Enzyme Inhibition: Combating Cardiovascular Diseases, Diabetes, and Obesity Using Phytochemicals Found in Indian Spices

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The objective of this project is to come up with a natural treatment by studying the inhibitory effects of aqueous spice extracts on lipid and carbohydrate enzyme metabolizing activities that lead to regulated blood glucose levels.The hypothesis is if the inhibitory effects of ginger, cardamom, cloves, garlic, and cinnamon were tested on the enzyme metabolizing activities of lipids and fats, then cloves will inhibit the enzyme activity the most, both in lipids and carbohydrates, because they have the highest levels of flavonoids. The highest inhibition rates for amylase was observed in cloves at 50% for 6 mg/ml concentration and all spices showed a steady increase in amylase inhibition with increasing concentrations, with the exception of cinnamon. The highest inhibition for lipase was observed in cinnamon at 58% for 6 mg/ml concentration and all the spices showed a steady increase in lipase inhibition with increasing concentrations with the exception of ginger. The results of this project prove the hypothesis to be partially correct since cloves exhibited the highest amylase inhibition but not the highest lipase inhibition. This is due to the fact that the phenolic acids and flavonoids present in the cloves are binding more effectively to the amylase enzyme and reducing the catalytic activity (decreasing the formation of a substrate-enzyme complex) in the lingual phase where buffers are not present. On the other hand, cinnamon with the chemical constituents of cinnamaldehyde and eugenol acted best at inhibiting lipase hydrolysis. Lipase inhibition proved to be effective at treating obesity and CVD by reducing the absorption of fatty acids and accumulation of adipose tissue. Amylase inhibition could be used to treat diabetes by blunting the postprandial peaks.