

MEASUREMENT OF FAT LOSSES BY STEATOCRIT

METHOD IN GIARDIASIS

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ABSTRACT : Nesrin ERDEM, İffet UYSAL. Department of Pediatrics, Faculty of Medicine, Dokuz Eylül University, İzmir. Measurement of fat losses by steatocrit method in giardiasis.

This study included 40 patients with giardiasis and 40 normal control subjects. All patients were evaluated before and some of them after treatment also. They were outpatients who had symptoms of giardiasis and whose diagnoses were confirmed by detecting cysts and trophozoites of *Giardia intestinalis* in their stool specimens in the laboratory of our Mikrobiology Department. Stool fat was found to be more than 25 % in all patients with giardiasis but was not detected in normal control subjects and in control patients after treatment, by using steatocrit method.

In this study, ratios of fat losses are expressed as percentages and it was proved that fat malabsorption is reversible and disappear after treatment.

KEY WORDS: Malabsorption, steatocrit, giardiasis.

In recent years *Giardia intestinalis* infection has been realised as a frequent cause of infectious diarrhoeas. Incidence in children is higher than that in adults. Especially it causes infection more frequently in children who have malnutrition and immune deficiency and who are living in day care centers (1,3,4).

Children infected with *Giardia intestinalis* may be entirely asymptomatic, may have acute watery diarrhoea or chronic diarrhoea and more than half of patients have signs of malabsorption of fat, protein, disaccharid, fat soluble vitamins and trace elements (1,5,6,11). Stool has a fatty appearance in such cases. Classical method for estimating the amount of stool fat requires collection of stool for 72 hours and completion of this complicated analysis lasts a week. During this period preservation of stool is quite difficult.

In this study, we have estimated the amount of fat in stool of patients with giardiasis by using the steatocrit method which has been described by Phuapradit et al (2) to measure stool fat content in newborn infants. It has been reported as a simple, quick, reliable micromethod which requires only 0,5 g. stool and can be completed within 30 minutes.

MATERIAL and METHOD

This study included 40 patients (20 female, 20 male) who were admitted to the pediatric outpatient clinic of our hospital with complaints related to giardiasis (*Giardia intestinalis* trophozoites or cysts were identified in their stool specimens) along with 40 normal children (29 male, 11 female) having no complaints and no parasite in their stool specimens. After treatment, 9 patients (4 male, 5 female) of the giardiasis group had no giardia trophozoite or cyst detected in their stools. The giardiasis patient's ages ranged between 10 months to 14 years (mean 5,94 years). The ages of the normal control group ranged between 18 days to 14 years (mean 6.77 years).

We used a practical micromethod (9) to measure stool fat which had been modified from the steatocrit method of Phuapradit and co-workers (2). According to this method one volume of stool and one volume of water were mixed thoroughly and homogenised. This mixture was drawn into two capillary hematocrit tubes and filled up to two thirds of their lengths. They were sealed at one end by flame and centrifuged for 3 minutes at 3000 RPM using a hematocrit centrifuge. After centrifugation, solid material accumulated at the bottom and normally water layer remained at the top. In fat malabsorption cases, a fat layer appeared between the solid layer and the water layer. Stool fat content was expressed as percentage (steatocrit) of the total length of fat layer to the sum of the fat and solid layer.

$$\text{Steatocrit} = \frac{\text{fat layer}}{\text{fat layer} + \text{solid layer}} \times 100$$

We found more than 25% stool fat in all of the 40 patients with giardiasis. None of the 40 normal children showed any fat in their stool specimens by this method. Also, we could not demonstrate any fat in the stools of the 9 patients who had no complaint and had no parasite in their stools 2 weeks after treatment. Statistical evaluation of our results which has been done in the Institute of Computation Sciences of Ege University using MINITAB II Program is as follows.

In giardiasis group, steatocrit values were 25-29 % in 5 (12.5%) patients, 30-34 % in 6 (15%), 35-39 % in 3 (7.5%), 40-44 % in 8 (20%), 45-49 % in 1 (2,5 %), 50-54 % in 11 (27,5 %). 55-59 % in 2 (5%), 67% in 3 (7.5%) and 92 % in 1 (2.5%). Mean steatocrit value in patients with giardiasis was found 44.625 ± 13.4 and variation coefficient, 0.3002.

$$C_v = \frac{S}{X} = \frac{13.4}{44.625} = 0.3002$$

C_v = variation coefficient

S = standard deviation

X = mean steatocrit value

Since no fat was present in the stool specimens of normal control group and post-treatment group by this method the reliability degrees were not calculated and accepted as 100% for both of these group.

