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Evaluation of labeling and nutritional information of wholemeal breads: fiber, sodium and adequacy with current legislation

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Abstract

Ensuring useful and reliable information on food labels is a right secured by the Code of Consumer Protection that helps choose the best products. This study aimed to evaluate the labeling and nutritional information of wholemeal breads concerning contents of dietary fibers and sodium, conformity to existing laws and the Substitute of Law 5.081/2013, pending in Congress. This is an observational and descriptive study conducted in Caxias do Sul-RS, with data collected from April to May 2014. We analyzed 30 labels of breads and applied a form based on the proposed objectives: amount of fiber and sodium in a 50g serving conformity to the RDC 90, RDC 54, and Substitute Bill, regarding the indication of whole-wheat flour as the first ingredient, price and availability of the quality stamp that certifies whole grain products. It was found that half of the labels examined did not conform to RDC No. 54; 73.3% did not meet some requirements of the RDC No. 90; and 73.3% did not comply with the Substitute Bill in process; 60% of the bread brands did not indicate whole-wheat flour as first ingredient; and 86.7% of the bread brands examined did not have the certification stamp The average content of sodium found on the labels was 185 mg, which represents more than twice the "low" attribute referred to in the RDC 54. We concluded that most of the labels in this study showed various nonconformities in relation to the proposed objectives.

Key words: Food labeling. Fibers. Sodium. Nutritional Facts. Legislation breads. Legislation Food. Bread.

Introduction

One of the foods most recommended by health professionals is whole-wheat bread. Whole grains are foods that have been widely studied because of the dietary fibers in their composition, and the adequate intake of fibers in diets reduces the risk of high blood pressure,[1] *diabetes mellitus*,[2,3] dyslipidemia,[4] cardiovascular diseases,[5] gastrointestinal diseases,[6,7] cancer,[8-12] and obesity.[4,13]

Whole-wheat flour for home use is obtained "from dehusked grains and with maximum ash content of 2.0% on dry matter" (author's translation). For industrial use, it is used whole-wheat flour obtained from dehusked grains and maximum ash content of 2.5% on a dry basis, and it should meet specific requirements for each application segment.[14]

The American Association of Cereal Chemists International (AACCI) and Food and Drug Administration (FDA) define whole grains as "the intact portion of the grain, whose principal components, the endosperm, germ and bran, are present in the same relative proportions as they exist in the intact grain".[15,16] Whole-wheat flour consists of flour entirely milled from grains, containing the bran, the germ and the endosperm. Whole-wheat bread, according to Resolution RDC no. 90 of October 18, 2000, is defined as the "product that is mandatorily prepared with bread flour and whole-wheat flour and/or wheat fiber and/or wheat bran"[18] (author's translation). However, as the minimum allowed amounts of whole-wheat flour are not specified, any quantity, even tiny amounts, the product label indicates as having whole-wheat flour in its composition. Prevalence of consumption of whole-wheat bread, according to gender, is represented by male (1.3%) and female (2.4%). The southern region has the greatest percentage of whole-wheat bread consumption, of 4.3%. *Per capita* consumption according to the income class is found among the higher salaries, of R$ 1,089.00, which represents 2.5 grams (g)/day.[19]

The Brazilian Institute of Geography and Statistics (IBGE), in a partnership with the Ministry of Health, investigated the nutritional profile in the country, and found that 68% of the population consumes too little of dietary fibers, below the recommended levels, and more than 70% of the population consumes sodium above the tolerable upper intake levels,[19] which is confirmed by the average consumption of the Brazilian population, of 9.6g/day/*per capita*.[20] The World Health Organization (WHO) recommends sodium intake to less than 2,000 milligrams (mg), which is the upper limit of sodium intake per day. People with hypertension should consume amounts of sodium below such recommended level.[21] Excessive sodium intake has been considered a cause of high blood pressure, stomach cancer, and cerebrovascular accident, or stroke.[20] The above-described nutritional profile of Brazilians can be explained by their high consumption of processed foods.

