Food labels consistently underestimate the actual weights of single-serving baked products

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Reducing the high prevalence of obesity is a national health objective to be achieved by the year 2000 (1), yet results of phase 1 of the third National Health and Nutrition Examination Survey indicate that the incidence of overweight is increasing among US adults (2) and adolescents (3). Despite this trend, as many as 44 million persons 25 years of age or older report that they are attempting to lose weight (4); energy restriction is often the method of choice (5,6). Unfortunately, this method rarely is effective in the long term, and achieving and maintaining a healthful weight remains a lifelong challenge for many overweight persons (5). One reason for the failure to lose weight may be that "counting calories" relies on knowledge of both the energy content and the portion sizes of the foods consumed, neither of which is intuitively obvious. Research indicates that most people find it difficult to estimate the portion sizes of commonly consumed foods (7,8) and that accurate estimates of portion size lead to inaccurate estimates of energy intakes (9,10).

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The 1990 Nutrition Labeling and Education Act was enacted by the US Congress to help the public make healthful food choices (11,12). In implementing this act, the Food and Drug Administration (FDA) issued regulations that require information about the nutrient content of most packaged foods to be disclosed on their labels (13). These regulations, however, specifically exempt small businesses from mandatory nutrition facts labeling as long as they make no specific health claims for the products (14).

A separate and long-standing labeling regulation requires all manufacturers, including small businesses, to state the accurate weights of food products on package labels (15). The requirement permits a small variation in weight to account for changes that may arise as a result of packaging and handling (eg, moisture loss). This regulation does not, however, address a situation in which the actual weight of a product exceeds the stated weight. In developing its regulations, the FDA assumed that the weights of most products would be close to the weights stated on the labels because of the "economic considerations of manufacturing" (13).

Dieters rely on food labels to obtain accurate information about the energy content of food products (11,12), so they are likely to assume that the stated weight on a food label is correct. If the actual weight of a product exceeds its label weight by a substantial amount, weight-loss efforts may be hampered.

While counseling patients about weight-loss methods, one of us (L.R.Y.) observed that the label weights on several single-serving baked products sold for immediate consumption — individually packaged muffins, brownies, and cookies — appeared to underestimate actual weights. Because many people today are eating "on the run," single-serving packages are becoming more popular (16,17) and may contribute to a substantial portion of daily energy intake.

Our study was designed to determine the accuracy of the weight stated on the food label of single-serving baked products.

METHODS

We surveyed all single-serving muffins, brownies, and cookies commonly available for purchase in a sample of small, 24-hour, privately owned grocery stores in downtown Manhattan, NY, near the university at which we work. After obtaining permission from the store managers, we selected and weighed all brands of such products available on display counters. Our sample included 19 distinct items: seven brands of muffins, seven brands of brownies, and five brands of cookies. These items are typical of single-serving baked products sold in similar stores throughout Manhattan. Most of the products were not promoted as low-calorie or low-fat foods. These products were exempt from mandatory nutrition facts labeling because they were manufactured by small companies and were not making any health claims.

We weighed each product twice using a calibrated Pelouze Portion Controller (Model Y32R, Evanston, Ill) food scale and recorded weights to the nearest tenth of an ounce to permit comparison with the manufacturers' label weights. We computed the average weight of each item and the difference between the label and measured weights rounded to the nearest percentage. We bought at least two samples of each item and weighed wrappings separately; their weights were negligible.

RESULTS AND DISCUSSION

The Table shows label weights, measured weights, and the percentage difference between the measured and label weights for all products sampled. For all but two of the samples, measured weights exceeded the weights given on the food label; none of the samples weighed less than the label weight.

For the seven brands of muffins sampled, all but one of the measured weights exceeded the label weights, and

Table
Comparison of label and measured weights for commonly available single-serving muffins, brownies, and cookies

Item	Label weight (oz)	Measured weight (oz)[a]	% Difference
Muffins			
Brand 1	4	5.5	+38
Brand 2	5	6	+20
Brand 3	8	9.5	+19
Brand 4	5	5.8	+16
Brand 5	10	11.5	+15
Brand 6	6	6.3	+5
Brand 7	6	6	0
		Mean difference = +16%	
Brownies			
Brand 1	3	4	+33
Brand 2	2	2.4	+20
Brand 3	3	3.5	+17
Brand 4	4	4.5	+13
Brand 5	5	5.5	+10
Brand 6	4	4.3	+8
Brand 7	2.8	2.8	0
		Mean difference = +14%	
Cookies			
Brand 1	4	5	+25
Brand 2	2	2.5	+25
Brand 3	3.25	4	+23
Brand 4	2.8	3.4	+21
Brand 5	5	5.5	+10
		Mean difference = +21%	

[a]Mean weight of two samples of the same brand.

five of the measured weights exceeded the label weights by more than 10%. The mean difference between the measured and label weights of the muffins was 16%. Similarly, the actual weights of all but one of the seven brownies sampled exceeded the label weights, and four exceeded the label weights by more than 10%. The mean difference between the measured and label weights of the brownies was 14%. All of the five brands of cookies sampled weighed more than their label weights; four exceeded the label weights by more than 10%. The average difference between the measured weights and label weights of the cookies was 21%.

Nearly one third (6 of 19) of the sampled packages weighed at least 1 oz more than was stated on the label. This difference could account for an underestimation of the true energy value of a product by as much as 100 to 175 kcal, depending on macronutrient and water content (18). Allison et al (19) found that manufacturers of regionally and locally prepared diet and health foods underreported the energy content of their products by a significant amount. The finding was attributed to differences between reported and actual weights and energy densities; however, the study did not report the product weights. In our study we measured product weights and extended observations to include more commonly available baked products.

APPLICATIONS

Our results indicate that information on the labels of single-serving baked products consistently underestimates the true weights of the products, often by as much of 20% to 25%. These inaccuracies could increase energy intake significantly. For people who are attempting to determine the portion sizes of foods commonly consumed, balance their energy intake, or simply make food choices based on reading food labels, such errors may prove notable.

Dietitians counseling patients about the role of portion sizes in energy intake should be aware of such discrepancies and should not assume that label weights for single-serving baked products are accurate. Weighing foods on a food scale yields much more precise estimates. When appropriate, patients should be advised to use food scales to estimate portion sizes — and therefore the energy content — of the foods they are consuming.

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