

# Konjac

## Root/Glucomannan for Weight Control, Blood Lipids & Constipation



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The konjac plant (*Amorphophallus konjac*), native to warm subtropical to tropical eastern Asia, has been used in China, Japan and South East Asia as a food source (to make noodles, tofu and snacks) and as a traditional medicine (for treating asthma, cough, hernia, breast pain, burns as well as hematological and skin disorders) for more than 2,000 years. The part of the plant used for this purpose is the corm, a root-like tuber, which is actually an underground stem; although not botanically correct, it is generally referred to as konjac root due to its appearance. In modern times, konjac is primarily valued for its naturally occurring glucomannan content.<sup>1</sup>

Glucomannan is an unabsorbable polysaccharide gum (insoluble fiber) composed of glucose and mannose.<sup>2</sup> It represents about 40 percent of the dried konjac corm<sup>3</sup>—although some nutraceutical preparations may provide as high as 94.9 percent glucomannan.<sup>4</sup> Within the natural foods industry, glucomannan is probably most widely recognized as a weight-loss nutraceutical, although research also demonstrates other significant benefit including the reduction blood lipids (e.g. cholesterol) and constipation.

### Weight loss

Several studies have been conducted on glucomannan's weight-loss properties. Most, but not all,<sup>5</sup> have demonstrated positive results, which can be attributed

to more than one mechanism of action. These include a reduction of the appetite-inducing hormone ghrelin,<sup>6</sup> promoting satiety (the feeling of having been fed to capacity) by the formation of a viscous gel helping to fill part of the stomach, promoting the excretion of some food calories that get caught up in the gel, and improving blood sugar balance.<sup>7</sup>

In a five-week, randomized, double-blind, parallel-group, placebo-controlled study,<sup>8</sup> glucomannan alone (1.24 g/day), glucomannan with guar gum (420 mg each/day), glucomannan with guar gum and alginate (4.32 g, 900 mg and 900 mg/day) and placebo were compared to assess their respective weight reduction benefits in 176 healthy overweight adults following a balanced, low-calorie diet. Supplements were taken three times daily with 250 ml (8.45 oz.) of water 15 minutes before meals and at 3 p.m. The results showed that all glucomannan-containing supplements significantly reduced body weight (=9 lbs.) more than placebo and diet alone. A similar 60-day study<sup>9</sup> with 30 adults showed that glucomannan was more effective than diet alone in reducing body weight, blood glucose, total serum cholesterol and hunger while improving satiety sensation more effectively than the low-calorie diet alone.

In a clinical study,<sup>10</sup> two groups of 25 severely obese patients followed a very low calorie diet for three months. One of those groups also used a glucomannan

supplement (about 4 g/day in three divided doses). Results showed that the diet plus glucomannan group had greater satiety with improved adherence to the diet in the absence of any relevant side effects, more significant weight loss in relation to the fat mass alone, an overall improvement in blood fats and carbohydrate tolerance. The glucomannan supplements efficacious and well tolerated.

In a nine-week, double-blind, placebo-controlled study,<sup>11</sup> glucomannan (1 g, one hour prior to each meal with 8 oz. water) or placebo was tested in 20 obese adults, without any change to their eating or exercise patterns. Results showed a significant average weight loss (5.5 lbs) using glucomannan. Serum cholesterol and LDL cholesterol were also significantly reduced (21.7 and 15.0 mg/dl respectively) in the glucomannan treated group. No adverse reactions were reported.

In another 16-week, parallel, double-blind, placebo-controlled clinical study,<sup>12</sup> 200 overweight or obese patients were treated with a mixture of glucomannan (1 g) and psyllium husks (3 g) or placebo twice or three times daily along with a calorie-restricted diet. Results showed that, compared to placebo, both glucomannan/psyllium husks groups experienced increased satiety after meals, greater reductions in LDL-cholesterol, and improvements in total cholesterol: HDL-cholesterol and HDL-cholesterol: LDL-cholesterol ratios.

In addition, glucomannan (2-3 g/day) has been used in studies<sup>13-14</sup> on childhood obesity. Compared to placebo groups, the results demonstrated that glucomannan significantly decreased in body weight, as well as levels of cholesterol, triglycerides and alpha-lipoprotein.

## Blood lipids

Studies using glucomannan alone or in combination with other nutraceuticals have been conducted to evaluate effectiveness in the treatment of high blood lipid such as cholesterol and triglycerides. In most cases, a diet low in saturated fat and cholesterol was included. The table below shows the statistically significant results of those studies on glucomannan alone (see chart below).