Globalization, urbanization and the growing number of women entering the labor market are factors that have contributed to a change in the Brazilian dietary pattern. With globalization, products not consumed before began to be offered; and urbanization (in Brazil, in 2000-2010, there was an increase of 23 million people) attracted the interest of supermarket networks to the urban centers, which favored the access to ready-made foods, high in sodium, fats and sugars.[22] Consumption of processed foods has grown 317.64% in the last 30 years.[23]

Today, there is a large supply of "ultra-processed" foods, which Monteiro et al.[24] define as any food derived from raw food or *in natura* food, added or not by other processed foods, which undergo a high degree of processing and are intended to have long shelf life, be accessible and palatable. Ultra-processed foods may have addition of salt and sugar, additives, vitamins and minerals, and may be subjected to techniques such as frying, toasting, smoking, sautéing, cooking or drying. Usually they are foods with high amounts of calories, sodium, trans fats, and with low amounts of dietary fibers, which, according to Popkin, have a strong relation with the increase of non-communicable, chronic diseases.[25] Examples of ultra-processed industrial foods are sliced bread, frozen, ready-made products, pizzas, pasta, hamburgers, nuggets, sausages and smoked meats, bakery products with high contents of hydrogenated vegetable fat, emulsifiers and other additives, biscuits, ice creams, cakes and packaged cake mixes, packaged snacks, candies and sweets in general, seasonings and sauces, soft drinks, among others.[26]

IBGE found that consumption of ready-made meals and pre-made mixes has grown 37%.[19] The interest for practical, fast foods can be partially explained by other factor that contributed to the increasing consumption of processed foods: women entering the labor market. This resulted in less free time for women to cook the meals, which increased the consumption of sandwiches, ready-made foods and fast foods.[22] The widespread marketing of high calorie foods and poor in nutrients with affordable prices,[27] as well as the practicability that they offer in not requiring utensils such as cutlery and plates, favored the option for processed foods.[26]

Considering these factors, consumers should understand and use the information contained on food labels so that they can choose the best products, and health professionals can indicate the foods that have the greatest health benefits to the population.

This study aimed to assess labeling and the nutritional information of whole-wheat breads regarding the composition of dietary fibers and sodium and their conformity to current legislation.

Methodology

This is an observational and descriptive study of assessment of labels of different brands of whole-wheat breads. Thirty bread brand names marketed in Caxias do Sul, state of Rio Grande do Sul, were selected. The brand names of the assessed whole-wheat breads were not identified in order to preserve their identity. For comparison of the product varieties, the diverse breads were identified with numbers. Criteria for inclusion were that the labels clearly identified "whole-wheat bread", the composition of Nutritional Information indicated the contents of fibers and sodium, and that the serving weighed 50g. This amount of breads serving was based on the RDC no. 359,[28] of December 23, 2003, which stipulates 50g serving for packaged breads, sliced or not, stuffed or not.

Breads not named "whole-wheat bread" and had a serving weight different from 50g were excluded. Information on the amount of fibers and sodium was collected for each 50g of bread contained on the label. To assess the food labels of whole-wheat breads, a specifically developed form was used, based on the proposed goals: amount of sodium and dietary fibers in 50g serving, consistency with the information printed on the label, according to the RDC no. 54, of November 12, 2012, which defines dietary fibers source or high content of dietary fibers. It was also investigated whether the bread makers have been adapting themselves to meet the Substitute of Bill nº 5.081/2013, which regulates the sale of whole-wheat breads as well as the first ingredient mentioned on the nutritional information, and the existing certification stamp of whole grain products on the product, and price.

The brands selection process was conducted from April to May, 2014. Data were entered into a database for further descriptive analysis and comparisons between the samples and variables. In this study, descriptive statistics was used, in which data were represented by absolute numbers and frequency, as well as mean and standard deviation. Data were analyzed using the Statistical Package for Social Sciences (SPSS)®, version 18.0. Chi-square test and student's t-test were used. Results were considered statistically significant when p-value was equal to or lower than 0.05.

Results

In total, 30 labels of whole-wheat breads were examined. Some nonconformities to current laws and the Substitute Bill under consideration by the Senate were observed on the food labels. Half of the products was not consistent with the RDC no. 54/2012, with respect to the terms "source" and "high content" of fibers. Approximately 73.3% of the labels did not conform to the Substitute Bill cited. Moreover, 73.3% of the labels did not indicate the percentage of whole-wheat flour, as provided for on section 9.4 of the RDC no.90 of October, 2000. The other variables, with respect to law, are shown on Table 1.

