Whole-gut Transit Rates and Wet Stool Weight in an Urban Nigerian Population


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The objective of this study was to test the "dietary fiber theory of Western diseases" in Lagos, an area of relatively low prevalence, by investigating the relationship between fiber in diet, stool weight, and whole-gut transit rates in a sample of the population on an urban-type diet. A 5-day study of fiber in diet and stool weight in 9 normal subjects showed a positive correlation between stool weight and consumed fiber. A second 5-day study of the diet, whole-gut transit rates, and wet stool weight in 37 male students revealed that only 15% of the lunches and dinners consisted of staple foods rich in crude fiber, that the mean transit time for first marker was 24.8 hours (SD ± 10.8) and for 80% of the markers was 48.5 hours (SD ± 20.9), and that the mean stool weight was 143.3 gram (SD ± 48.5). There was a negative correlation between transit time and wet stool weight both for first and 80% of markers. The transit time was slower and the stool weight less than figures quoted for rural Africans, but was not significantly different from British figures. The consequences of adopting a sophisticated low fiber diet due to urbanization in rapidly developing urban communities are discussed. It is suggested that in order to prevent an increase in the incidence of colorectal "Western diseases," a health education drive in urban areas highlighting the qualities of high fiber staple foods be instituted.

Geographical pathology of large bowel disease, such as diverticular disease of the colon, appendicitis, carcinoma of the colon and rectum, and hemorrhoids, has been the subject of many papers in recent years [1–4]. The epidemiological evidence for the relationship between low dietary fiber, small weight of stools, slow transit rates of intestinal contents, and the colorectal conditions listed above have previously been highlighted [5]. Bearing in mind the apparent rarity of some of these conditions in various populations studied in Africa and in Lagos [6, 7], and the prevalence of hemorrhoids among the urban population of Lagos, this study was designed to confirm the already established relationship between crude fiber in the diet and stool weight [5], and to measure the transit rates in a sample of the Lagos population.

Material and Methods

A small group of 9 male patients with no bowel disorders, admitted to the wards of Lagos University Teaching Hospital for hernia operations, was studied. They were fed on a normal mixed hospital diet with at least 2 meals a day containing high fiber staple foods. The various items of food were carefully recorded for 5 days and the amount of food eaten was calculated by weighing the food served to the patients and subtracting the weight of food remnants, if any. The amount of fiber consumed was calculated from available food tables [8, 9]. Daily stools were collected for 5 days and the average daily weight of stools for each subject was calculated.

A second group of 37 final-year male medical students was also studied. They had no bowel symptoms, their ages ranged from 23–28 years with a mean of 25 years, and they were fed the students' cafeteria meals. A daily food chart with a record of the type of food eaten at every meal was kept for 5 days during the period of study. The whole-gut transit rate was studied by a modification of the
method of Hinton et al. [10]. Twenty barium-impregnated radiopaque pellets were ingested with breakfast at 8:00 a.m. on the first day of the test. Six hours after ingestion of the pellets, a plain x-ray of the abdomen was performed and the number of pellets were counted in order to ascertain that all pellets had been ingested (Fig. 1). The stools were then collected in polythene bags properly labelled with date and time of passage over a period of 5 days. The specimens were examined by fluoroscopy using an x-ray image intensifier, and the pellets contained in each parcel were counted, care being taken to flatten out the stools in the polythene bags so that pellets did not overlap. The times at which the first marker appeared in the stools, as well as the time required to pass 80% of the markers, were recorded in all subjects. The stools were weighed daily in the polythene bags and a record was made of the bowel habits of each student.

Results

Relationship of Ingested Fiber to Wet Stool Weight

The average daily wet weight of stools obtained from the 9 hospitalized subjects studied over 5 days and the average daily amount of fiber consumed during the same period are shown in Table 1. Analysis shows a statistically significant positive correlation between stool weight and fiber in diet (Fig. 2). The mean daily stool weight during the same period of all 9 subjects was 169 grams (SD ±55.3) and the mean crude fiber intake was 7.7 grams (SD ±2.35).

Fig. 1. Plain x-ray of the abdomen showing radiopaque markers.