In addition, glucomannan has also been studied in combination with *Garcinia cambogia* as well as with plant sterols. A 12-week, randomized, double-blind, placebo-controlled study<sup>20</sup> examined the effects of 1.5 g/day konjac (94.9 percent glucomannan) plus 2.4 g/d *Garcinia cambogia* extract (52.4% HCA) or placebo prior to main meals (three times/day) in 58 obese subjects. Compared to placebo, results showed that the combination significantly reduced total cholesterol (-32.0 mg/dL) and LDL-c levels (-28.7 mg/dL).

Similarly, a randomized, placebo-controlled, crossover study<sup>21</sup> examined the effects plant sterols (1.8 g/day), glucomannan (10 g/day), a combination of glucomannan and plant sterols, and a placebo on lipid profile and cholesterol biosynthesis in 34 adult type 2 diabetic and non-diabetic subjects with mildly

high cholesterol levels. Compared to placebo, results showed that a significant reduction of cholesterol concentrations (-4.72 mmol/l). LDL cholesterol concentrations were significant decreased after glucomannan (-3.16 mmol/l) and combination treatments (-2.95 mmol/l). In addition, lathosterol concentrations, an index of cholesterol biosynthesis, were significantly lowered (P<0.05) after the combination treatment compared to the plant sterol treatment.

## Constipation

As a soluble fiber, it might be expected that glucomannan supplementation would offer some benefits for the gastrointestinal tract, included the treatment of constipation. In fact most research, though not all,<sup>22-23</sup> has shown that this is the case.

In a multi-centric, open and non-controlled study,<sup>24</sup> 93 subjects with chronic constipation received 1g of glucomannan, three times daily for one month, and then 1 g two times daily for one month. Results were that after one month there were significant improvements in constipation, and those improvements lasted through the second month. Likewise, a 10-day, double-blind, placebo-controlled study<sup>25</sup> with 13 adult subjects with chronic constipation and 18 control subjects was conducted. The constipated subjects received either 1 g glucomannan three times daily or placebo. The results were glucomannan subjects showed statistically significant improvement in constipation compared to controls and placebo group. Other studies<sup>26-27</sup> have not only shown improvements in defecation times

with glucomannan, but improvements in healthy colonic bacteria (*bifidobacteria* and *lactobacilli*) as well.

To examine the effect of 500 mg/day glucomannan on 31 chronically constipated children, a double-blind, placebo-controlled, randomized, crossover study<sup>28</sup> was conducted. The results were that significantly fewer children complained of abdominal pain and more children were successfully treated while on fiber (45 percent) as compared with placebo treatment (13 percent). Parents rated significantly more children (68 percent) as being better on fiber versus 13 percent as being better on placebo. In a similar 12-week double-blind, placebo-controlled, randomized study<sup>29</sup> 20 neurologically impaired children who were chronically constipated were treated with 200 mg glucomannan per kg body weight (e.g., 4.5 g for a 50-lb child) daily or placebo. Compared to placebo, results showed a significant increase stool frequency, a significant decrease in laxative or suppository use, significantly improved clinical scores of stool consistency, and significantly reduced episodes of painful defecation.

## Safety and nutrient interactions

With oral supplementation of glucomannan, esophageal and gastrointestinal obstructions have been reported when the tablet form has been used.<sup>30</sup> Consequently, it may make more sense to use capsule or powder forms instead. Given its gel-like form once ingested and subsequent absorptive properties, glucomannan may reduce the absorption of fat soluble vitamins such as A, D, E and K.<sup>31</sup> It doesn't seem to affect water-soluble vitamins. As a result, glucomannan should be taken at a different time of the day than supplements containing fat-soluble vitamins. **VR**

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	Chen et al <sup>15</sup>	Vuksan et al <sup>16</sup>	Arvil et al <sup>17</sup>	Guardamgna et al <sup>18</sup>	Martino et al <sup>19</sup>
No. of subjects	22	278	63	36	40
Population	Adult Diabetics	Adult meta. syndrome	Healthy adults	Children w/ high cholest.	Children w/ high cholest.
Glucomannan	3.6 g/d	8-13 g/d	3.9 g/d	1 g/d	500 mg/d
Total choles.	-11.1%	-12.4%	-10%	-5.1%	-18%
LDL-choles.	-20.7%	-22%	-7.2%	-7.3%	-24%
Total/LDL ratio	-15.6%	-15.2%	unknown	unknown	unknown
LDL/HDL ratio	unknown	-22.2%	n.s.	unknown	unknown
ApoB	-12.9%	-15.1%	unknown	-6.1% (females)	unknown
Triglycerides	unknown	unknown	-23%	n.s.	-10%
Fasting glucose	-23.2%	unknown	unknown	unknown	unknown
Fructosamine	unknown	-5.2%	unknown	unknown	unknown
Systolic BP	unknown	unknown	-2.5%	unknown	unknown

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