

Fiber content of bran breads. Discrepancy between reality and food label information in Lahore, Pakistan

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Summary. *Background.* Dietary fiber is known to have several physiological benefits. Wheat bran, which is added to bran breads, can be a good source of dietary fiber. Recently, the consumption of bran breads has increased tremendously in Pakistan, as consumers attempt to increase their fiber intake. But the discrepancy of nutrition fact labels with the actual amounts of nutrition provided by a food product has always remained as a source of consumer's mistrust on commercial products. *Aim of the study.* This study was carried out to assess the fiber content of commercially available bran breads and to compare the extracted amounts with the content reported on food labels. *Methods.* Manual proximate analysis of six brands (three from industry and three from bakery) of breads locally available in Lahore, Pakistan was done. Three samples of each bread were analyzed for fiber content and the average content was calculated. *Results.* The findings showed that industry products on average contain a significantly larger fiber content compared to the bakery products. Significant differences in fiber extracted and that mentioned on the package label were revealed; the actual fiber content extracted was significantly less than that mentioned on the food labels. A serving of local bran bread was found to fulfill <1% of daily adequate intake for dietary fiber. *Conclusions and recommendations.* It is suggested that bran breads locally available in Lahore, Pakistan should not be relied upon as a sole source of dietary fiber. Also, the food industry is suggested to revise food labels and to justify their claims in order to help protect the consumer's rights.

Key words: bran, dietary fibre, proximate analysis, food labels, bread

Introduction

Recent surge in the demand for fiber rich foods is probably ironical; it has gained much attention after the refined grain products became popular. Wheat bran, the outermost edible and nutritious layer of the grain (1) is added to a variety of food products for the outstanding quantity of dietary fiber contained in it. In this regard two products with similar composition, bran breads and whole grain breads, have gained popularity. Whole wheat bread results from the use of whole grain flour, including bran and the entire grain (2), while, the bran bread is made by adding bran to all-purpose flour. Wheat bran bread contains about 11grams of fiber per 100 gram bread (3).

Historically, the term dietary fiber has seen several revisions in its definition and is now used to refer to the intact plant components not digestible by human enzymes (4). Being structural part of the plants, dietary fibers are found in rich quantities in whole grains, vegetables, fruits, edible seeds, bran, and legumes (5). The term crude fiber refers to the inorganic residue left after acid and alkali treatment of food and contains cellulose, lignin and hemicellulose (6).

Evidence supports several physiological benefits of fiber intake and is recommended for the management of several chronic diseases. A research study (7) showed inverse correlation between dietary fiber intake and several cardiovascular risk factors in both sexes, supporting its protective role against cardiovascular

disease. Increased fiber intake has also been found to be associated with the management of diabetes (8). In addition, consumption of fiber rich foods is linked to weight management. Whole-grain products have been distinguished from refined-grain products to aid in weight control. In a research study, weight gain has been found to be inversely associated with the intake of high-fiber, whole-grain foods and positively related to the intake of refined-grain foods (9). This role of fiber rich foods in weight control may be due to their high satiety value. Fiber intake delays gastric emptying and reduces food intake in same as well as in the next meal (10). These beneficial effects of whole grain consumption on body mass index and lipid profiles have also been observed in obese Pakistani women (10).

Role of dietary fiber in maintenance of gastrointestinal tract health is also well established. In a meta-analysis (12), the authors concluded that fiber intake can increase stool frequency in constipated patients. High intake of cereal fiber is associated with decreased risk of gastrointestinal cancers including colorectal, stomach and liver cancers (13). Fermentable fibers can promote immunity by acting as prebiotics and stimulating the growth of bacterial mass in the gut (10).

Owing to its widespread health benefits, high fiber intake is an important recommendation in therapeutic diets of several chronic diseases (4). Additionally, fiber intake has been recommended for general healthy population, emphasizing on its potentially preventive effects. According to the United States' Institute of Medicine (14), adequate intake for total fiber is 38g and 25 g/day for adult males and females respectively.

These recommendations for daily fiber intake can be met by choosing whole foods over refined items. Although, a combination of whole grain components has been suggested to impart health benefits (15), others have suggested the particular role of bran component (16, 17). Bran breads should logically contribute significantly to the daily fiber intakes and thus, be of public health importance. This study was carried out with the objective of assessing the fiber content of bran breads locally available in Lahore, Pakistan and to determine the percentage of fiber recommendation contributed by them.

Material and Methods

Study setting

The analysis was done in Food and Biotechnology Research Center, Pakistan Council of Scientific and Industrial Research (PCSIR) laboratories, Lahore, Pakistan.

Study design

Cross sectional design was adopted for this study.

Sample

Six local brands of bran breads were non-randomly selected based on their widespread use and availability. Half (n=3) of the samples were taken from local bakeries while the rest (n=3) were local food industry brands. Three samples from each brand were analyzed for composition.