Table 1. Percentage of conformity to current legislation of the assessed labels of whole-whet breads sold in supermarkets in Caxias do Sul–RS, Brazil, 2014.

Variable	N (%)
Conformity of terms "source" and "high content" of dietary fibers to RDC no. 54/2012[24] (n=30)	
No	15 (50.0)
Yes	15 (50.0)
"Source" conformity (n=14)	
No	2 (14.3)
Yes	12 (85.7)
Conformity of "% of whole-wheat flour" > 51% or < 51%- to Law no. 5.081[26](n=30)	
No	22 (73.3)
Yes	8 (26.7)
Conformity to the RDC no. 90[20]- statement of "% of whole-wheat flour" used	
Not stated	22 (73.3)
Stated	8 (26.7)

Legend : n= number; RDC= Collegiate Board Resolution; >= higher; < = lower.

It was observed that of the labels containing the certification stamp, only 33.3% indicated whole-wheat flour as the first ingredient of the list. When the relationship between the existing quality stamp and conformity to the required percentage of whole-wheat flour was examined, statistical significance was found, i.e., the labels having the stamp printed on are the ones that best conform to the legislation (Table 2).

Table 2. Relationship between printed certification stamp with conformity of the assessed labels of whole-wheat breads sold in supermarkets in Caxias do Sul-RS, Brazil, 2014.

Variable	Stamp (%)	P value*
Conformity of terms "source" and "high content of dietary fibers" to the RDC no. 54/2012[24]		
No	6.7	0.59
Yes	20.0	
"Source" conformity (n=14)		
No	0	1.0
Yes	25.0	
Conformity of "% of whole-wheat flour" > 51% or < 51% to Law no. 5.081[26]		
(n=30)	0	0.003*
No	50.0	
Yes		
"Whole-wheat flour" -1st on the ingredients list (n=30)		
No	0	
Yes	33.3	0.02*
RDC no. 90[20]- statement of "% of whole-wheat flour" used		
Not stated	0	
Stated	50.0	0.003*

Legend: RDC= Collegiate Board Resolution; %= percentage; n= number; > = higher; < = lower; 1st = first; p= p-value .

Regarding the relationship between price and other variables, it was found that the price of the majority of the products that did conform to the legislation was higher, with statistical significance for the breads that were consistent with the Substitute Bill and RDC no. 90 (Table 3).

Table 3. Relationship between price and conformity of labels and certification stamp of whole-wheat breads sold in the supermarkets of Caxias do Sul-RS, Brazil, 2014.

Variable	Average price# R$ (SD)	P-value*
Conformity of terms "source" and "high content of dietary fibers", according to the RDC no. 54/2012[24]		
No	5.88 (1.97)	0.006*
Yes	7.99 (1.94)	
"Source" conformity (n=14)		
No	7.63 (0.29)	0.77
Yes	8.11 (2.17)	
Conformity of "% of whole wheat-flour" > 51% or < 51% to Law no. 5.081[26]		
No	6.43 (2.18)	0.04*
Yes	8.32 (1.67)	
Whole-wheat flour -1st on the ingredients list		
No	6.69 (2.28)	0.48
Yes	7.29 (2.11)	
RDC no. 90[20] Statement of % of whole-wheat flour used		
Not stated	6.42 (2.18)	0.04*
Stated	8.32 (1.67)	
Certification stamp		
No	6.78 (2.29)	0.35
Yes	7.91 (1.35)	

Legend: RDC = Collegiate Board Resolution; n= number; % = percentage;
> = higher; < = lower; #Average price of 500 g of bread; SD = Standard Deviation;
R$ = value in reais; p = p-value.

The ratio of the average content of dietary fibers to whole-wheat flour was found to be of 2.7 g on average (SD=0.8) in the breads that did not have whole-wheat as the first ingredient and an average of 3.3 g (SD=0.6) in those which have whole-wheat as the first ingredient, being statistically significant (p=0.05). Thus, the labels containing whole-wheat flour as the first ingredient of the nutritional information had a higher average content of fibers when compared to the labels that did not have whole-wheat flour as the first ingredient.

As to the correlation between fibers and sodium milligrams, an inverse relation was found, i.e., as the amount of fibers increased in the product, the amount of sodium decreased, although not statistically significant (p=0.55).

