

PREVENTION OF DIETARY HYPERCHOLESTEROLAEMIA  
BY CHICKPEA SAPONINS AND NAVY BEANS

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Chickpeas (*Cicer arietinum*) and navy beans (*Phaseolus vulgaris*) are rich in saponins (Fenwick and Oakenfull 1983). Isolated saponins can lower plasma cholesterol concentrations when fed to animals (Oakenfull et al. 1984) and chickpeas have been shown to lower plasma cholesterol in rats and humans (Mathur et al. 1968). We have therefore investigated the effects of feeding chickpeas, isolated chickpea saponins and navy beans on cholesterol and bile acid metabolism in rats.

The diets were based on a standard hypercholesterolaemic diet containing (per kg) cholesterol (10 g) and sodium cholate (1.8 g), with cornstarch (556 g), casein (180 g), bran (135 g), corn oil (80 g), vitamins and minerals. Cooked and dried navy beans and chickpeas were finely ground and added in amounts such that their protein replaced casein with the other ingredients appropriately adjusted. Other diets contained casein and isolated chickpea saponin (10 g/kg) or chickpea flour from which the saponin had been extracted. Each diet was fed to a group of five animals.

After three weeks we found that: (1) Animals fed chickpea saponins and navy beans had lower plasma cholesterol concentrations than the control group. (2) Extracted chickpeas also lowered plasma cholesterol, whereas whole chickpeas did not. (3) Saponin caused a substantial increase in faecal excretion of bile acids. Chickpeas and navy beans also increased faecal bile acids but extracted chickpeas had no effect. (4) There were no major effects from the different diets on the population of the intestinal microflora. (5) Scanning electron microscopy of tissue from the small intestine showed that the chickpea diet was associated with a different appearance of the villi tips - suggesting either mechanical damage or a shortened regeneration cycle.

Diet <sup>a</sup>	Control	Chickpea saponin	Extracted chickpea	Whole chickpea	Navy bean
Plasma cholesterol (mM)	4.88±0.41 <sup>c</sup>	2.74±0.56	2.45±0.38	4.33±0.56	2.42±0.08
Faecal bile acids <sup>d</sup> (mg/g)	6.6	24.0	5.3	13.6	13.7
Faecal neutral <sup>b</sup> sterols (mg/g)	14.9	20.1	7.8	31.6	26.0

<sup>a</sup> All diets contained cholesterol (10 g/kg) and sodium cholate (1.8 g/kg).

<sup>b</sup> Pooled samples. <sup>c</sup> Means ± Standard Errors.

In summary, navy beans and isolated chickpea saponins prevented dietary hypercholesterolaemia; whole chickpeas did not and the reason for this is not immediately obvious.

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