Trans and Saturated Fat on Food Labels in Canada: Fact or Fiction?

Peter Pantazopoulos, BSc,[1] Keri Kwong, MSc,[1] William Lillycrop, BSc,[1] Lynn Wong, BSc,[1] Yu Gao, MSc,[1] Shirley Chalouh, BSc,[1] Mark Samadhin, MSc,[1] W.M. Nimal Ratnayake, PhD,[2] Sara Krenosky, MSc,[2] Lydia Dumais, BSc,[2] Mary R. L'Abbe, PhD[2,3]

ABSTRACT

Objective: Food labels are the number one source for nutrition information for Canadians, but are food labels accurate? This study aims to provide an assessment of the accuracy of the reported trans fatty acid and saturated fatty acid values on food labels in selected foods.

Methods: Over 380 samples of cookies, crackers, granola bars, breakfast bars and a variety of frozen foods were collected between 2005 and 2008 in the Greater Toronto Area, Ottawa and Vancouver, as part of Health Canada's Trans Fat Monitoring Program. The food categories chosen were based on earlier studies indicating that they were significant sources of trans fatty acids and the individual samples were chosen based on market share data. The trans fatty acid and saturated fatty acid contents of the samples were determined by gas chromatography and the laboratory results were compared to the values reported in the Nutrition Facts tables.

Conclusions: Statistical analysis indicated no significant difference between laboratory and food label values for cookies, crackers, granola bars, breakfast bars and frozen foods for trans fat or saturated fat. The results demonstrate that Canadians can rely on food labels for making informed dietary choices with respect to trans fat and saturated fat content.

Key words: Trans fatty acids; saturated fatty acids; nutrition facts table; Canadian food and drug regulations; accuracy of nutrition labelling; consumer use of labels

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Trans fats or trans fatty acids (TFAs) are unsaturated fatty acids that have at least one of the carbon-carbon double bonds in the *trans* configuration, as opposed to the majority of dietary unsaturated fatty acids that have the double bonds in the *cis* configuration. While TFAs are found naturally at low levels in dairy products and meat from ruminant animals, they are also industrially produced, during the conversion of liquid oils to solid fats via partial hydrogenation. The partially hydrogenated oils are attractive to food manufacturers as they enhance the taste and texture of food products and increase their shelf-life.[1] Partially hydrogenated oils can be found in shortenings and margarines and are used in the preparation of a variety of foods, including fried foods and bakery products. These readily available pre-packaged foods such as cookies, crackers and baked goods are potential sources of TFAs.

Recently, there has been a lot of focus on TFAs because of their negative health implications. Studies have shown that TFAs contribute to cardiovascular disease.[2] Trans fats increase the blood levels of LDL-cholesterol and lower HDL-cholesterol.[3] High LDL-cholesterol and low HDL-cholesterol are strong risk factors for coronary heart disease. In the mid-1990s, the Canadian intake of TFAs was among the highest in the world due to the widespread use of partially hydrogenated canola oil in the preparation of various food products such as margarines, fried foods and bakery products.[4]

Food labels have been shown to influence consumer purchasing behaviours. In a 1996 diet and health survey, it was reported that 48% of consumers changed their purchasing decision based on the nutrition information on the label.[5] In 2003, the Government of Canada introduced mandatory nutrition labelling regulations including mandatory declaration of the amount of TFAs in the Nutrition Facts table (NFT), making Canada the first country in the world to do so.[6] The inclusion of TFAs in the NFT has helped Canadians to make informed dietary decisions. Thus, the accuracy of what is reported in the NFTs is important for informed decisions. This study aims to provide a snapshot of the accuracy of the reported TFA and saturated fatty acid (SFA) values in the NFTs of selected foods found within the Greater Toronto Area, Ottawa and Vancouver.

METHODS

Design and sampling strategy

Over 380 samples were collected in the Greater Toronto Area, Ottawa and Vancouver from local grocery stores between 2005 and 2008. The food categories sampled included granola bars, crackers, cookies, breakfast bars and frozen foods. The food categories were chosen since these foods were previously identified as significant sources of TFAs.[7] The individual products within each category were selected based on market share data. Detailed sample collection for individual food products, organized by food category, company, date of collection and brand name information, can be found on

Author Affiliations

1. Food Laboratory Division, Ontario Region, Regions and Programs Branch, Health Canada, Scarborough, ON
2. Bureau of Nutritional Sciences, Food Directorate, Health Products and Food Branch, Health Canada, Ottawa, ON
3. Department of Nutritional Sciences, Faculty of Medicine, University of Toronto, Toronto, ON

Correspondence: Peter Pantazopoulos, Food Laboratory Division, Ontario Region, Regions and Programs Branch, Health Canada, 2301 Midland Avenue, Scarborough, ON M1P 4R7, Tel: 416-738-6548, Fax: 416-973-1559, E-mail: peter.pantazopoulos@hc-sc.gc.ca

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Health Canada's website as part of the Trans Fat Monitoring Program[8-10] and detailed fatty acid data were published recently.[11]

All samples consisted of three consumer-sized packages from the same lot with the exception of frozen food samples, where only one consumer package was used. The entire content of the packages was homogenized and from that a subsample was taken for analysis.