Discussion

Contemporary dietary patterns associated with an easier access to industrial foods, rich in sugars, sodium and fats, and poor in fibers, which help trigger the onset of non-communicable diseases, contribute to the morbidity and mortality profile and the continuous increase of prevalent overweight in the country.[29] Labels provide consumers with accurate information on the foods they choose. Considering these factors, it is necessary that consumers use and understand the information contained on the labels, to help them choose the best products, and health professionals to indicate the foods that offer the best benefits to the population.

In the present survey, various nonconformities to current legislation were found. According to the Resolution RDC no. 54, of November 12, 2012, in order that foods can be classified as with "high content of fibers", they must contain at least 5g of fiber per serving. To be defined as "fibers source", it must have at least 2.5 of fibers per serving (ANVISA).[30] The companies affected by this Resolution had until January 1st, 2014 as the deadline to make the necessary adjustments on the products. Only half of the brands examined conformed to this new rule.

The RDC no. 90 of October 18, 2000[18] approved the Technical Regulation regarding its section 9.4, which specifies that the labels must contain the bread name and quality, stating that "when the product has in its composition whole-wheat flour, wheat bran and/or cereal grains flour (except wheat), leguminous foods, roots and tubers, the label must provide the percentage of these ingredients." (Author's translation). Bread makers had 180 days from the date of publication of the regulation (October 20, 2000) to make the necessary adjustments to meet the new rule. The present study showed a noncompliance percentage of 73.3% to the regulation.

There is a lack of parameters for the amount (percentage) of whole-wheat flour that breads must contain, once the Resolution RDC no. 90, of October 18, 2000[18], defines bread as a "product that must be prepared with wheat flour and whole-wheat flour and/or wheat bran." (Author's translation). Because the minimum amounts of whole-wheat flour are not established, any amount, even tiny ones, will be claimed on the label as having whole-wheat flour in its composition.

Given this dilemma, the Bill no. 5.081-A of 2013[31] was drafted, which provides for marketing rules of whole-wheat breads. The National Agency of Health Inspection (ANVISA), seeing the need to establish criteria for the amount of whole-wheat flour in foods, suggested changes to the wording of the bill, which is under consideration by the Brazilian National Congress in the form of Substitute. The Substitute Bill requires the use of the wording "whole and the like" on the labels of grain-based foods.

ANVISA' suggestions, which are part of the Substitute Bill, can be briefly described as follows:[32] to include all grain-based products, not only whole-wheat bread; replace the word "packaging" by the appropriate technical term "labeling", because the RDC no. 259/02 of September 2002,[33] defines packaging as "the container, box or bag intended to ensure protection, easy transportation and handling of food products", and labeling as the "descriptive or graphic matter, printed, marked, stamped, engraved, embossed, lithographed or sticked on the food package." (Author's translation).

ANVISA also suggested the substitution of the terms "whole grains" by "whole grain flour" and the creation of the word "whole", which must appear on the labels when the product has more than 51% (fifty-one percent) of whole grains in its composition. Products containing 15% (fifteen percent) to 51% (fifty-one percent) of whole grains "shall indicate on the label the term 'semi-whole' or 'with addition of whole-wheat flour'". The product with less than 15% (fifteen percent) may not use any reference on the labels that it is a "whole" or "semi-whole" or "with addition of whole-wheat flour product" or any other wording that may induce consumers to realize that that product is a whole grain product. This Substitute was approved by the Commission of Economic Development, Industry and Commerce, and proceeded to the Consumer Protection Commission (CDC) and the Commission of Constitution, Justice and Citizenship (CCJC), where it is under final consideration. Currently it is awaiting the opinion of the CDC's rapporteur.

In this study, the word "label" was chosen because of the definition of the RDC 259/02[33] of September 20, 2002 and the decision of the Substitute Bill to replace "packaging" by "labeling". Objective of this study is precisely the reading of the "labels" of the foods assessed.