DISCUSSION

Giardia intestinalis infections frequently cause fat absorption disturbance in the gastrointestinal tract. Mechanisms that have been suggested to explain the absorption disturbances include physical blockade of mucosal surface by trophozoites, mucosal changes caused by invading trophozoites, mucosal damage without invasion, associated intestinal bacterial overgrowth, deconjugation of bile acids and inhibition of lipolysis (7).

Fat absorption capacity of intestine has not been measured yet. Generally it is evaluated by measuring amount of dietary fat and excreted fat. When dietary fat intake increases, fat absorption increases as well. In fat absorption investigations even though 40 g olive oil and corn is added to basal diet, excreted fat by stool is 8 percent of dietary fat or less (8). Before measuring amount of stool fat, a diet is adjusted in which fat includes 40-50 percent of energy requirement of patient. 2 days later stool is collected over a period of 3 days. Stool should be collected 6 consecutive days from the patients in whom absorption disturbance is suspected. Stool must be kept in refrigerator to prevent decomposition of fat by bacteria. This classical method requires large amounts of stool, it is a complicated analysis and is completed within one week. During this period preservation problem makes it difficult.

Fat absorption can be evaluated indirectly by serum caroten level and lipiodol tolerance test. Low serum caroten levels indicate that dietary intakes of food which contain caroten are low or absorption of fat is disturbed, but by this method, whether steatorrhea is related to intestinal mucosa or pancreas, can not be clearly distinguished. For lipiodol tolerance test, 0,5 ml/kg lipiodol is given orally and then 12-18 hours later urine is collected in fraction over 6 hour periods. Positive iodine reaction at least in 1/4 dilution of urine indicates indirectly that fat absorption is normal (10).

Phuapradit et al (2) have a simple, reliable micromethod (steatocrit) using small amount of stool to establish fat malabsorption in low birth weight infants and prematures. The authors compared the steatocrit method to Sobel's method that is used to measure stool fat

content and found correlation between the steatocrit and Sobel's method. In our study, we have applied the steatocrit method in giardiasis, an important cause of fat absorption disorders.

Although it is known that fat absorption is disturbed and steatorrhea appears in giardiasis, we have not encountered any study which has been done to measure the amount of stool fat in giardiasis in our country or in other countries. All of the 40 giardiasis patients in our series had steatocrit values higher than 25% (range 25-92%, mean $44,625 \pm 13,4\%$). None of the 40 control children had any fat in their stool specimens by the steatocrit method. Patients were treated and 2 weeks later nine arrived for follow-up. Parasitological examination of treated patients indicated that they didn't have any parasite and we observed that they didn't have any fat in their stool specimens just like normal control children.

Our findings indicate that fat loss in giardiasis is large and fat malabsorption is reversible, therefore, the steatocrit method which is a simple and reliable method for evaluation of fat malabsorption can be used for follow-up studies in giardiasis whether treatment is successful or not. However, the steatocrit method is not useful in acute cases since fat malabsorption has not become evident yet. The patients in our series were not acute ones.

ÖZET

Giardiasisde steatokrit yöntemi ile yağ kayıplarının ölçümü.

Bu çalışma 40 giardiasisli hasta ve 40 normal kontrol vakasını kapsamaktadır. Hastalar tedaviden önce ve kontrolde gelenler tedaviden sonra değerlendirilmiştir. Giardiasisli hastaların hepsi giardiasis ile ilgili semptomlara sahip olan poliklinik vakalarıdır. Tanı mikrobiyoloji laboratuvarımızda gaitada *G.intestinalis* kistlerinin veya trofozoitlerinin görülmesiyle konulmuştur. Steatokrit yöntemiyle giardiasisli hastaların hepsinde gaitada %25 ten fazla yağ saptanmış, normal kontrol vakalarının ve tedavi edilmiş kontrol hastalarının hiçbirisinde gaitada yağ bulunmamıştır.

Bu çalışmada yağ kayıp oranları yüzde olarak ifade edilmiştir ve yağ malabsorbsiyonunun reversibl olduğu, tedaviden sonra kaybolduğu ispatlanmıştır.

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