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IODINE CONTENT OF U.S. WEIGHT-LOSS FOOD

Manikya Kuriti, MD¹, Elizabeth N. Pearce, MD, MSc², Lewis E. Braverman, MD², Xuemei He, MD², and Angela M. Leung, MD, MSc³

¹Department of Internal Medicine, St. Elizabeth Medical Center/Tufts University, Boston, Massachusetts

²Section of Endocrinology, Diabetes, and Nutrition, Boston University School of Medicine, Boston, Massachusetts

³Division of Endocrinology, Department of Medicine, David Geffen School of Medicine, University of California Los Angeles, Los Angeles, California

Abstract

Objective—The recommended iodine intake is 150 µg/day in adults, 220 µg/day during pregnancy, and 290 µg/day during lactation. Individuals exclusively consuming restricted diets as part of a weight-loss program may be at risk for mild to moderate iodine deficiency. The purpose of this study was to assess the iodine content in meals and snacks from 3 U.S. commercial weight-loss programs, all of which are intended to be the sole source of dietary intake during the desired weight-loss period.

Methods—The iodine contents in the products representing 1 week of all meals and snacks from 3 U.S. commercial weight-loss programs were measured by spectrophotometry. The measured total iodine content in 1 week's worth of food from each program is reported as an average level per day.

Results—A total of 53 total items were analyzed (29 different items [7 breakfasts, 7 lunches, 7 dinners, 6 snacks, 2 desserts] from Jenny Craig[®], 21 different items [7 breakfasts, 7 lunches, 7 dinners] from Nutrisystem[®], and 3 different items [1 breakfast, 1 lunch, 1 dinner; each to be intended to be eaten daily for 1 week] from Medifast[®]). Daily iodine content (mean ± SD) of meals and snacks from the weight-loss programs were 34.2 ± 1.2 (Jenny Craig[®]), 12.2 ± 0.7 (Nutrisystem[®]), and 70.1 ± 1.1 (Medifast) µg/day.

Conclusion—These results indicate that the dietary content in the foods from 3 U.S. commercial weightloss programs is far less than the recommendations for iodine intake of 150 µg/day in nonpregnant, nonlactating adults. Individuals following each weight-loss program should be advised to take a multivitamin containing 150 µg of iodine daily.

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Address correspondence to Dr. Angela M. Leung, Division of Endocrinology, 111D, VA Greater Los Angeles Healthcare System, 11301 Wilshire Boulevard, Los Angeles, CA 90073. amleung@mednet.ucla.edu.

DISCLOSURE

The authors have no multiplicity of interest to disclose.

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INTRODUCTION

Iodine is an essential component of the thyroid hormones, thyroxine (T4) and triiodothyronine (T3), which are required for normal metabolic processes. During pregnancy and the postpartum period, adequate iodine nutrition is particularly crucial, as the developing fetus and newborn infant require thyroid hormone for normal growth and neurodevelopment. Iodine deficiency may be associated with goiter and hypothyroidism. Maternal iodine deficiency during pregnancy is associated with adverse outcomes in the offspring, including cretinism and decreased IQ (1,2). Despite ongoing public health efforts, iodine deficiency affects over 2.2 billion individuals (3) and remains the leading cause of preventable mental retardation worldwide (4).

Urinary iodine concentrations are a biomarker for dietary iodine intake over the preceding few days (4) and may be used clinically to confirm compliance with a low-iodine diet. However, levels of urinary iodine cannot be used to determine iodine status in an individual given the day-to-day variation in dietary iodine intake. Instead, median urinary iodine levels are used to reflect dietary iodine sufficiency across populations (4). According to recent data from the National Health and Nutrition Examination Surveys (NHANES), the median urinary iodine concentration in U.S. adults decreased by more than 50% from the early 1970s to the late 1990s (5). During this period, there was an almost fourfold increase in the prevalence of urinary iodine values $<50 \mu\text{g/L}$ (indicating moderate to severe iodine deficiency) among women of childbearing age. Although subsequent studies have shown that this decrease has stabilized (6–8), the most recent NHANES survey (2005–2008) demonstrated that 35.3% of pregnant women had urinary iodine levels less than $100 \mu\text{g/L}$ (6), which suggests mild iodine insufficiency (4).