In the present survey, considering the Substitute of Law no. 5.081,[32] 73.3% of the food labels would not be in conformity with the law if it were in force. About 26.7% would be adequate, which can be explained by the requirement imposed on two industries of well known brand names in the country by decision of the Court of Justice of Rio de Janeiro, which demanded these companies to inform, in a period of 180 days (notification in February 2014), on their labels the actual content of whole-wheat flour in the composition of their food products. A Public Lawsuit filed by prosecutor Pedro Rubim, Public Prosecutors' Office of Collective and Consumer Protection of Rio de Janeiro (MP-RJ), was prompted by complaints from consumers.

In this study, it was observed that 60% (n=30) of the samples did not indicate whole-wheat flour as the first ingredient on the list of ingredients. Such result was found in an analysis conducted by PROTESTE – Consumers Association,[34] a civil nonprofit entity considered the largest consumer defense organization in Latin America, which also integrates the National Consumer Defense System (SNDC), coordinated by the Department of Consumer Defense and Protection (DPDC), an agency under the Ministry of Justice. This association conducted a research in 2012 with seven brands of whole-wheat breads and found that four brands had refined wheat flour as the first ingredient. The analysis was used as an argument in favor of the Bill that is under consideration in the form of Substitute.[32] As mentioned earlier, the RDC 90[18] does not specify that this ingredient must be the first on the list, but the RDC nº 259[33] of September 2002, which issued the Technical Regulation on Packaged Food Labeling, reads as follows: "the respective proportion of all ingredients must be indicated in descending order" (author's translation). Therefore, any bread named "whole-wheat bread", if it does not indicate whole-wheat flour as the first ingredient, will not be a good food choice.

In a study conducted by Pimentel & Simões[35] in northern Paraná, which assessed the population's awareness of the health benefits associated with dietary fibers intake, it was found that the consumers in the region had a satisfactory level of awareness, and that whole-wheat bread was one of the most consumed food products by the 58% of the respondents. This information only reinforces the idea that consumers understand the benefits of dietary fibers but fail to read the label regarding the amount or presence of whole-wheat meal as the first ingredient of the product to be chosen.[35]

The Whole Grains Council – WGC is a nonprofit organization of consumer defense located in Boston, United States,[36] operating jointly with its mother company, Oldways, and supported by a colligation of small and big companies that produce and support whole grain products. The council is continuously working with governmental agencies, including FDA of United States, and the United States Department of Agriculture (USDA) to, under government's rules,

encourage consumption of whole grains.[37] WGC aims to inform consumers where to buy and consume whole grains, aiming to promote healthy eating and the certification of companies that actually produce grains.

In 2005, WGC created a stamp for whole grains products. There are two different varieties of stamp: the Basic Stamp, for foods that contain at least 8g, or a half serving of whole grain, but may also contain some refined grain, and the 100% Stamp, when all its ingredient grains are whole grains. There is a minimum requirement of 16g of whole grains per serving. This stamp assures customers that the grains, flakes and flours are 100% whole, also assuring that the grains did not lose their nutrients during the process.[38]

The WGC stamp is a mark on packages that allows consumers to spot and buy whole grain foods. Companies willing to use the stamp must be members of WGC and present information on every product certified by the council. Companies also sign a legal agreement to comply with all requirements and guidelines of the Stamp program.[37] Since March 2013, more than 9,200 products use the WGC stamp in 41 different countries and in five languages. In Brazil, five brand names use this stamp.[39]

It was found in this study that 86.7% of the labels did not have the stamp that certifies the assurance of whole grains in their composition. It was also found that the average amount of fibers was 2.95 g (SD = 0.75). Daily recommended amount of fibers is 25g.[20] According to the American Diabetes Association (ADA), daily recommended amount of dietary fibers is 25g for women and 38g for men, or 14g per 1,000Kcal of the diet for the population in general.[21]

Regarding salt, it is known that its restriction in the diet is recommended not only for individuals with hypertension but also for the population in general. Brazilians consume twice as much the minimum recommended amount of salt. Current daily recommendation is 5g of salt (equivalent to 2,000 milligrams of sodium), which represents, in home measure, one teaspoon of salt.[21]

In Brazil, the highest sodium consumption is found in men aged 14-18 years, which represents an intake of 3,705.6 mg, followed by 19-59 years old individuals, also male, consuming 3,637.6mg.[19] The Ministry of Health recommends that sodium intake should not exceed 2,300mg for adult individuals.

