Comparative Study of Onion and Garlic on Serum Cholesterol, Liver Cholesterol, Prothrombin Time And Fecal Sterols Excretion in Male Albino Rats

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Introduction

Onion and garlic are agricultural products which are commonly consumed in the diet of the people of Pakistan. They give a good taste and flavour to the food to which they are added. It has been reported by many research workers that onion and garlic reduced the serum cholesterol level [1,2] Bordia et al. [3] observed that onion and garlic decreased the serum cholesterol level and increased the coagulation time. Sharma et al. [4] reported that after feeding of high cholesterol diet for 24 weeks produced hypercholesterolemia and when onion was substituted with high cholesterol in the diet, onion decreased the elevated serum cholesterol level.

Methods and Materials

Male albino rats weighing 60-70g were used in the experiment for 12 weeks on semipurified diet. The composition of the diet is given Table-1. Animals were housed in a group of four in each cage having raised wire floor. The rats were kept for adjustment for a week by feeding mouse feed. Food and water were provided adlibitum. The composition of the diet is given in Table 1.

Garlic and onion were provided in food diet at 20% level. The experiment was carried out at normal temperature for 12 weeks. The weight of the rats was recorded initially at the start and finally at the end of the experiment. The rats were fasted overnight and then were anesthetized with ether and the blood was drawn from the heart puncture. Serum was separated from the blood by centrifuging at 2500 r.p.m. for 10 minutes [5]. Feces were dried in an oven at 60-70°C overnight and lipids were extracted from an aliquot of feces with chlorofom-methanol mixture (2:1) V/V [1]. The feces were refluxed at 55°C for two hours and the mixture was allowed to stand overnight. The mixture was then centrifuged and the lipids were removed. The residue was re-extracted with chloroform-methanol mixture (2:1). The two extracts were combined and the volume was adjusted to a certain volume with choloroform-methanol mixture (2:1). Lipids were also extracted from the aliquot of the liver with chloroform-methanol (2:1) V/V [1]. Serum cholesterol, liver cholesterol and total fecal sterols were determined by the method of Kings and Wotton [6] and prothrombin time by the method of Morris [7].

Results and Discusions

In this experiment onion and garlic were tested on albino rats for 12

Tabel-1: Composition of the control, onion and garlic deit

S.No.	Ingredient	Control diet (g)	Onion diet (g)	Garlic diet (g)
1.	Casein (fat and vitamin free).	15.00	15.00	15.00
2.	Fat (hydrogenated)	20.00	20.00	20.00
3.	Mineral mixture	4.0	4.0	4.0
4.	Vitamin mixture	1.0	1.0	1.0
5.	Choline Chloride	0.5	0.5	0.5
6.	Cholesterol	0.5	0.5	0.5
7.	Onion	-	20.0	-
8.	Garlic	-	-	20.0
9.	Sucrose	59.0	39.0	39.0
		100.0	100.0	100.0

Composition of the Mineral mixture is given (8)
Composition of the Vitamin mixture is given (9).

weeks, at 20 percent level for its effect on growth, serum cholesterol, liver cholesterol, fecal sterols and prothrombin time. The results are given in Table-2.

1) Weight Gain

Weight gain of the rats fed garlic significantly ($P < 0.05$) decreased whereas there was no significant reduction in weight gain with onion. Weight gain was lower with onion and garlic than control by 13.7 and 19.8 percent respectively.

Concentration of Serum Cholesterol

Serum cholesterol level was significantly reduced with onion ($P < 0.05$) and garlic ($P < 0.01$). Serum cholesterol level was lower with onion and garlic than control by 20.4 and 26.5 percent respectively. These results are to some extent different from those of Jain [10] who stated that onion did not effect the total, free and ester cholesterol and phospholipids, but similar to those of Sharma et al. [4] who observed that when onion was given with high cholesterol in the diet,

Table-2: Effect of onion and garlic on growth serum cholesterol, liver cholesterol prothrombin time and fecal sterols excretion

S.No.	Parameters	Control	Onion	Garlic
1.	Gain in weight (g)	150.0 ± 4.5	130.1 ± 5.6 (13.7*)	120.2 ± 6.5 (19.8*)
2.	Serum Cholesterol mg/dl.	300.2 ± 18.4	238.7 ± 8.1 (20.4*)	220.4 ± 11.5 (26.5*)
3.	Liver Cholesterol mg/100g	440.7 ± 14.4	336.0 ± 14.4 (14.6*)	271.3 ± 20.3 (38.4*)
4.	Fecal Sterols Excretion mg/rat/48 hours	190.2 ± 3.9	230.5 ± 2.9 (21.1**)	247.6 ± 2.3 (30.1**)
5.	Prothrombin time seconds	20.0	28.0 (40.0**)	30.0 (50.0**)

Mean of four rats ± Standard error of the mean
percent Increase** and Percent decrease*.

it decreased the elevated serum cholesterol level. Sainani et al. [11] showed that routine consumption of onion and garlic reduced the serum cholesterol. Sharma et al. [7] reported that onion juice 25 g/kg body weight with high cholesterol prevented the increase of serum cholesterol. Jain and Vyas [2] also reported that the addition of garlic in the diet prevented the expected rise in serum cholesterol Sharma et al. [12], Jain and Konar [1] Bordia et al. [3] and Sharma et al. [4] also reported somewhat similar results.

Concentration of Liver Cholesterol

Liver cholesterol was significantly reduced with onion ($P < 0.05$) and garlic ($P < 0.01$). Liver cholesterol was lower with onion and garlic than control by 14.6 and 38.4 percent respectively. The decrease with garlic was 2.5 times than that of onion. Jain [2] reported that liver cholesterol was not altered by onion whereas garlic significantly decreased the liver cholesterol. Jain and Konar [10] also observed that when garlic was supplemented with cholesterol to the diet, tissue cholesterol was decreased.

Prothombin Time

Prothrombin time was increased with onion and garlic. Prothrombin time was higher with onion and garlic than control by 40 and 50 percent respectively.

Jain and Vyas [13] investigated the effect of onion and garlic on coagulability of blood. They observed that blood coagulation was increased with onion and garlic. Bordia et al. [3] also exa-

mined the effect of 50g each of onion and garlic on human subjects. They noted that onion and garlic both increased the coagulation time and fibrinolytic activity.

Total Fecal Sterols Excretion

Total facel sterols excretion were significantly increased with onion ($P < 0.01$) and garlic ($P < 0.01$). Fecal sterol excretions were higher with onion and garlic than control by 21.1 and 30.1 percent respectively. The results are similar to those of Jain [10] who reported that fecal cholesterol excretion was increased with garlic.

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