The diet is the primary source of adequate iodine nutrition. The Recommended Daily Allowances (RDA) for iodine are $150 \mu\text{g}$ in adults, 220 to $250 \mu\text{g}$ during pregnancy, and 250 to $290 \mu\text{g}$ during lactation (4,9). The major sources of dietary iodine in the U.S. are dairy products, grains, and iodized salt (10). In the U.S., iodine is present in dairy foods (due to the iodophor cleansers of milk cans and teats) and occasionally in bread dough (due to the use of iodate as bread conditioners) (10,11). The iodine content of plant foods depends on iodine levels in soil and in groundwater used in irrigation, in crop fertilizers, and in livestock feed. Most foods contain 3 to $75 \mu\text{g}$ of iodine per serving (9). Salt iodization is a useful approach toward decreasing iodine deficiency in populations, although the U.S. Food and Drug Administration does not mandate the listing of iodine content on food packaging.

Individuals following a restricted diet have been shown to be at risk for inadequate dietary iodine intake. Among 141 Boston-area individuals, the median urinary iodine concentration of vegans ($78.5 \mu\text{g/L}$; range, 6.8 – $964.7 \mu\text{g/L}$; $n = 78$) was significantly lower than of vegetarians ($147.0 \mu\text{g/L}$; range, 9.3 – $778.6 \mu\text{g/L}$; $n = 63$) ($P < .01$); the median urinary iodine concentration of the vegan group was in the range consistent with moderate iodine deficiency (12). In another study, fast foods from McDonald's and Burger King were low in iodine except in milk shakes, iodinated bread, or fish products (13). In the U.S., approximately onethird of the population fulfills the criteria for obesity, with a greater proportion (50–70%) attempting some degree of weight-loss (12). Data from 2001–2006

NHANES reported that the prevalence of commercial weight-loss program users among 2,523 individuals (56% women) trying to lose weight was 9.9% (13).

The objective of this study was to measure the iodine content in 1 week's worth of all provided food products (snacks and meals), each intended to be individuals' sole source of dietary intake, from 3 U.S. weight-loss programs.

METHODS

A 1-week program of meals consisting of breakfast, lunch, dinner, and snacks were ordered from each of 3 U.S. commercial weight-loss companies. All items were stored at 4°C prior to analysis. All food products were blended and measured for iodine concentrations in triplicate using a Technicon Autoanalyzer spectrophotometer (Oakland, CA) with an inter and intra-assay coefficients of variation of 12.4% and 3.2%, respectively. Samples were retested a fourth time if a >25% difference was found among the measurements. Projected weekly iodine intakes ($\mu\text{g/g}$) were calculated based on labeled serving sizes; the average total daily intake (μg) is reported. Descriptive data are presented as means \pm SD.

RESULTS

A total of 53 meal items were analyzed from 3 U.S. commercial weight-loss programs. The iodine content was determined from 29 items (7 breakfasts, 7 lunches, 7 dinners, 6 snacks, and 2 desserts) from Jenny Craig[®], 21 items (7 breakfasts, 7 lunches, and 7 dinners) from Nutrisystem[®], and 3 items (7 each of 3 different items, which were to be eaten daily for 1 week) from Medifast[®]. The measured iodine content from the total of 1 day's worth of Medifast[®] products (3 different items) were used to report the average daily dietary iodine content.

The average daily iodine content ($\mu\text{g/day}$) of meals and snacks from Jenny Craig[®] was 34.2 ± 1.2 (Table 1), 12.2 ± 0.7 from Nutrisystem[®] (Table 2), and 70.1 ± 1.1 from Medifast[®] (Table 3).

