SHORT COMMUNICATION

EFFECT OF DIETARY FIBRE ON ORAL GLUCOSE TOLERANCE TEST

NAWAL KISHORE, SHAKUNTALA SHARMA AND R.K. SHARMA

Department of Physiology,
S. N. Medical College and Hospital, Agra - 282 002

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Summary : Role of dietary fibre in lowering blood sugar levels has been studied in mongrel dogs. Pectin, wheat bran, guargum and Isabghol were fed with standard diet. Blood sugar levels were almost the same on 7th day ($P < .05$). However, after 15 days pectin reduced blood sugar levels significantly ($P < .05$), while other dietary fibre could not bring significant effect on blood sugar levels ($P < .05$).

Key words: dietary fibre oral glucose tolerance test

INTRODUCTION

The fibre content of the diet appears to be a big factor in normalisation of carbohydrate metabolism and has its role in reducing blood glucose levels in diabetic patients (6). Broddribb and Humphrey (2) observed in patients of diverticular disease that oral glucose tolerance curve fell when they were fed about 24 *gm* bran daily for atleast 6 months.

Recently, Jenkins *et al.* (7) have examined the effect of addition of dietary fibres on 24 hours urinary glucose excretion and found reduction by 40-50% in these subjects. The present study was undertaken with a view to compare the effect of various dietary fibre on oral glucose tolerance test (OGTT) in healthy mongrel dogs.

MATERIALS AND METHODS

Experiments were carried out on unanaesthetised healthy mongrel dogs. 24 dogs of either sex (weight 10-12 *kg* mean - $11.2' \pm 1.16$ *kg*) were randomly divided into four groups, comprising of 6 dogs in each group. Each subject was fed a standard diet prepared from conventional foods (Wheat fibre 200 *gm*, Milk 500 *ml*, Meet 500 *gm*).

Oral glucose tolerance test (OGTT) were performed by administering 2.4 *gm/kg* glucose to all the fasted dogs via stomach tube. Blood was sampled via femoral vein through a heparinized indwelling teflon catheter at 0, 30, 60, 90, 120 min in each dog. After initial estimations, different types of dietary fibre were fed with standard diet as schedule below :

Group A Pectin	— 0.5 *gm/kg*	of the body weight	(5-6 *gm*)
Group B Guargum	— 0.5 *gm/kg*	" "	(5-6 *gm*)
Group C Isabghol	— 1.0 *gm/kg*	" "	(10-12 *gm*)
Group D Wheat Bran	— 2.0 *gm/kg*	" "	(20-24 *gm*)

Blood glucose was estimated by method of Astoor and King (1). OGTT were again repeated on 7th and 15th day. The tolerance curves were plotted on a graph paper and areas under the curves were measured with a planimeter. The difference between plain GTT areas (Mean GTT) and areas under GTT with dietary fibre (△Mean GTTD) were calculated (5). Food intake and body weight of the dogs were also recorded on simultaneous days. The level of significance was determined by student 't' test.

OBSERVATIONS

The diet was well accepted by dogs. Food intake and body weight were constant throughout the study period. Results are summarised in Table I.

TABLE I : Planimetric areas during OGTT without and with different diets on 15th day.

Dietary fibre	*△Mean GTT*	*Mean GTTD*	*Difference*	*Mean body weight (kg)*	
				Before	*After*
Group A	311.0	297.4	+32.4*	10.8±0.70	10.66±0.52
Group B	287.4	269.8	+17.6	11.2±1.1	11.0 ±0.90
Group C	263.0	258.0	+ 5.0	11.0±0.96	11.0 ±0.96
Group D	309.0	299.6	+ 9.4	11.5±0.78	11.65±0.92

*$P < .05$

After administration of fibre rich diet in all groups on 7th day, the levels of blood sugar were almost the same. After 15 days, OGTT was lowered significantly in group A where pectin was fed ($P < .05$), while in other groups, the levels were reduced, but statistically the differencess were insignificant ($P < .05$).

DISCUSSION

Dietary fibre is unavailable carbohydrate which include cellulose and hemicellulose (8). In the modern era, dietary fibre has been largely neglected because it provides little nutrition, thus the incidence of diabetes and coronary heart diseases have increased tremendously (3).

The data in this study clearly indicate that pectin produced an overall decrease in OGTT over two weeks ($P < .05$), while other dietary fibre could not bring significant effect on blood sugar levels.

Jenkins *et al.* (6) have found by adding 16 *gm* guargum and 10.0 *gm* pectin i.e. 42 6% decrease in the rise of blood glucose levels over 15-90 min periods. Broddribb and Humphrey (2) studied the effect of bran on glucose tolerance test in 37 patients and found significant decrease in blood glucose levels at 1 hr ($P < .002$) and 1½ hours ($P < .04$). Walker (9) reported the effect of bran and found that fasting and 1 hour glucose levels after ingestion of 50 *gm* glucose were lowered in Bantu children. Gassull *et al.* (4) have studied the effect of unavailable carbohydrate gelling agents in reducing the post-prandial hyperglycemia in normal volunteers and diabetic patients. Jenkins *et al.* (7) have shown that such agents may inhibit the absorption of carbohydrate by an effect on gastric emptying and/or by increasing the intraluminal contents and thus limiting the diffusion and delaying small intestinal absorption.

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