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Cholesterol lowering effects of Psyllium husk

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ABSTRACT

Psyllium or *isabgol* is a soluble fibre that comes from a herb called *Plantago ovata*, most commonly used as a gentle laxative. Husk is derived from the thousands of tiny gel-coated seeds of psyllium plant. Being a great laxative, it can help relieve diarrhea and constipation issues, along with treating intestinal problems like irritable bowel syndrome. Several large-scale, population-based studies suggest that the soluble fibre of psyllium can help lower cholesterol and has also been used to help regulate blood sugar levels in people with diabetes. Psyllium husk acts by forming a gelatin-like structure when it comes in contact with water, that traps waste and helps in its transport through the intestinal tract.

Keywords: Psyllium husk, fibre, cholesterol

INTRODUCTION

Hypercholesterolemia is a significant, independent risk factor for coronary heart disease. Soluble fibre, such as psyllium husk, has been shown to have an increased cholesterol-lowering effect in people with hypercholesterolemia. This has led to a growing interest in recent years in the use of dietary fibre for health maintenance, cholesterol reduction and disease prevention [1].

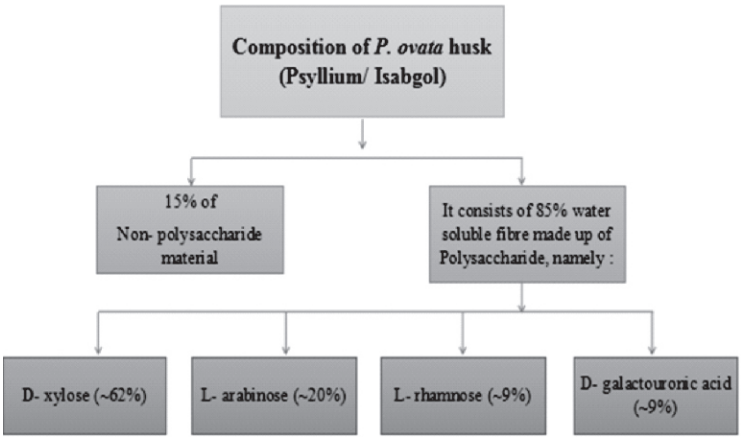
Phytoconstituents of Psyllium

The mucilaginous fibre of psyllium forms a gel when it comes in contact with water. This ability helps the seed to retain water in order to prevent the seed from drying out. Psyllium seeds contain over 30% of mucilage in the outer seed coat, fatty oils (5%), tannin, sugars, sterols and protein [2]. The constituent fatty acids in the oil are linolenic, linoleic, oleic, palmitic, stearic, and lignoceric. The de-husked seed is found to be rich in starch [3]. Psyllium husk consists of around 70% water soluble fibre, made up of polysaccharides [4].

Medicinal Uses

Similar to oats and wheat, psyllium is rich in soluble mucilaginous dietary fibre. The psyllium seed husks have been used in Ayurvedic and herbal medicines. Additionally, psyllium husk is an effective supplement in dietary therapy for the treatment of mild to moderate hypercholesterolemia, due to the presence of concentrated soluble fibre (containing up to 70% of total fibre, around 8 times more than oat bran). The probable

Fig. 1: Composition of *P. ovata* husk (Psyllium/ Isabgol) [4]



mechanism of action maybe that the soluble fibre binds to the 'bad' cholesterol and flushes it out of the body.

According to studies, psyllium is a medicinally active natural polysaccharide. It has been used for the treatment of constipation [5], diarrhea [6], inflammatory bowel diseases [7], obesity in children and adolescents [8], high cholesterol [9-11] and diabetes [10, 12-14].

One of the earliest non-placebo controlled clinical studies [15] showed a significant cholesterol-lowering effect of psyllium. Then the first double-blind, placebo-controlled trial of psyllium showed its effectiveness in mild-to-moderate hypercholesterolemia [16]. Thereafter, many clinical trials investigated the effect of psyllium husk as a supplement to dietary modification. The latest meta-analysis, conducted on people suffering from mild-to-moderate hypercholesterolemia and consuming a low-fat diet, established that psyllium supplementation could significantly lower serum total cholesterol and low density lipoprotein (LDL) concentrations [11].

Psyllium Husk for Constipation

Psyllium husk contains around 70% soluble fibre and close to 30% insoluble fibre. The large quantity of soluble mucilage present in psyllium husk soaks up water from the gut, swelling into a jelly-like mass, making the stool softer and mechanically stimulating intestinal peristalsis. The insoluble fibre fraction contributes bulk to stool and helps to stimulate its movement through the intestinal tract, hence both the soluble and insoluble fibre fractions may together decrease tendencies for constipation. Digestive enzymes and gut flora have no significant effect on the mucilage and it passes unchanged through the intestine, providing a soothing and protective effect as a demulcent and lubricant [17]. Along with this protective action, the mucilage gel absorbs toxins present in the gut, thereby preventing its absorption into the system. In addition, psyllium can also act as a prebiotic, aiding healing of the inner lining of the inflamed intestines.