Laboratory analysis

A 1 gram aliquot of the homogenized sample was taken for analysis. The analysis was done according to the procedure described in detail by Ratnayake et al.,[11] in which the fat extraction was performed according to a slightly modified procedure of the AOAC (Association of Official Analytical Chemists) Official Method 996.06,[12] the analysis of the fatty acid composition by gas chromatography (GC) and calculation of the total fat content expressed as triglyceride equivalents performed according to the AOCS (American Oil Chemists' Society) Official Method Ce 1h-05.[13] The total fat content for each food item was converted to the serving size amount as per food label declaration, for example the serving size for cookies was 30 g. To ensure accuracy of laboratory results, the following quality assurance measures were implemented: The laboratory participated routinely in the AOCS Laboratory Proficiency Program; the lead chemist is an official AOCS Approved Chemist on trans fatty acid content; an AOCS reference material as well as a duplicate sample was analyzed with every set as part of the routine quality control.

Statistical analysis

Data are presented as means, standard deviations and differences. All statistical analyses were performed using spreadsheet applications such as Excel or Lotus 1-2-3 and the final values presented have been rounded. T-tests were conducted by comparing mean laboratory values to label values for each food category at the 95% confidence level.

The difference between the value in the NFT and the one determined by GC analysis was calculated and plotted in Figure 1 for each individual sample and food category. To assess potential individual outliers, the warning and control limits were estimated using a $k_{(n-1)}$ value of 2.8 and 3.6 representing the 95% and 99% confidence levels, respectively. Individual samples above the 99% confidence level are considered as potential outliers.

Nutrition labelling regulations in Canada allow companies to report 0 g of TFA in the NFT when the amount is less than 0.2 g TFA per serving and the food product meets the criteria for the "low in saturated fats" nutrient content claim.[6] In order for a food product to be labelled "low in saturated fats", it must contain 2 g or less of a combination of saturated and trans fatty acids per serving (or per 100 g for pre-packaged meals) and it provides 15% or less energy from the sum of saturated and trans fatty acid.[6] To ensure comparability of results, these regulations were also applied to the laboratory-derived TFA and SFA values.

RESULTS

It should be noted that this data set can only be considered as a snapshot of the accuracy of the values declared in the NFT, as each individual value originates from a single sampling at a single point in time.

Table 1. Mean Trans Fatty Acid and Saturated Fatty Acid Data: Comparison of Label Values With Those Determined by Laboratory Analysis

Commodity Type (Number of Samples)	Mean ± SD (g per serving size)		Mean Difference ± SD
	Label Value	Laboratory Value	(g per serving size)
Trans Fatty Acids			
Breakfast bars (n=34)	0.19 ± 0.47	0.19 ± 0.37	0.00 ± 0.10
Crackers (n=93)	0.27 ± 0.60	0.28 ± 0.61	-0.01 ± 0.07
Cookies (n=42)	0.81 ± 0.74	0.80 ± 0.80	0.02 ± 0.19
Granola bars (n=34)	0.10 ± 0.22	0.11 ± 0.25	0.00 ± 0.08
Frozen foods (n=133)	0.94 ± 1.57	1.14 ± 1.73	-0.20 ± 0.79
Overall (n=336)	0.58 ± 1.14	0.66 ± 1.25	-0.08 ± 0.50
Saturated Fatty Acids			
Breakfast bars (n=39)	1.22 ± 0.96	1.17 ± 0.93	0.05 ± 0.02
Crackers (n=104)	1.36 ± 0.89	1.21 ± 0.77	0.15 ± 0.23
Cookies (n=74)	2.62 ± 1.47	2.41 ± 1.26	0.20 ± 0.39
Granola bars (n=36)	1.15 ± 0.83	1.09 ± 0.77	0.06 ± 0.24
Frozen foods (n=133)	5.53 ± 4.49	5.41 ± 4.49	0.12 ± 1.2
Overall (n=386)	3.01 ± 3.36	2.87 ± 3.01	0.13 ± 0.73

The difference between the value declared in the NFT and the laboratory result was calculated by subtracting the laboratory result from the label value. Figure 1 indicates the difference between each individual value declared in the NFT and the laboratory result for breakfast bars, cookies, crackers, granola bars, and frozen foods, for TFAs and SFAs. The results are summarized in Table 1.

