

VOLATILE FATTY ACID PRODUCTION AND CHOLESTEROL METABOLISM  
IN RATS FED GUAR GUM AND ANTIBIOTIC

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The inclusion of soluble dietary fibres in the diet reduces blood cholesterol of laboratory animals. This effect may be caused by inhibition of cholesterol synthesis by volatile fatty acids (VFA) produced by fermentation of the fibre in the caecum and large bowel (Chen et al. 1984). In this experiment, the effects of fermentation on cholesterol synthesis and plasma cholesterol concentrations were studied by using antibiotics to suppress microbial activity.

Wistar rats, 12 per treatment, were fed a basal diet or diets containing either 10%  $\alpha$ -cellulose or 10% guar gum. The diets were fed for two weeks and contained 1% cholesterol and 0.2% cholate. Half of the animals on each treatment had antibiotic (0.12% benzylpenicillin, 0.02% streptomycin sulphate and 0.002% chloramphenicol) added to their drinking water. The rats were killed and a number of physical and biochemical measurements made (see table).

Diet	Antibiotic	Caecal contents(g)	Caecal pH	Caecal VFA <sup>1</sup>	Serum cholesterol <sup>2</sup>	Cholesterol synthesis <sup>3</sup>
Basal	No	1.82 <sup>a</sup>	7.64 <sup>a</sup>	89.1 <sup>a</sup>	4.08	42.6
	Yes	5.59 <sup>b</sup>	6.90 <sup>b</sup>	10.7 <sup>b</sup>	3.97	32.7
Cellulose	No	1.45 <sup>a</sup>	7.87 <sup>a</sup>	61.4 <sup>a</sup>	5.13	43.5
	Yes	4.17 <sup>b</sup>	7.32 <sup>b</sup>	13.6 <sup>b</sup>	5.67	45.5
Guar gum	No	2.54 <sup>a</sup>	6.97 <sup>a</sup>	102.2 <sup>a</sup>	2.80	27.2

1  $\mu$ mol/g contents

2 mmol/L

3 nmoles mevalonate converted to cholesterol/liver/hour

a,b Different superscripts indicate significant differences ( $P < 0.05$ ) between treatment with and without antibiotic

The inclusion of guar gum in the diet significantly decreased ( $P < 0.05$ ) serum cholesterol, hepatic synthesis of cholesterol from <sup>14</sup>C-mevalonate and caecal pH, whereas caecal weight, caecal contents and VFA were increased.

When antibiotic was included in the drinking water, caecal fermentation was significantly diminished as shown by a substantial reduction in caecal VFA (acetate, propionate and butyrate). The inclusion of antibiotic in the diet increased the weight of caecal contents and gave varied results for caecal pH.

The inclusion of guar gum, a soluble, highly fermented dietary fibre, in the diet of rats caused a significant reduction in serum cholesterol, which was not counteracted by antibiotic. Cholesterol synthesis rates were not affected by antibiotic in any treatment group, although guar gum depressed both hepatic and intestinal synthesis rates when compared to rats fed  $\alpha$ -cellulose.

The results of this experiment indicate that increased VFA production may not be the primary cause for the decrease in serum cholesterol and cholesterol synthesis arising from ingestion of guar gum.

CHEN, W.L., ANDERSON, J.W. and JENNINGS, D. (1984). Proc.Soc.Exp.Biol.Med. 175:215

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