Psyllium Husk and its Cholesterol lowering effects

Soluble and insoluble fibre fractions of psyllium husk have their role in reducing total serum cholesterol and LDL cholesterol, contributing to reduced risk of heart diseases [4]. Many studies have pointed towards the cholesterol-lowering benefits of psyllium husk, leading to consistent significant reduction in

plasma LDL levels, in the range of 10% to 24% [18, 19]. Effect of psyllium husk consumption on hypercholesterolemia works by lowering serum cholesterol as it binds to bile acids in the intestine, thereby reducing the risk of coronary heart disease [20]. To achieve its cholesterol-lowering effect, only a small serving of psyllium husk needs to be consumed, as it is rich in soluble fibre. Incorporating psyllium husk in our diet is just one helpful measure that helps lower cholesterol, but it works best in conjunction with cutting back on saturated fats, losing weight and regular exercise.

Mechanism of action

Psyllium's hypocholesterolemic effect has not been fully understood, but it has been shown to stimulate bile acid synthesis in animal and human models [21]. It has been long established that the mechanism for reducing serum cholesterol rests on the diversion of hepatic cholesterol for bile acid production. Hence, it has been proposed that consuming psyllium causes greater viscosity in the intestine, thus preventing absorption of bile acids and neutral steroids, a phenomenon that has been observed for other viscous sources of dietary fibre [22, 23]. According to one human study, psyllium was found to lower LDL cholesterol and decrease cholesterol absorption after consumption of 5.1 grams of psyllium husk twice a day for eight weeks [4].

Clinical Studies

A single-blind, placebo-controlled parallel clinical trial by Williams *et al*., tested the effectiveness of psyllium husk containing 3.2 g of soluble fibre in reducing total cholesterol and LDL cholesterol in healthy children for 12 weeks. In the high-fibre group, total cholesterol reduced by 21 mg/dL as compared to the 11.5 mg/dL reduction in the control group. Similarly, LDL cholesterol decreased by 23 mg/dL for the high-fibre group compared with 8.5 mg/dL of the control group. The good cholesterol, high density lipoprotein (HDL) increased by 4 mg/dL for the high-fibre group as opposed to 1 mg/dL increase for the controls [24].

Another double-blind, placebo-controlled, parallel trial studied the effect of psyllium (5.1 g twice a day) in reducing serum cholesterol levels in healthy individuals with primary hypercholesterolemia, kept on high or low-fat diets for 16 weeks. Psyllium recipients in both the high and low-fat diet groups showed significant decrease ($P < 0.05$) in total cholesterol and LDL cholesterol levels. Total cholesterol and LDL cholesterol levels decreased by 5.8% and 7.2%, respectively, in psyllium recipients on high-fat diets and 4.2% and 6.4%, respectively, in psyllium recipients on low-fat diets. However, no significant reductions in lipid levels were observed in the placebo group [25].

Results of a double-blind, placebo-controlled parallel study, showed that psyllium is an effective and well-tolerated therapy for mild-to-moderate hypercholesterolemia [16]. The effect of psyllium mucilloid on serum cholesterol levels was investigated in individuals with mild-to-moderate hypercholesterolemia where they were treated with 3.4 g of psyllium or cellulose placebo (3 doses a day) for eight weeks. Treatment with psyllium reduced serum total cholesterol levels by 14.8% and LDL cholesterol by 20.2%, relative to their baseline values.

In another study, individuals with documented hypercholesterolemia along with complaints of constipation were recruited for the study. They were asked to incorporate 3.5 g psyllium husk three times a day into their diet. Their total cholesterol, LDL, HDL cholesterol and triglycerides were measured for 3 weeks of treatment. Total cholesterol was significantly decreased from 252 mg/dl before treatment to

239 mg/dl after 3 weeks of treatment. Similarly, LDL cholesterol decreased from 174 to 162 mg/dl during the study. Triglycerides and HDL levels were unchanged [26].

Ziai *et al*., in a double-blind placebo-controlled study determined the plasma lipid and glucose lowering effects of 5.1 g of psyllium husk fibre (twice a day), as an adjunct to dietary and drug therapy, in patients with type II diabetes for 8 weeks of treatment period. Fasting blood glucose was measured every 2 weeks, and total plasma cholesterol, LDL cholesterol, HDL cholesterol, triglyceride, and insulin levels were measured every 4 weeks. HDL cholesterol increased significantly (p<0.05) following psyllium treatment and the LDL/HDL ratio was significantly decreased (p<0.05) [27].

Conclusion

Psyllium husk is an edible, soluble, bulking fibre that promotes easy and healthy elimination of waste from the colon and acts as a prebiotic. Additionally, the case studies discussed above prove the positive benefits of psyllium husk on heart health and cholesterol levels. Psyllium, when added to a prescribed low-fat diet, may obviate the need for typical lipid-lowering medications or may prove to be a valuable adjunct to other treatments in patients with moderately elevated LDL cholesterol levels. Studies have also shown that psyllium is safe, well-tolerated and unlike stimulant laxatives, psyllium husk is gentle and non-addictive.

Although psyllium husks are primarily composed of soluble fibre, they provide health benefits of both the soluble and insoluble fractions. This is the reason that psyllium husks are the best single source of dietary fibre.

Contraindications [4]

Psyllium husk is contraindicated in the following conditions:

- People with un-diagnosed rectal bleeding, and those who are unable to defecate even after using a laxative
- Patients suffering from abnormal constrictions in the gastrointestinal tract, oesophagus; people with potential or existing internal blockage or people with paralysis of the intestine
- Patients with known hypersensitivity to psyllium husk
- Patients with abdominal pain, nausea or vomiting, unless advised by their doctor

Word of advice

Psyllium husk should be taken with at least 150 ml water, since if not taken with the adequate amount it might lead to esophagus blockage, as psyllium husk swells when it comes in contact with water.

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