For TFAs, most food categories had an average difference between label value and laboratory result of approximately 0.0 g TFA per serving size, with the exception of frozen foods, which had a difference of approximately -0.2 g TFA per serving size (Table 1). The overall average difference, for all food categories (n=336), was found to be only -0.08 g TFA per serving size.

For SFAs, the overall average difference between the values declared in the NFTs and laboratory results (n=386) was only 0.13 g per serving size (Table 1). The average difference between label and laboratory values, for all categories of foods tested, did not exceed 0.2 g per serving size for TFAs or SFAs.

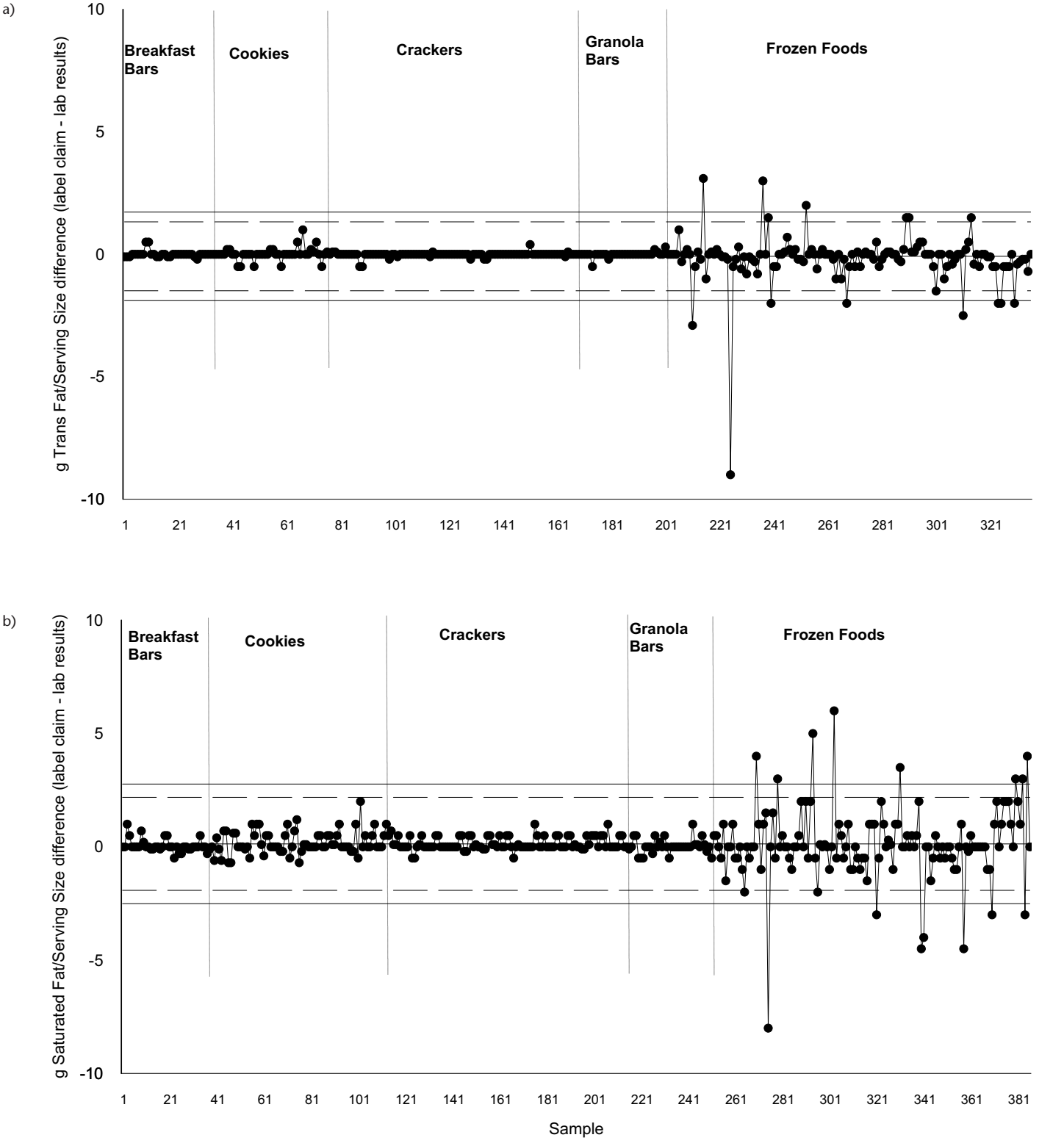
For the TFA analysis, the sample size is 336; the SFA had a sample size of 386. This difference is attributed to the contents of the Nutrition Facts table. At the time of analysis, some samples did not have TFA values listed in the NFT.

