

EFFECTS OF DIETARY SAPONINS ON BILE ACID SECRETION
AND PLASMA CHOLESTEROL IN THE RATDAVID L. TOPPING,* ROSS L. HOOD,** RICHARD J. ILLMAN,* GERALD B. STORER,*
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Burkitt & Trowell (1975) have proposed that dietary fibre may lower plasma cholesterol in man - possibly by adsorption of bile acids. Plant fibres have been shown to adsorb bile acids *in vitro* (Eastwood & Hamilton, 1968) but Oakenfull & Fenwick (1978) have shown that only fibre containing saponins shows significant binding. As plant materials containing saponins are hypocholesterolaemic in man or experimental animals (Horlick *et al.*, 1967; Mathur *et al.*, 1968) we decided to investigate effects of purified saponins on bile acid secretion and plasma cholesterol in the rat.

The 4 experimental groups, 5 rats each, were control (fed a synthetic diet), saponin (+ 1% saponin), cholesterol (+ 1% cholesterol) and saponin + cholesterol (+ 1% saponin + 1% cholesterol). After 3 weeks the rats were anaesthetised and the bile duct cannulated. Bile was collected for 30 min and the animals then bled for determination of plasma cholesterol. Faeces were collected and pooled for 7 day periods for each group.

Plasma cholesterol concentrations were similar in the control and saponin groups, 58 ± 4 and 59 ± 2 mg/100 ml, respectively. In the cholesterol group, plasma levels were significantly ($P < 0.001$) raised to 101 ± 4 mg/100 ml. Feeding saponin + cholesterol significantly ($P < 0.01$) reduced this hypercholesterolaemia to 80 ± 4 mg/100 ml. Bile acid production rates were similar in the control and saponin groups (464 ± 94 and 404 ± 44 μ g of bile acid/100 g of body weight/hr, respectively). Production was significantly increased ($P < 0.001$) in the cholesterol group to 1326 ± 234 μ g of bile acid/100 mg of body weight/hr and to 1816 ± 198 μ g of bile acid/100 g of body weight/hr in the saponin + cholesterol rats. The effect of saponin in increasing production was significant statistically ($P < 0.05$). Faecal bile acid and neutral sterol concentrations in control rats were 2.60 and 1.03 mg/g of dry matter respectively. In the saponin group these were increased to 7.32 and 3.74 mg/g of dry matter. Neutral sterol and bile acid concentrations were increased in the cholesterol fed rats to 10.89 and 6.88 mg/g of dry matter and were further raised in the saponin + cholesterol group to 12.61 and 7.51 mg/g of dry matter.

The data we have obtained in these experiments confirm that saponins lower plasma cholesterol. The increases in faecal bile acids and neutral sterols support the hypothesis that saponins act by the adsorption of bile acids in the intestine.

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