FAECAL FAT CONTENT IN HEALTHY ADULTS BY THE 'ACID STEATOCRIT METHOD'

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ABSTRACT

Malabsorption syndromes causing steatorrhoea are quite common in India. Estimation of faecal fat is an important non-invasive investigation, which provides vital information regarding the occurrence of malabsorption. The aim of this study was to estimate the fat excretion per day in stools of apparently healthy adults on an unrestricted diet in random spot stool samples using the Acid Steatocrit Method, which provides an alternate, simpler and yet reliable method of stool fat estimation. Several studies have proved the correlation of the acid steatocrit method with the conventional methods. In India, however, there has been no published data regarding the normal levels of fat in the stools, by the acid steatocrit method. We follow the normal range values, as set by the United States and the European countries, not having a range for the Indian population. Hence, we took up a preliminary study, to estimate stool fat in a section of normal and healthy Indian population. The result obtained after screening 600 healthy and normal adults, showed the mean of stool fat to be 8.72 gms/24 hours, which is much higher than that, defined by Western literature (7 gms/24 hours). This can be accounted for, by the cultural and ethnic variations in dietary and food habits. Further studies are required in the same direction, involving larger population groups, and in different malabsorptive conditions.

KEY WORDS

Malabsorption, steatorrhoea, acid steatocrit, stool, fat.

INTRODUCTION

The malabsorption syndromes result from impaired digestion or assimilation of foodstuffs by the small bowel. When a condition of malabsorption has been established, the differential diagnosis becomes important for treatment aspects. The detection of steatorrhoea is useful for the diagnosis of pancreatic insufficiency & small bowel disorders causing malabsorption. Steatorrhoea due to chronic pancreatitis and intestinal malabsorption is quite prevalent in India. Owing to difficulties imposed by, stringent preparation procedures prior to the test, the collection methods, and the elaborate analytical procedures, clinicians and laboratories shy away from asking for this valuable investigation.

In the recent years a rapid method has been

developed using a random spot stool samples- Acid steatocrit method (1). It has been established that it correlates well with the 72 hrs faecal fat level by studies conducted in the West. (1-7)

Hence in this preliminary study, an attempt has been made to estimate the levels of fecal fat in a group of healthy adults by the Acid-steatocrit method.

METHODOLOGY

Random stool samples from 600 apparently healthy adults who attended the OPD departments of our hospital as potential blood donors or as subjects for executive health check-ups, and in a section of students and staff of our college were collected. The ages of these subjects were in the range of 18-86 years. All of them were on diet of their choice and had no history of GI disorders with in the past 6 months. All the stool samples were assessed for stool fat -qualitatively by stool microscopy, and quantitatively by the acid steatocrit method as described by Tran *et al.* (1), which is briefly given below :

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A 500 mg sample of blended stool was diluted 1:3 times (by weight) with double distilled water in a 12 ml test tube. It was then mixed well by vortex action and homogenized for 2 minutes. 500 µl of homogenized stool was pipetted into a 3 ml test tube into which 100 µl of 5M HClO₄ was added and then vortexed for a minute. The pH was confirmed to be <1. This stool acid mixture was aspirated into a 75 µl capillary tube and one end of the tube was sealed with wax. This tube was then centrifuged at 13,000 rpm for 15 minutes. This resulted in the separation of the fatty layer from the solid layer. Using a focussing magnifier and scale, the fatty layer and the solid layer were measured. The acid steatocrit percentage was calculated using the formula:

$$\text{Acid Steatocrit\%} = \text{FL} / (\text{FL} + \text{SL}) \times 100$$

where, FL = Fatty layer and SL = Solid layer.

The faecal fat content was quantified as follows:

$$\text{Faecal fat} = -0.43 + [0.45 (\text{Acid Steatocrit \%})] \text{ gms / 24 hrs.}$$

The results were entered in a computer database and statistically analyzed using the Microsoft Excel spreadsheets Programme.

RESULTS AND DISCUSSION

In this study 600 subjects were included. The median age was 32.7 years. The range of faecal fat in the spot stool samples was 5.8 - 12.36 gms/24 hrs and the mean fat content was 8.72 ± 1.86 gms/24 hrs. (95% confidence interval = 8.72 ± 0.15). The mean and mode were identical at 8.72 gms/24 hrs. The above parameter followed a normal distribution pattern.

Stool microscopy did not reveal any abnormality in all 600 samples. There are a variety of methods to measure faecal fat from concentration to fat balance studies.

The methods generally used for the detection of faecal fat are, the microscopic examination (8) of freshly passed stool sample, the standard titrimetric method of Van de Kamer (9), the near-infrared reflectance assay -NIRA (10) and fat absorption tests (11). The microscopic examination though is adequately sensitive, has poor reproducibility and poor accuracy particularly in inexperienced hands. The second method, the Van de Kamer method is the quantitative estimation of faecal fat by extraction. This method needs a 72 hr collection of stool after 6 days of high fat diet and is found to be unpopular among patients and technicians. The NIRA technique is considerably advantageous over the Van de Kamer method, but this method

also requires a 72-hour sample and prior processing of the stool sample. The fat absorption tests require the patient to undergo vigorous pre- test preparation and needs sophisticated equipment. It also entails blood tests.

For the purpose of defining steatorrhoea a figure of 6 gms/day, after a diet of standard fat content, is usually taken as the upper limit in the west. However Nakamura & Takeuchi (6) have found fecal fat <5 gms/day in normal healthy individuals in Japan. This can be explained as caused due to cultural & ethnic variation in the diet.

The standard Van de Kamer method is limited in its utility by the dietary constraints imposed and the multiple stool collection procedure. There have been a number of studies (5, 6, 8, 9, 10, 11) in the USA and in the European countries using the steatocrit method, and correlating it with the 24 hrs faecal fat as measured by the standard Van de Kamer method.

In our study, it was found that, faecal fat in a random spot stool sample had mean of 8.72 ± 1.86 gms/24 hrs.

Further studies in this direction include, involving larger number of subjects of different cultural and ethnic background, for the purpose of establishment of a reference range level.

As the acid steatocrit method of stool fat estimation is relatively simple, reliable, well established and cost effective, it can be used in clinical laboratories in place of the cumbersome and uncomfortable titrimetric methods.

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