Methods

Acid/alkaline hydrolysis method was used for crude fiber determination (18). The analysis was carried out manually. Drying oven, Soxhlet apparatus, desiccator furnace, and laboratory weighing balance were the main apparatus used. The reagents used included 1.25% sulfuric acid, 1.25% sodium hydroxide solution and hexane. The samples were homogenized and oven dried to constant reading at 100 degree Celsius. They were then extracted with hexane in Soxhlet apparatus to remove the crude fat. The dried and defatted samples were boiled for 30 minutes first with 1.25% H₂SO₄ and then with 1.25% NaOH solutions. Lastly, the dried filtrate was ignited at 600 degree Celsius for 8 hours in desiccator furnace. Percent crude fiber was calculated using the following formula.

% crude fiber = $100 * [(Weight\ of\ crucible\ with\ defatted,\ dried\ sample) - (weight\ of\ crucible\ with\ ash)] / weight\ of\ sample$

Results

Average fiber contents of the samples from two sources (bakery and industry) were 0.79%±0.04 and 1.09%±0.02 respectively (Table 1). Bakery breads

Table 1. Fiber content analysis of bran breads

Samples	Fiber content in g/100g of bread (M±SD)	Fiber content (g)/ serving (1 slice=28g)				
		Observed content [O]	Expected content [E] ^a	Deficit (O minus E)	% E met (O/E*100)	% AI ^b met per serving
Bakery products	0.79±0.04	0.2212±0.0002*	4.0000*	-3.7788	5.53	0.69
Industry products	1.09±0.02	0.3052±0.0003*	1.0000*	-0.6948	30.52	0.95

Note: ^a mentioned on label, ^b adequate intake for dietary fiber=32g/day on average¹⁴

**p*=0.000

had lesser average amount of crude fiber than the local industry products. The average fiber content of one serving (one slice of bread=28grams) was found to be 0.2632±0.0002g (0.2212g for bakery products and 0.3052g for industry products). The difference between fiber contents of both sources was statistically significant (*p*<0.05). A serving of bakery bran bread provided 0.69% of the adequate intake [AI] for fiber while industry product fulfilled 0.95% of the AI. The bakery products were found to have 5.53% while the industry brands had 30.52% of fiber content mentioned on their labels (Figure 1). The amounts of fiber extracted were found to be significantly different from that mentioned on the food labels (Table 1)

Discussion

Although, bran breads are usually preferred over white breads for dietary fiber contained in them, the results revealed that they fail to fulfill this requirement

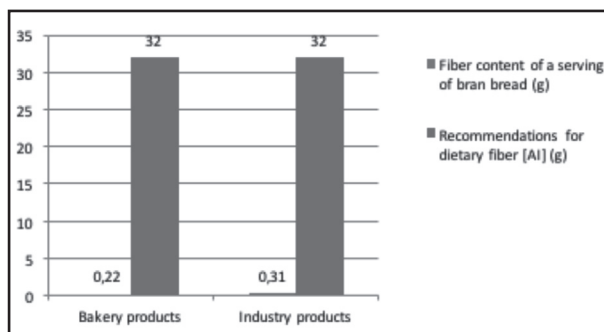


Figure 1. Comparison of fiber content extracted from one serving of bran breads with the recommended dietary inakes for fiber

of the consumers. A food is said to be a good source of a certain nutrient if a serving covers 10% to 19% of the daily value for that nutrient (4). Based on this definition, bran bread providing less than 1% of daily recommendation for fiber cannot be claimed to be a good source of fiber, neither should it be encouraged over white bread for increasing the fiber intake.

Moreover, the amounts of fiber extracted were found to be significantly different from that mentioned on the food labels (Table 1). Although crude fiber does not depict the exact dietary fiber content, it includes most of the insoluble fiber component (6). A major portion of wheat bran is composed of cellulose. The hemicellulose and soluble fiber concentration in wheat is significantly less (1% of dry weight) as compared to other cereals (19). Therefore, even if crude fiber is not fully representative of fiber fraction, the natural composition of wheat bran tends to make it so. The crude fiber extracted from breads in this study can, therefore, be said to represent the major fiber fraction of breads included in the research.

In the current study, only some brands of bread were analyzed and manual technique was employed for proximate analysis. The future researchers are suggested to extend this work using more robust methods and including a larger sample of claimed fiber rich grain products. The huge discrepancy between the extracted fiber content and that claimed on food labels requires attention of the industrialists, food scientists and policy makers. This issue certainly has public health significance and has implications for the consumers of bran breads who invest relatively larger amount of money for protecting their health.

The food manufacturers are suggested to revise the food labels and to justify the claims made on the labels. The food label regulatory bodies must responsibly control for the information being delivered to the consumers.

Conclusions

Although the fiber content of industry products was found to be higher compared to the bakery bran breads, neither of them contained the amounts mentioned on their labels. Bran breads, generally expected to increase fiber intakes, were found to meet only a small percentage of daily requirements of dietary fiber. Revision of food composition labels and further fiber content assessment of whole grain products is recommended in order to protect the consumer rights and to help the public in making right food purchasing decisions.

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