

INTERACTIVE EFFECTS OF NON-STARCH POLYSACCHARIDES AND FISH OIL ON LIPID METABOLISM

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A number of dietary factors are known to influence plasma lipid levels, these include dietary fat and fibre (Albrink et al 1979). We have examined the effects of three fibre constituents: pectin, guar gum and methyl cellulose on lipid metabolism in rats as well as the interactive effects of these fibres with the hypotriglyceridemic agent, fish oil. Pectin, guar gum and methyl cellulose belong to a class of fibre components known as the non-starch polysaccharides. Rats were fed, for two weeks, a modification of the American Institute of Nutrition (AIN-76) semi-purified diet including either pectin, guar gum or methyl cellulose (8% by weight), with or without fish oil, FO (6%), and with or without 1% cholesterol / 0.2% cholic acid (C). All diets contained corn oil either at a concentration of 10% as in the fibre alone diets or 4% as in the fish oil containing diets. Plasma lipid levels were determined and livers were analysed for receptor activity and rates of cholesterol and fatty acid synthesis.

Statistical analyses were determined using Students unpaired t-tests. Methyl cellulose fed rats had significantly ($p < 0.05$) higher plasma cholesterol levels (3.47 ± 0.21 mmol/l) than rats fed pectin (2.90 ± 0.03 mmol/l) but were not significantly different from guar gum fed rats (2.95 ± 0.14 mmol/l). A reduction in cholesterol levels was observed when fish oil was added to the diets (refer to table). The reduction was significant ($p < 0.05$) for pectin plus fish oil and methyl cellulose plus fish oil but not for guar gum plus fish oil. The same trends were observed for plasma triglyceride levels. Rats fed pectin, guar gum and methyl cellulose had plasma triglyceride levels of 0.97 ± 0.08 , 1.35 ± 0.35 and 1.88 ± 0.43 mmol/l respectively.

Plasma lipid concentration mmol/l (SEM)	Pectin			Methyl cellulose			Guar gum		
	+FO	+C	+FO+C	+FO	+C	+FO+C	+FO	+C	+FO+C
Cholesterol	2.21 (0.08)	2.87 (0.15)	2.96 (0.06)	2.60 (0.13)	5.16 (0.29)	2.68 (0.15)	2.54 (0.16)	3.89 (0.19)	2.65 (0.07)
Triglyceride	0.48 (0.02)	1.69 (0.26)	1.17 (0.10)	0.96 (0.11)	1.13 (0.27)	0.85 (0.12)	0.80 (0.14)	1.24 (0.07)	0.78 (0.13)

When cholesterol and cholic acid were included in the diets there was no effect on plasma cholesterol in the pectin fed group but plasma cholesterol was significantly ($p < 0.05$) increased when cholesterol was fed in conjunction with methyl cellulose or with guar gum. Triglyceride levels were elevated only in the group fed pectin and fish oil. In the absence of cholesterol feeding there were no differences in hepatic cholesterol synthesis in any of the groups. In the methyl cellulose fed animals there was no significant difference in hepatic low density lipoprotein receptor activity whereas activity was significantly increased ($p < 0.05$) when fish oil was fed in conjunction with pectin but was not significant for guar gum. The different fibres produced varying effects on plasma lipid levels with either cholesterol or fish oil feeding. These results indicate that there are complex interactions between dietary fibre, fish oil and cholesterol which must be considered when planning dietary experiments. These interactions seem not to depend solely on the solubility, viscosity or charge of the fibre but on some other property.

ALBRINK, M.J., NEWMAN, T. and DAVIDSON, P.C. (1979). *Am. J. Clin. Nutr.* 32: 1486.