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ROLE OF *GUM ARABICA* AND *GUM CATECHU* IN GLYCEMIA AND CHOLESTEROLEMIA

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THE gums of *Acacia arabica* and *Acacia catechu* find an important place in delicious food preparations on festive and fasting occasions. Since the authors[1] reported the hypocholesterolemic and hyperglycemic effects of *Guar gum*; an interest was aroused to study the effects of *Gum arabica* and *Gum catechu* on blood sugar and serum cholesterol levels.

Normal albino rats weighing 150 to 200 g body weight were employed in three different groups. Each group comprised of 8 rats and all the rats were caged separately. Rats of group A were fed with control diet (Hindustan Lever Ltd., Bombay). The diets of groups B and C contained 15% *Gum arabica* and *Gum catechu* respectively.

Initial blood sugar and serum cholesterol in rats were estimated by bleeding the live rats[2], without anaesthesia, in the well-fed state. The blood sugar was determined by the modified method of Folin-Wu[3] and serum cholesterol by the method of Henley[4]. The rats were given the respective diets *ad lib* for a week. Then they were bled again in the well-fed state and sugar and cholesterol were estimated. The results were statistically analysed.

The rats were found to gain in body weight after one week feeding. The blood sugar and serum cholesterol in rats of group A, which were maintained on control diet, remained constant. But *Gum arabica* decreased blood sugar highly significantly in group B (table 1) and the serum cholesterol did not fall significantly. *Gum catechu* did not affect blood sugar (Group C) but serum cholesterol was increased highly significantly.

The gums had no consistency in their behaviour towards blood sugar and serum cholesterol. Whereas *Guar gum*[1] was hyperglycemic and hypocholesterolemic; *Gum arabica* was hypoglycemic and normocholesterolemic and *Gum catechu* was normoglycemic and hypercholesterolemic. The gums are digestible carbohydrate derivatives; normally they would be expected to raise blood sugar level and it was so by *Guar gum*. But the normoglycemic behaviour of *Gum catechu* and hypoglycemic effect of *Gum arabica* indicated the presence of some powerful hypoglycemic activity therein, which suppressed the elevation of sugar level. Thus the gums, especially *Gum arabica* emerged interesting for the study on carbohydrate metabolism and beneficial to the diabetic patients. On fractionation with suitable solvents, a powerful hypoglycemic agent might be isolated.

Table 1 *Blood sugar and serum cholesterol levels in rats and their statistical significance*

	Group		
	A	B	C
Diet	Control	15% Gum arabica	15% Gum catechu
Blood sugar			
Initial	99±6	96±3	103±6
After a week	99±6	78±4 ($P<0.001$)	105±8
Serum cholesterol			
Initial	93±7	93±7	90±5
After a week	92±7	90±6	108±6 ($P<0.001$)

(Values are mean + SD and are expressed in mg/dl)

In the recent findings[5,6] the feeding of hypoglycemic substances to the induced diabetic rats, merely suppressed the diabetes, that too during feeding period only and the blood sugar shot up on discontinuation of the diet, so a different behaviour could not be expected from *Gum arabica*.

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EFFECT OF THE FOOD CONTAMINANT *ASPERGILLUS VERSICOLOR* TOXICITY ON AMINO ACID UPTAKE IN RATS

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STERIGMATOCYSTIN, a biogenetic precursor of aflatoxin B_1 is a carcinogenic major secondary metabolite of *Aspergillus versicolor* which had been reported to be toxic to various species of experimental animals[1,2].

The main sites of action of most of the mycotoxins have been found to be liver, kidney, intestine and in some cases brain also. In the present investigation, to study the membrane transport, an attempt has been made to study the *in vivo* transport of two amino acids, ^{14}C methionine and ^{14}C alanine by intestinal perfusion experiment[3].

The removal of amino acids from the mucosal side of the gut to the serosal side of the tissue represents the amino acid uptake[4].

400 g of bread which contained 0.03% calcium propionate as preservative was mixed with 40% by weight of water, sterilized, cooled, inoculated with spores of *A. versicolor* (10^7 spores/ml) and allowed to incubate for 21 days at 29°C. After this period the contaminated bread was sterilized free of the fungus and dried. This contaminated diet was mixed with normal diet in the ratio of 1:2 and fed as the contaminated diet.

Weanling albino rats (40) of either sex were divided into two groups. The control group received normal diet, while the experimental group was fed with the contaminated diet. Water was given *ad libitum*. At the end of 60 days perfusion study was carried out by the method of Younoszai *et al*[3].

Perfusion fluid was 0.15 M sodium phosphate buffer (pH 7.5) containing sodium chloride 135 mM, potassium chloride 5 mM, the respective amino acids at 1 mM and C^{14} labelled amino acids.

The scintillating fluid was a mixture of dioxane and ethylene glycol (50:1 v/v) containing PPO (4 g/l), POPOP (200 mg/l) and naphthalene (60 g/l).

Rats were fasted for 24 hr before the experiment. The animal was anaesthetized by intraperitoneal injection of sodium phenobarbitone (50 mg/kg). The abdominal cavity was opened by a middle longitudinal incision, the duodenum was picked up and the common bile duct was ligated. The entire small intestine was used for absorption study as a single unit by inserting cannulas at the pylorus (inlet) and terminal ileum (outlet). The intestine was first washed with 159 mM sodium chloride solution. Then the perfusion solution was perfused at a constant rate (1.0 ml/min). After initial equilibration with buffer for 15 min, six "10 minutes-samples" were collected for analysis. The perfusate (0.1 ml) was taken immediately after perfusion and the radio activity was measured in a liquid scintillation counter with 10 ml of scintillating fluid. Radio activity of the perfusate was also measured separately.

Membrane-bound enzymes, namely total ATPase, Na^+K^+ dependent ATPase were studied by the method of Evans[5], alkaline phosphatase by the method described by King[6] and 5′ nucleotidase by the method of Campbell[7].

The results given in table 1 reveal that during *A. versicolor* toxicoses the levels of total ATPase, Na^+K^+ dependent ATPase and alkaline phosphatase are reduced while that of 5′-nucleotidase is increased.

Table 1 *Activities of total ATPase, Na^+K^+ dependent ATPase alkaline phosphatase and 5′ nucleotidase in intestinal tissue of control and experimental rats*

Enzyme	Control	Experimental
Total ATPase	3.79 ± 0.19	2.25 ± 0.24^a
Na^+K^+ dependent ATPase	2.01 ± 0.15	1.33 ± 0.09^a
Alkaline phosphatase	1.84 ± 0.11	1.52 ± 0.13^b
5′ nucleotidase	0.96 ± 0.08	1.86 ± 0.17^a

^{a} $p < 0.001$; ^{b} $p < 0.01$
Enzyme activities are expressed as μmol of product liberated per mg protein under incubation conditions (mean ± SD)

Na^+K^+ dependent ATPase is a membrane-bound enzyme and is important in maintaining intracellular sodium and potassium concentration. The decreased levels of the enzymes suggest that the *A. versicolor* toxins affect the cell membrane integrity and permeability. The decrease in alkaline phosphatase may be attributed to the fact that the membrane plasticity is being affected. 5′-nucleotidase being a marker enzyme for plasma membrane the increase in activity again reflects the membranal disturbances that are brought about by the *A. versicolor* toxicity.

Figures 1 and 2 give the uptake of ^{14}C-methionine and ^{14}C-alanine. The uptake of the two amino acids is significantly lowered in the intestinal tissue of the experimental group.

The decrease in the uptake of labelled amino acids caused by *A. versicolor* toxicoses could be discussed in terms of membrane damage, damage to the carrier