

CARTAS AL EDITOR

Effect of Tannic Acid on the Intestinal Absorption of D-Galactose in Chicks

Recently published studies both from our laboratory (7, 14) and others (6, 9) have shown that feeding growing animals on diets containing raw legumes as the chief source of protein brings about a number of undesirable physiological and biochemical effects. Frequently, these effects have been ascribed to the presence in the raw legumes of different antinutritive substances (3) as well as to the sulphur amino acid deficiency of these plant proteins (15). Inhibition of the intestinal ability to transport nutrients well could be one of the most remarkable effects observed in legume-fed animals (5, 7). Since raw legumes contain a significant amount of tannins (7, 8), we designed this experiment with the aim of elucidating to what extent tannic acid by itself might bring about in chicks a qualitative inhibitory

effect on the intestinal absorption of galactose —monosaccharide actively transported across the intestinal epithelium of birds— similar to that seen in raw legume fed birds (13).

One-day old male White Leghorn chicks weighing about 40-50 g were randomly assigned into two dietary groups of 10 animals each; one group was fed an adequate control diet containing heated soybean (HSB) as the main source of protein; a second group was fed the same HSB diet with 2.5% of tannic acid (Sigma) added (4). Animals were fed *ad libitum* over period of 49 days. Diets were isocaloric and contained about 21% of protein. Housing, way of feeding, composition of diets and other experimental details were as previously reported (12). *In vivo* intestinal absorption

Table 1. Body weight changes and *in vivo* and *in vitro* intestinal absorption of D-galactose (2.77 and 2 mM, respectively) of chicks fed *ad libitum* from birth over a period of 49 days on diets containing heated soybean (HSB) as the main source of protein with or without added tannic acid.

Diets were isocaloric and contained about 21% of protein. Entries are mean values (* SEM) from 10 animals in each group.

Diet	Body weight gain (g/day)	<i>In vivo</i> intestinal absorption of D-galactose ($\mu\text{mol}/\text{cm}$ of intestine); four successive absorption periods of 10 min each				<i>In vitro</i> intestinal absorption of D-galactose (μmol transported/100 mg of tissue)
		1st	2nd	3rd	4th	
HSB	28.7 \pm 0.7	0.49 \pm 0.02	0.50 \pm 0.01	0.47 \pm 0.01	0.48 \pm 0.01	0.67 \pm 0.05
HSB+tannic acid 2.5%	13.9 \pm 0.6*	0.33 \pm 0.01*	0.32 \pm 0.02*	0.34 \pm 0.01*	0.34 \pm 0.01*	0.56 \pm 0.05*

* $p < 0.05$, as compared to HSB-fed birds (Student's *t* test).

experiments of D-galactose (Sigma) were carried out according to the method of Sols and Ponz as described by RUANO *et al.* (11), and the *in vitro* ones by the technique of CRANE and MENDELSTAM (2). Statistical evaluations were carried out by conventional Student's *t* test.

As compared to HSB-fed birds, those treated with tannic acid exhibited a significant reduction both in the rate of growth and in the *in vivo* and *in vitro* intestinal absorption of galactose (table I). These results show that the intestinal absorption inhibitory effect was significantly greater than that observed in similar animals fed an analogous diet containing raw field bean (*Vicia faba* L.) or other legumes, over experimental periods similar to those used in this study (13). On the other hand, these results agree with previously reported investigations carried out in field-bean-fed rats in which intestinal transport of glucose was studied (7). The mechanism by which tannic acid inhibits the intestinal absorption of galactose is not completely known, although several hypotheses have been put forward (5, 6, 10). It can be suggested that the tannin content of legumes may play a significant role in both growth and intestinal transport inhibition in chicks; nevertheless, the action of other antinutritive substances contained in the raw legume seeds, especially lectins (1), cannot be disregarded at all.

Key words: Tannic acid, *Vicia faba* L., D-Galactose, Intestinal absorption, Chicks.

Palabras clave: Ácido tánico, *Vicia faba* L., D-galactosa, Absorción intestinal, Pollo.

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