HYPOCHOLESTEROLAEMIC EFFECTS OF DIETARY FIBRE

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Summary: Role of dietary fibre in lowering serum cholesterol has been studied in mongrel dogs. Pectin, wheat bran, guar gum and Isabghol were fed with standard diet. No statistically significant changes were found in serum cholesterol levels in any group ($P > .05$) after one week. Later by 15th day, pectin reduced serum cholesterol significantly i.e. 12.4% ($P < .02$). However, in groups being fed other forms of fibre the levels of serum cholesterol were reduced by 3.8% to 7.0%, but the differences were statistically insignificant ($P > .05$).

Key words: dietary fibre serum cholesterol

INTRODUCTION

Dietary fibre comprises plant polysaccharides and lignin, which are resistant to hydrolysis by the digestive enzymes of man (6,12) and hence they are also called "unavailable" or "unabsorbable carbohydrate".

Key *et al.*(8) first reported the reduction of serum cholesterol in a group of healthy middle aged men, when pectin was fed 15 *gm* daily. Mathur *et al.*(11) have also reported the hypocholesterolaemic effect of Bengal gram in men. Trowell (12) has reported that serum cholesterol rose when fibres were removed from the diet and fibre rich diet or addition of cellulose reduced serum cholesterol.

Recently, Durrington *et al.* (3) have reported the cholesterol lowering effect of pectin in healthy subjects. The present study was undertaken to compare the effect of various dietary fibres on serum cholesterol in mongrel dogs.

MATERIALS AND METHODS

Twentyfour healthy mongrel dogs (10-12 *kg*) were taken and randomly divided into four groups comprising of 6 dogs in each batch. Serum cholesterol was estimated by the method of King (10) before dietary fibres were added to control diet. After initial estimation of serum cholesterol values, the different dietary fibres were fed with standard diet as scheduled below:

Group A	—	Pectin	0.5 *gm/kg* of the body weight.
Group B	—	Guar gum	0.5 *gm/kg* of the body weight.
Group C	—	Isabghol	1.0 *gm/kg* of the body weight.
Group D	—	Wheat bran	2.0 *gm/kg* of the body weight.

Serum cholesterol estimation was further repeated on 7th and 15th day after administration of fibre diet. The level of significance was determined by Student's 't' test.

RESULTS

Results are summarised in Table I.

TABLE I : Effect of various dietory fibres on serum cholesterol.

Groups		*Mean value of serum cholesterol (mg%)*	*On 7th day*	*Overall change (1/7th day)*	*P value*	*On 15th day*	*Overall change (1st/15th day)*	*P Value*
A	Pectin	149.2±15.4	142.7± 9.8	4.3%	>.2	130.6±13.0	12.4%	<.02
B	Guargum	158.0±16.5	153.3±11.2	2.9%	>.4	147.0± 9.6	7.0%	>.1
C	Isabghol	142.6±21.0	142.0±15.6	0.45%	>.5	137.6±20.6	3.8%	>.2
D	Wheat bran	161.3±20.2	159.1±10.4	1.0%	>.5	155.6±21.6	3.8%	>.5

After administration of fibre rich diet on 7th day the levels of serum cholesterol were reduced from 0.45% to 4.3%, but statistically, the difference was insignificant in all the groups (P> .05). After 15 days, serum cholesterol was lowered significantly in group A (P < .05), where pectin was fed, while in other groups, the levels were reduced from 3.8% to 7.0% but statistically the differences were insignificant (P< .05).

DISCUSSION

The role of dietary fibre as a hypocholesteroleamic agent has been stressed by many workers (4,7,9,13,14). In the present study, four types of unabsorbable carbohydrates were fed and their effect on serum cholesterol levels were recorded in dogs. On 7th day, the levels were not changed significantly in any group (0.45% - 4.3%). The difference was statistically insignificant (P> .05).

Subsequently it was noted that on 15th day, serum cholesterol levels were found to be low significantly in group A (P< .02), while in other groups, the difference was insignificant (P> .05). Thus, Pectin reduced serum cholesterol significantly over two weeks (P< .02).

Eastwood (4) and Trowell (12) have also reported the reduction in serum cholesterol and triglycerides, when they supplied fibre diet from noncereal and cereal sources. Jenkin *et al.*(6) and Durrington *et al.*(3) have reported statistically significant decrease in total serum cholesterol values, followed by decrease in serum apo-lipoprotein B. Heaton and Pomare (5) found insignificant change in serum cholesterol values by high fibre diet. There was a significant correlation between the change in serum cholesterol and the amount

of bran. This may suggest that bran may lower serum cholesterol if given in large enough doses (1,13).

Recently, many studies have also shown the role of dietary fibres as hypocholesterolaemic agent. Tsai *et al.* (14) demonstrated the effect of pectin, Carragheenam, Agar, gum arabic, cellulose and wheat bran in rats at a level of 5 or 7% to examine their effect on serum and tissue cholesterol levels and found among the fibres tested, pectin displayed the most hypocholesteroleamic effect. They have correlated the effect with the distribution of cholesterol within the body. Jenkins *et al.* (7) administered guar gum in 10 patients with type II a or b hyperlipedemia for the two weeks (5 *gm* three times a day) and found significant fall after two weeks. Carroll *et al.* (2) could not find such effect of the addition of different types of fibrous material to a semi-purified diet in rabbits and rats. The raw starch was well digested.

In this study, pectin only lowered serum cholesterol, while other dietary fibre could not reduce cholesterol levels significantly over two weeks duration. It is possible that the dog is basically a carnivore and perhaps does not have any normal requirement for fibres, while in human beings dietary fibres may play a role in reducing the incidence of ischaemic heart diseases by their hypocholesterolaemic effect.

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