diet has long been recommended by the medical community.

Mangos have been studied previously for their antibacterial, antiviral and anticancer properties, but little had been done to ascertain the effect of mangos on cardiovascular health. To help determine how mangos may affect the body's metabolism, the National Mango Board commissioned a research study to see what affect the fruit would have on blood glucose and lipids in mice fed a high-fat diet.

Glucose (sugars) and lipids (fats) provide the body with energy, but inappropriate levels of glucose and lipids can lead to conditions like obesity, high cholesterol, insulin resistance and plaque build-up in the arteries. People with cardiovascular disease (or the precursory signs of this disease) and diabetes can use prescription drugs to address their symptoms, but drugs can have undesirable side effects.

In a research study led by Dr. Edralin Lucas of Oklahoma State University, Stillwater, Okla., the flesh from whole Tommy Atkins mangos were studied with the hope that mangos may some day be offered as a novel nutritional strategy to help regulate blood sugar and fat associated with diet-induced obesity.

Overall Findings:

- 1. Mango is effective in reducing body fat accumulation in mice fed a high-fat diet.**

In this study, very little difference in body weight was seen among mice given six different types of diets, but the amount of body fat was notable. Mice on a high-fat diet that ate mango had a percentage of body fat similar to mice eating a normal diet. To our knowledge, this is the first study demonstrating the effectiveness of mango in reducing body fat in mice fed a high-fat diet.

 - Specifically, the hormone *leptin* was positively affected by mango. Leptin is a hormone produced in our fat cells and is an indicator of body fat content. Mice that ate mango as a part of their high-fat diet had a lower concentration of leptin, which indicates that their body fat levels were lower than in mice that did not eat mango.
 - Mango also seems to have an affect on the hormone *adiponectin*, which is also produced by our fat cells. Adiponectin increases the breakdown of fats and also maintains blood glucose concentrations. Researchers

found higher concentrations of adiponectin in mice that ate mangos, again indicating a reduction in body fat.

- Mango was shown to be as effective as the glucose-lowering drug rosiglitazone and lipid-lowering drug fenofibrate in reducing fat mass in this animal model.

2. **Overall, researchers determined that adding 1% mango to the diets of mice on a high-fat diet was effective in lowering blood glucose levels.** After two months on treatment, mice on a 1% mango diet had the best response after a glucose tolerance test. While human studies have not yet been conducted, these findings suggest that mango may potentially help prevent some of the factors involved in metabolic syndrome – a cluster of conditions like obesity, insulin resistance, and high cholesterol that can increase the risk of cardiovascular disease.

- While it is not clear what components of mango pulp are responsible for its glucose-lowering properties, scientists offer several possible explanations for why mangos seem to help regulate blood sugar. (Each of these possibilities requires further study to determine its efficacy).
 - The fruit's high fiber content may offer one explanation. The Tommy Atkins variety of mango used in this study contains approximately 4% dietary fiber, and fiber has been shown to lower blood sugar levels in laboratory animals and humans.
 - Mangos may affect the pancreas, causing them to release the hormone insulin which helps regulate blood glucose.
 - It's also possible that mangos may directly or indirectly suppress the absorption of glucose from the small intestine.

Mango had an intermediate effect on cholesterol in mice fed a high-fat diet.

Looking ahead:

Ongoing human research will be necessary to determine whether using mangos is effective as a nutritional strategy for preventing cardiovascular disease, diabetes, and other conditions. Specifically, scientists need to research exactly how mangos help to reduce body fat, as well as how mangos alter blood sugar (whether effects are seen in the pancreas, small intestines or liver, as mentioned above).

Human studies should be conducted to determine whether mango effects on mice are also found in humans. Also, more research is necessary to determine exactly which components in mangos are responsible for the fruit's positive qualities. If mangos are found to have a similar positive impact on human health, future studies should include additional varieties of mangos to determine whether different varieties have different effects. If certain mango varieties show superior health benefits, producers may want to consider growing those cultivars, especially if there's evidence that marketing such health benefits would increase demand for mangos overall.