DISCUSSION

We report that the average daily iodine content of the food products from 3 major U.S. weight-loss programs ranges from 12.2 to 70.1 $\mu\text{g/day}$, far lower than the recommendations for daily iodine intake of 150 μg in adults and 220 to 290 μg during pregnancy and lactation (4,9). The food products provided by these programs are intended to be the sole source of dietary intake during the desired weight-loss period. Participants are recommended to drink only water and/or diet, caffeine-free, and sodiumfree beverages (no dairy-based beverages) during the initial weight-loss period. The products are also generally intended to include adequate vitamin and mineral content. Consumers of Nutrisystem[®] and Medifast[®] diets are not advised to take any dietary supplements. Jenny Craig[®] consumers may be advised to ingest Jenny Craig[®] bars containing calcium or a multivitamin purchased by the individual consumer, which may or may not contain iodine.

As iodine content is not mandated to be listed on food packaging, the present report, as the first analysis of the measured iodine content of food products provided by U.S. weight-loss companies, suggests potential iodine deficiency among users of such diets. This may be particularly important regarding the consumer group of childbearing-age women, given the crucial importance of optimal iodine nutrition during fetal and neonatal neurodevelopment. Although our findings are based on a representative week's of meals from the 3 companies, these do not include all of the companies' available food choices. Our results may not be applicable to other options selected by a different consumer at a different time. In addition, the duration of and/or strict adherence to such diets vary considerably among individuals but may be long lasting in some. Based on 2001–2006 NHANES data, the use of such programs was a significant predictor of successful (10%) weightloss (13). Among users of the Jenny Craig® weight-loss program, longer duration of program use was associated with greater weight-loss (14).

We advocate for further research to better understand the iodine status of commercial weight-loss diet consumers. Until these data are available, we recommend that all users of such weight-loss diets take a daily multivitamin containing 150 µg of iodine (derived from potassium iodide) to achieve optimal iodine nutrition.

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Abbreviations

NHANES	National Health and Nutrition Examination Surveys
RDA	Recommended Daily Allowances
T3	triiodothyronine
T4	thyroxine

REFERENCES

1. Zimmerman MB. The adverse effects of mild-to-moderate iodine deficiency during pregnancy and childhood: a review. *Thyroid*. 2007; 17:829–835. [PubMed: 17956157]
2. Bath SC, Steer CD, Golding J, Emmett P, Rayman MP. Effect of inadequate iodine status in UK pregnant women on cognitive outcomes in their children: results from the Avon Longitudinal Study of Parents and Children (ALSPAC). *Lancet*. 2013; 382:331–337. [PubMed: 23706508]
3. International Council for the Control of Iodine Deficiency Disorders (ICCIDD). Available at: <http://www.iccid.org>.
4. WHO, UNICEF, and ICCIDD. Assessment of the iodine deficiency disorders and monitoring their elimination. 2007 WHO/NHD/01.1.
5. Hollowell JG, Staehling NW, Flanders WD, et al. Serum TSH, T(4), and thyroid antibodies in the United States population (1988 to 1994): National Health and Nutrition Examination Survey (NHANES III). *J Clin Endocrinol Metab*. 2002; 87:489–499. [PubMed: 11836274]
6. Caldwell KL, Makhmudov A, Ely E, Jones RL, Wang RY. Iodine status of the U.S. population, National Health and Nutrition Examination Survey, 2005–2006 and 2007–2008. *Thyroid*. 2011; 21:419–427. [PubMed: 21323596]

