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The 1-hour D-xylose test in the diagnosis of villous atrophy

by

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The results obtained in 40 cases of intestinal mucosal biopsy and parallel 1-hour D-xylose test are presented. Of 40 patients, 15 had subtotal villous atrophy, while in 25 the villous structure was intact. Among the 15 patients with villous atrophy 10 gave D-xylose values of less than 20 mg per dl. In the control group all D-xylose values were above 20 mg per dl.

In the diagnosis of the malabsorption syndromes caused by morphological abnormalities of the intestinal mucosa, peroral intestinal biopsy has become an essential procedure in the diagnosis of villous atrophy [1, 4]. The biochemical tests have less importance in this respect. Estimation of the excretion and blood concentration of D-xylose is widely used in the diagnosis of disturbances of intestinal absorption. The 1-hour D-xylose test described in 1973 by Rolles et al. [3] is often applied as a screening test for coeliac disease. These authors claimed that a serum D-xylose level of 20 mg/dl or more, 1 hour after administration practically excluded the presence of coeliac disease. The present paper reports on studies of the diagnostic value of the 1-hour D-xylose test in subtotal villous atrophy and in cases with a normal villous architecture.

Material

Three groups of patients were examined

1st group: 25 patients referred to us for suspected malabsorption, but in whom the clinical picture, a normal intestinal structure and chemical tests excluded such a condition.

2nd group: 13 patients exhibiting typical signs of subtotal villous atrophy in the biopsy specimen. Although repeated biopsies were not carried out in each patient, they all responded favourably to a gluten-free diet.

3rd group: In 2 patients subtotal villous atrophy was found, but the underlying cause could not be revealed. They failed to respond to a gluten-free diet, or to elimination of cow's milk from the diet. Giardiasis was ruled out and repeated biopsy, demonstrating the persistance of villous atrophy, excluded the possibility of post-infectious enteritis. Nor could we find a primary immune deficiency or drug intoxication. Since both these patients were admitted with severe atrophy, their condition was most likely due to protein calorie malnutrition.

All patients were below 30 kg body weight and the tests were performed after 8 hours fasting. The patients did not receive any drugs for at least 1 week prior to testing.

Methods

Peroral intestinal biopsy was carried out using Crosby-Kugler and Watson type children's capsules. The specimen for histological examination was taken at the level of Treitz's ligament. Examinations were done with a dissecting and a light-microscope. For the latter method 5 μ thick sections were prepared and stained with haematoxylin-eosin. The condition of the intestinal mucosa was categorized on the basis of the height of the microvilli: in the case of subtotal villous atrophy (SVA) their height was below 150 μ, while in the normal case they exceeded 300 μ.

The 1-hour D-xylose test was carried out according to Rolles et al. [3]. Each patient was given 5 g D-xylose dissolved in 100 ml of water. Blood was drawn before and 1 hour after the administration of D-xylose. The chemical test was done within 4 hours following venipuncture. Samples were stored at 4°C during this interval. The method of Roe and Rice [2] was followed with the modifications of Schaad et al. [5]. When evaluating the results, values of 20 mg/dl or less were regarded as pathological, values over 20 mg/dl as normal.

Results

Results for the 2nd and 3rd groups are given in Table I. In Fig. 1 the results of each group are seen separately.

In the 1st group only one patient yielded a value of 20 mg/dl, in all the other it was well above 20 mg/dl.

In the 2nd group, the D-xylose values exceeded 20 mg/dl in 3 cases, thus reaching the normal range for the

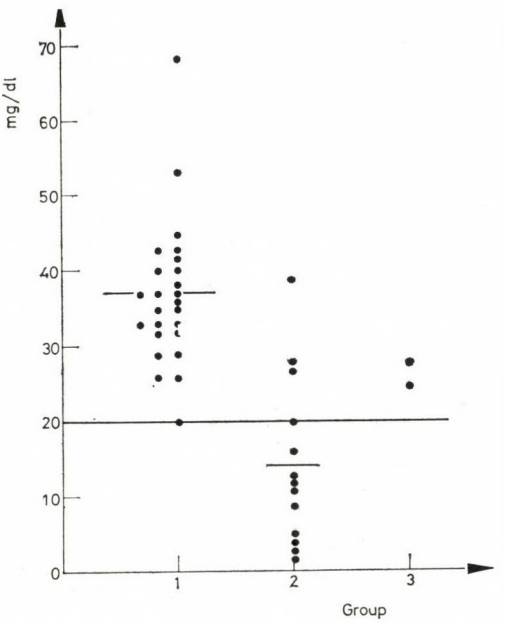

Fig. 1. 1-hour D-xylose value, mg/dl, in controls and cases of villous atrophy

TABLE I

	No. of patients	Age (year)	1-hour D-xylose value, mg/dl
Normal mucosa (1st group)	25	2.9 (0.6—8.6)	37 ± 7.4
Subtotal villous atrophy (2nd and 3rd group)	15	1.7 (0.4—6.5)	18 ± 3.8

TABLE II

	Rolles et al. [3]		Lamabadusuriya et al. [1]		Schaad et al. [5]		Present material	
	1-hour D-xylose test values							
	above	under	above	under	above	under	above	under
	20 mg/dl							
Control (normal mucosa)	75	—	19	—	not reported		25	—
Subtotal villous atrophy	1	52	6	13	—	16	5	10

test. In the 3rd group the values were over 20 mg/dl. The difference between the 1st and 2nd groups was highly significant mathematically ($P < 0.001$).

DISCUSSION

The D-xylose test values reported by different authors are collected in Table II. In the control group of patients with normal mucosal architecture the 1-hour value always exceeded 20 mg/dl. Among the 53 patients with untreated coeliac disease, Rolles et al. [3] found a single one with a value higher than 20 mg/dl. Lamabadusuriya et al. [1] found a higher value in 6 of their 19 untreated coeliac patients, while of the 16 coeliacs of Schaad et al. [5] all had values below 20 mg/dl. In addition, Lamabadusuriya et al. [1], among their 13 cases of subtotal villous atrophy and coeliac syndrome kept on a gluten-free diet, found only 3 who gave D-xylose values under 20 mg/dl.

In our own material there were 5 patients among the 15 with villous atrophy whose value was over 20 mg/dl. The results for patients with normal villous structure were in all cases in the normal zone. Thus, D-xylose values of less than 20 mg/dl present evidence of subtotal villous atrophy, but values exceeding that limit do not necessarily exclude its possibility.

The serum D-xylose level after oral administration depends on a number of factors. Among these, the quantity of xylose ingested, the osmolarity of the solution, gastric emptying, passage through the intestines, microorganisms in the small bowel, certain drugs and by all possibility the extent of villous atrophy all play a part in the process. It would be difficult and only lead to errors to take all these factors into consideration.

On the basis of our observations it may be stated that a 1-hour D-xylose test value of less than 20 mg/dl indicates villous atrophy in the small bowel, while a result above 20 mg/dl does not exclude the possibility of such a change.

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