Figure 1 indicates that there are occasional outliers outside of the 99% confidence level. Outliers are expected in monitoring data due to sample, sampling and analytical variability. This is particularly noticeable in the food category of frozen foods (Figure 1). The outliers in the frozen food category are considered the result of sampling heterogeneity as they were the only food samples where only one consumer package was used rather than three. However, in order to assess if there was a statistically significant difference between mean laboratory and NFT values, the t-test was applied. Based on this test, there was no significant difference, at 95% confidence level, between the average laboratory and NFT values for cookies, crackers, granola bars, breakfast bars and frozen foods for TFAs and SFAs.

DISCUSSION

Food labels are important to consumers. More than two thirds of Canadians (68%) use food labels for food and nutrition information.[14] Additionally, an increasing number of consumers are choosing their foods based on the TFA content: 41% in 2001 vs. 69% in 2008.[14]

Figure 1. Difference between the Nutrition Facts table values and Health Canada laboratory analysis for a) trans fatty acids and b) saturated fatty acids



The dashed and solid lines represent the estimated 95% and 99% confidence levels respectively. The overall average difference is -0.08 g trans fatty acids and 0.13 g saturated fatty acids per serving size.

The introduction of mandatory nutrition labelling in 2003 with the inclusion of the TFA value in the NFT has been a positive step in helping to improve the health of Canadians. Food labels are the number one source for nutrition information for Canadians, however only half (56%) consider the nutrition information on food labels credible.[14]

The information provided in this paper clearly demonstrates that overall, food labels are accurate and are a credible source of infor-

mation for consumers regarding TFA and SFA content. Canadians can thus confidently rely on the reported values to make informed dietary choices.

Since this article was written, further trans fat monitoring work has been completed and is available on the Health Canada website.[15] While no further label analysis between Label Claim and HC laboratory results was conducted, the trans fat monitoring results indicate that manufacturers, small- and medium-sized restaurants, and cafeterias found in institutions such as schools are striving to reformulate their products to meet the recommended trans fat limits. This has resulted in a reduction of the estimated trans fat intake by Canadians from 3.7% of energy (or 8.4 g/day) in the mid-1990s to 1.4% of energy (or 3.4 g/day) in 2008.[11] While this is a significant reduction, there is still much work to be done to meet the World Health Organization recommended limit of TFA intake of <1% of energy.

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RÉSUMÉ

Objectif : L'étiquetage alimentaire est la première source d'information sur la nutrition pour les Canadiens, mais ces étiquettes sont-elles exactes? Nous avons cherché à déterminer l'exactitude des valeurs en acides gras trans et en acides gras saturés indiquées sur les étiquettes de certains produits alimentaires.

Méthode : Plus de 380 échantillons de biscuits, de craquelins, de barres tendres, de barres de petit déjeuner et d'aliments surgelés divers ont été prélevés entre 2005 et 2008 dans la Région du Grand Toronto, à Ottawa et à Vancouver dans le cadre du Programme de surveillance des gras trans de Santé Canada. Les catégories d'aliments ont été choisies en fonction d'études antérieures indiquant qu'elles étaient des sources importantes d'acides gras trans, et les échantillons individuels, en fonction des données sur leurs parts de marché. Les contenus des échantillons en acides gras trans et saturés ont été déterminés par chromatographie gazeuse, et les résultats obtenus en laboratoire ont été comparés aux valeurs du tableau Valeur nutritive sur l'étiquette du produit.

Conclusion : L'analyse statistique n'a fait état d'aucune différence significative entre les valeurs en gras trans ou en graisses saturées obtenues en laboratoire et indiquées sur les étiquettes des biscuits, des craquelins, des barres tendres, des barres de petit déjeuner et des aliments surgelés. Les Canadiens peuvent donc se fier à l'étiquetage alimentaire pour faire des choix éclairés en ce qui a trait au contenu en gras trans et en graisses saturées de leurs aliments.

Mots clés : acides gras trans; acides gras saturés; tableau de faits sur la nutrition; réglementation canadienne des aliments et des drogues; exactitude de l'étiquetage des aliments; utilisation des étiquettes par le consommateur