According to the RDC 54[30], in order that a food product is considered “low” in sodium, it must have a maximum of 80mg of this substance (in a 50g serving); to be considered “very low”, it must have a maximum of 40mg of sodium (in a 50g serving); and to fit the attribute “does not contain sodium” it must have a maximum of 5g of sodium (for a 50g serving). This study found an average of 185.3 mg of sodium (SD=54.5) in a 50g serving. Assuming, hypothetically, that

an individual eats bread servings only, at the end of the day this individual will have consumed 555.9 milligrams of sodium, which represents 24.34% of the daily recommended amount, i.e., 2,000g, according to the Ministry of Health. The average amount of sodium found on the labels of the samples was more than twice the recommendation for the attribute "low", which is another important factor to be considered by shoppers.

A study by Orlando *et al.* conducted in the northern region of the state of Rio Grande do Sul emphasized the importance of advising hypertensive individuals to be careful in reading the labels and to buy food products with 5% less sodium than the maximum daily value recommended for adults, reinforcing the importance of reading food labels.[40]

The agreement[41] made by the Ministry of Health and other associations defined countrywide goals for sodium reduction in processed foods, among them small baguette or French bread, which are breads ordinarily consumed in Brazil. It is worth noting that for whole grain breads, indicated especially for the chronically ill, there is not a law that limits the maximum sodium amount in this kind of food.

In this study it was found an average price of R$ 6.94 (for a 500g bread). Assuming that an individual buys four breads per month – R$ 27.76/month – this will represent an expenditure corresponding to 3.84% of the minimum wage (R$ 724.00 in June, 2014). Therefore, shoppers should pay attention to the weight of the breads, once they differ in price and amount. The one that seems cheaper may have less weight, which is not financially advantageous. This observation was included here by the fact that, in clinical practice, patients often mention price as a deterrent to consumption of whole-wheat breads.

A study by Pimentel & Simões[35] found low consumption of dietary fibers, which can be due to their high cost. Of the interviews conducted in the study, 84% of the respondents agreed that "fiber-rich foods cost more than the other ones" (author's translation). The results of the survey corroborated the data found in the present study that whole grain foods are seen by consumers as an expensive food item, and that the *per capita* consumption of foods per class of income is concentrated in monthly salaries above R$ 1,089.00, according to a IBGE survey.[19]

It was found in this study that the relation between pricing and compliance of labels to the current laws indicates that the higher the adjustments made to meet the laws the higher the bread price is – i.e., the greater the number of adequacies the more expensive the product is. It was also observed that the breads with labels indicating whole-wheat flour as the first item in the nutritional information are more expensive than those that did not indicate it ($p < 0.04$). In addition, breads with the certification stamp were more expensive than those that did not have it.

In this research, some methodological difficulties were encountered, such as the lack of similar studies for comparison purposes. The weights on the labels are not standardized in 500g, and it was necessary to adjust them in relation to price. The weight of the servings was carefully examined, which are not standardized in 50g either, and those that did not meet this requirement were excluded from the study. Likewise, the breads that did not have the words "whole-wheat bread" printed on the labels were also disregarded.

Conclusion

Most of the labels of whole-wheat breads that were evaluated in this study showed various nonconformities to the current Brazilian legislation and the Substitute Bill that is under consideration by the National Congress. Nutritional label is an essential tool that helps make adequate food choices. Given the findings, regular inspections by the competent authorities with respect to compliance with existing rules are clearly necessary, requiring adjustments where needed. Due to the health benefits that whole-wheat breads provide to consumers and knowing that this kind of food makes up the diet of individuals with some diseases, strict compliance with the law is crucial.

The study contributed to provide information to both consumers and health professionals to make better choices and indications regarding this food and similar products, because consumers did not receive products consistent with the reality of the labels.

Further studies on the area are necessary with the purpose of advising customers and improving guidance to consumers regarding whole-wheat breads, in order that they can use labels as a tool to help them choose foods that are beneficial to their health.

Thus, based on the findings of this study, nutrition professionals can recommend to their patients that the best choices for whole-wheat breads are those that have the certification stamp on the labels, observing which products provides higher amounts of dietary fibers and less sodium. Nutritional information should be used as a tool to help food choices until strictest observance and compliance with current laws are secured and penalties are imposed on those who do not conform to them.

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