7. Caldwell KL, Miller GA, Wang RY, Jain RB, Jones RL. Iodine status of the U.S. population, National Health and Nutrition Examination Survey 2003–2004. *Thyroid*. 2008; 18:1207–1214. [PubMed: 19014327]
8. Caldwell KL, Jones R, Hollowell JG. Urinary iodine concentration: United States National Health and Nutrition Examination Survey 2001–2002. *Thyroid*. 2005; 15:692–699. [PubMed: 16053386]
9. Dietary Reference Intakes. Washington, DC: National Academy Press; 2006. Food and Nutrition Board, Institute of Medicine.
10. Pearce EN, Pino S, He X, Bazrafshan HR, Lee SL, Braverman LE. Sources of dietary iodine: bread, cows' milk, and infant formula in the Boston area. *J Clin Endocrinol Metab*. 2004; 89:3421–3424. [PubMed: 15240625]
11. Pennington JA, Schoen SA. Contributions of food groups to estimated intakes of nutritional elements: Results from the FDA total diet studies, 1982–1991. *Int J Vitam Nutr Res*. 1996; 66:342–349. [PubMed: 8979163]
12. Leung AM, Lamar A, He X, Braverman LE, Pearce EN. Iodine status and thyroid function of Boston-area vegetarians and vegans. *J Clin Endocrinol Metab*. 2011; 96:E1303–E1307. [PubMed: 21613354]
13. Lee SY, Leung AM, He X, Braverman LE, Pearce EN. Iodine content in fast foods: comparison between two fast-food chains in the United States. *Endo Pract*. 2010; 16:1071–1072.
13. Nicklas JM, Huskey KW, Davis RB, Wee CC. Successful weight loss among obese U.S. adults. *Am J Prev Med*. 2012; 42:481–485. [PubMed: 22516488]
14. Finley CE, Barlow CE, Greenway FL, Rock CL, Rolls BJ, Blair SN. Retention rates and weight loss in a commercial weight loss program. *Int J Obes (Lond)*. 2007; 31:292–298. [PubMed: 16755283]

Table 1

Measured Iodine Content of Jenny Craig® Products

	Food item	Total iodine in item (µg)
1	Spaghetti with meatballs	14.21
2	Traditional lasagna	26.51
3	Chicken fajitas	0
4	Beef chow mein	0
5	Stuffed shells	24.36
6	Chicken carbonara	17.10
7	Florentine breakfast pizzas	20.58
8	Mesquite chicken	0
9	Cinnamon French toast	21.12
10	Meatball stuffed sandwich	9.60
11	Beef and cheese slider	10.00
12	Cinnamon rolls	10.12
13	Lemon pie	7.08
14	Blueberry streusel	7.81
15	Chocolate walnut brownie	5.70
16	Zesty tortellini soup	14.90
17	Mashed potato and beef	0
18	Beef chili	14.90
19	Southwestern style chicken	0
20	Chicken salad kit	0
21	S'mores bar	0
22	Chocolate chip snack bar	1.36
23	Peanut butter chocolate anytime bars	23.10
24	Cinnamon twists	0
25	Oatmeal breakfast square	5.50
26	Triple grain crisp cereal	2.58
27	Veggie chips	0.84
28	Multigrain hoops cereal	3.44
29	Honey mustard pretzels	0

Table 2

Measured Iodine Content of Nutrisystem® Products

	Food item	Total iodine in item (µg)
1	Ravioli in meat sauce	13.62
2	Lasagna with meat sauce	13.62
3	Rotini and meatballs	6.81
4	Cajun-style chicken	0
5	Chicken alfredo	12.78
6	Thick crust pizza	4.24
7	Mac and cheese	2.08
8	Fettucine alfredo	4.59
9	Chicken noodle soup	0
10	Loaded baked potato	8.50
11	Beans and ham soup	0
12	Chicken cacciatore	0
13	Chicken salad	0
14	Double chocolate muffin	3.42
15	Apple strudel scone	2.04
16	Chocolate frosted donut	3.57
17	Honey wheat bagel	0
18	Apple strudel bar	4.73
19	Fudge graham bar	5.00
20	Harvest nut bar	4.00
21	Maple brown sugar oatmeal	3.42

Table 3Measured Iodine Content of Medifast[®] Products

	Food item	Total iodine in item (µg)
1	Blueberry oatmeal	12.65
2	Southwest style eggs	30.69
3	Cinnamon and brown sugar cereal crunch	27.00