

From the Department of Clinical Nutrition and  
the Department of Surgery II, University of Göteborg,  
Sahlgren's hospital, Göteborg, Sweden

**DIETARY FIBRE  
– DETERMINATION AND  
PHYSIOLOGICAL EFFECTS**

*A study on ileostomy patients*

by

Ann-Sofie Sandberg

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## ABSTRACT

### DIETARY FIBRE - DETERMINATION AND PHYSIOLOGICAL EFFECTS

A study on ileostomy patients

by Ann-Sofie Sandberg, the Department of Clinical Nutrition, University of Göteborg, Sahlgren's hospital, S-413 45 GÖTHENBURG, Sweden

The aims of the present study were 1) to develop a method for determining dietary fibre *in vivo*; 2) to investigate whether the fibre components are degraded in the stomach and small intestine, 3) to study the effects of some dietary fibre sources on the absorption of nutrients in the small intestine, 4) to develop a simple *in vitro* method for estimation of dietary fibre. For 1) - 3) an experimental model with *in vivo* digestion in ileostomy subjects was used as it allowed the determination of fibre components in the ileostomy contents.

The ileostomy subjects were studied during two consecutive weeks on a constant low fibre diet which during the second period was supplemented with wheat bran, or during 10 consecutive days with a supplement of wheat bran or pectin on days 5, 6 and 7. Duplicate portions of the diet and ileostomy contents were collected and subjected to analyses of neutral polysaccharide constituents, uronic acids, Klason lignin, starch, phytate-P, nitrogen, fat, electrolytes and minerals. The added wheat bran or citrus pectin were analysed separately.

Almost the same amount of dietary fibre was obtained by *in vivo* digestion in ileostomy subjects as by direct *in vitro* determination of the fibre components of wheat bran. Approximately 80-100 % of the main hemicellulose components of bran, 75-100 % of the cellulose and 70-100 % of the uronic acids derived from citrus pectin were recovered in the ileostomy fluid. Thus, digestion in the stomach and small intestine of the fibre components studied occurs only to a minor extent. The degradation of phytate from bran was greater. Between 24 and 61 % of ingested phytate was found in the ileostomy fluid.

The ileostomy losses of nitrogen, fat and starch were not affected by an intake of 16 g of wheat bran/d. The addition of 15 g of citrus pectin/d caused an increased loss of nitrogen and particularly of fat, indicating impaired digestion and absorption of fat and possibly protein or increased endogenous losses of nitrogen from the small intestine.

The sodium excretion in ileostomy fluid increased both after intake of wheat bran and citrus pectin and was well correlated to the increase in wet weight of ileostomy contents. Wheat bran did not negatively affect the apparent absorption of minerals from the small intestine other than that of zinc, whereas pectin decreased the apparent absorption of iron.

The neutral detergent and acid detergent methods for rapid *in vitro* determination of fibre are evaluated. A significant amount of crude protein was found in the neutral detergent fibre residues and soluble polysaccharide components were lost. The acid detergent fibre residues were contaminated with hemicellulose and pectin. Thus, these methods cannot be used for adequate fibre determinations.

A simplified method for the determination of dietary fibre based on gravimetric determination of the residue after extraction with 80 % ethanol and chloroform and deduction of starch, crude protein and ash content from the residue is proposed. The method was applied to some cereals and vegetables and compared with determination of dietary fibre estimated as the sum of polysaccharide components and Klason lignin minus starch. Sufficient agreement in results was obtained when using the two methods.

*Key words:* dietary fibre, nutrient absorption, mineral absorption, small intestine, phytate, pectin, *in vitro* methods.

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