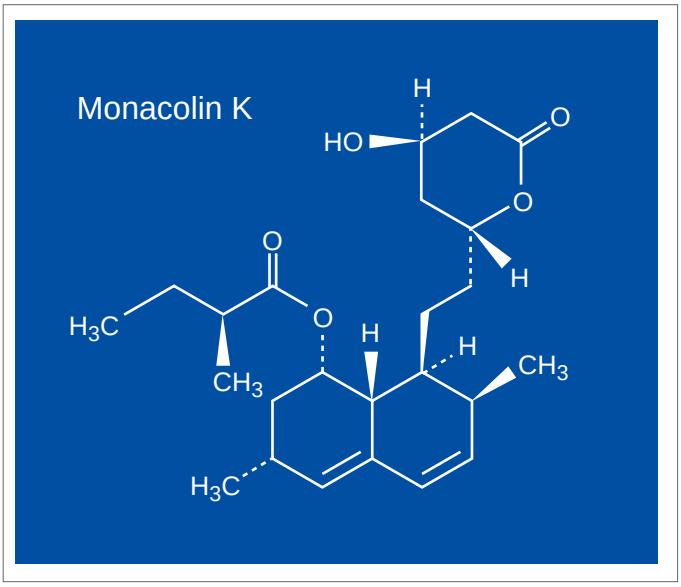

Monascus purpureus (Red Yeast Rice)

Description

Red yeast rice, a fermented product of rice on which red yeast (*Monascus purpureus*) has been grown, has been used in Chinese cuisine and as a medicinal food to promote "blood circulation" for centuries. In Asian countries, red yeast rice is a dietary staple and is used to make rice wine, as a flavoring agent, and to preserve the flavor and color of fish and meat.[1] Red yeast rice forms naturally occurring hydroxymethylglutaryl-CoA reductase (HMG-CoA reductase) inhibitors known as monacolins. The medicinal properties of red yeast rice favorably impact lipid profiles of hypercholesterolemic patients.

Active Constituents

The HMG-CoA reductase activity of red yeast rice comes from a family of naturally occurring substances called monacolins. Monacolin K, also known as mevinolin or lovastatin, is the ingredient in red yeast rice that Merck & Co., pharmaceutical manufacturer of Mevacor® (lovastatin), asserts is a patented pharmaceutical. However, red yeast rice contains a family of nine different monacolins, all of which have the ability to inhibit HMG-CoA reductase. Other active ingredients in red yeast rice include sterols (beta-sitosterol, campesterol, stigmasterol, sapogenin), isoflavones, and monounsaturated fatty acids.[2]

Mechanisms of Action

The first documentation of the biomolecular action of red yeast rice was published in 2002. The results indicate one of the anti-hyperlipidemic actions of red yeast rice is a consequence of an inhibitory effect on cholesterol biosynthesis in hepatic cells.[3] It is unclear whether the lipid-lowering effect of red yeast rice is due solely to the monacolin K content, or if other monacolins, sterols, and isoflavones contribute to its cholesterol-lowering effect.

The monacolin K content of one proprietary preparation of red yeast rice used in a clinical trial was calculated to be 0.2 percent of the total product.[2] This trial used a daily dosage of 2.4 grams of red yeast rice (the corresponding monacolin K dosage would be 4.8 mg). The dosages used in clinical trials of lovastatin are 20-40 mg daily.[4] It is unlikely the lipid-lowering effects found in this study was a result of the monacolin K content alone.

Clinical Indications

Hyperlipidemia

The first human trial, an eight-week study conducted in China, evaluated the effect of 1.2 g/day red yeast rice on 324 hypercholesterolemic adults (total cholesterol above 230 mg/dL) who also had elevated LDL (over 130 mg/dL) and low HDL (under 40 mg/dL) versus controls.[5] Total cholesterol, LDL cholesterol, and triglycerides dropped by 23, 31, and 34 percent, respectively. Serum HDL levels increased by 20 percent. The second study included 83 hypercholesterolemic adults on 2.4 g red yeast rice daily or placebo.[2] Participants were asked to maintain a diet of 30-percent fat, 10-percent saturated fat, and a maximum of 300 mg cholesterol daily. After eight weeks the treatment group had an 18-percent lower mean total cholesterol level compared to placebo and a 17-percent drop in total cholesterol from baseline. There was also a 23-percent difference in LDL between the treatment group and the placebo group and a 23-percent drop in the treatment group, evident at eight weeks. Triglycerides also dropped 16 percent in the treatment population. The drops in total cholesterol and LDL were consistent at eight and 12 weeks. There were no changes in HDL levels.

A multicenter, self-controlled, open-labeled study used the American Heart Association's Step I diet for four weeks followed by red yeast rice 2.4 grams daily for eight weeks in 187 hypercholesterolemic patients. There were no significant differences with the diet alone, but after eight weeks of red yeast rice, total cholesterol decreased 16.4 percent, LDL by 21 percent, triglycerides by 24.5 percent, and HDL increased 14.6 percent.[6]

Clinical trials using red yeast rice with hyperlipidemic elderly patients[7] as well as HIV-related dyslipidemic patients[8] have also demonstrated ability of red yeast rice to improve lipid profiles.

Drug-Nutrient Interactions

Because HMG-CoA reductase inhibitors reduce the production of coenzyme Q10 (CoQ10),[9] supplementation of CoQ10 with long-term use of red yeast rice extract may be prudent. Theoretically, the drug-related contraindications for lovastatin are probably prudent to adhere to with red yeast rice preparations as well, including avoidance of co-administration with gemfibrozil, cyclosporin, azole anti-fungals, erythromycin, clarithromycin, nefazodone, and protease inhibitors.[10] One case report of an adverse drug-nutrient interaction between cyclosporine and a multi-ingredient herbal preparation containing red yeast rice exists in the literature.[11]

Side Effects and Toxicity

Toxicity evaluations of red yeast rice in animals for as long as four months have shown no toxicity.[1] Human trials have not shown elevations of liver enzymes or renal impairment.[2,5] Side effects have been limited to headaches and gastrointestinal discomfort.

Although larger, long-term trials will be helpful in understanding the efficacy and potential long-term effects of red yeast rice, the apparent lack of statin-like side effects in these short-term studies warrants further investigation of this hypolipidemic agent.

Dosage

No dosage standards have been established for red yeast rice. Adult dosages used in clinical studies range from 1.2-2.4 g per day[2,5] to 0.8 g/kg/day.[1] In Asian countries the average daily intake of red yeast rice is 14-55 grams.[12]

It should be noted the monacolin content of red yeast rice varies significantly according to the strain. Total monacolin content of nine different commercially available preparations evaluated by high performance liquid chromatography (HPLC) varied from zero to 0.58 percent.[13] Findings of clinical trials using red yeast rice with a standardized level and profile of monocolins may not be applicable to all commercially available red yeast rice preparations.

Warnings/Contraindications

Theoretically, the contraindications for lovastatin use are probably prudent to adhere to with monacolin K-containing red yeast rice preparations, including pregnancy, breast feeding, and hepatic or renal impairment.[10]

Individuals with known allergies to yeast or fungus should exercise caution when supplementing with red yeast rice.

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