



Contents lists available at ScienceDirect

Preventive Medicine Reports

journal homepage: <http://ees.elsevier.com/pmedr>

Brief Original Report

Added sugars in kids' meals from chain restaurants

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ARTICLE INFO

Available online xxx

Keywords:

Dietary sugars
Fast foods
Nutrition policy

ABSTRACT

Objective. To analyze the added sugars in kids' meals from Canadian chain restaurants in relation to the World Health Organization's proposed sugar recommendation (less than 5% of total daily calories should come from added sugars) and current recommendation (less than 10% of total daily calories should come from added sugars).

Methods. Total sugar levels were retrieved from the websites of 10 fast-food and 7 sit-down restaurants in 2010. The added sugar levels in 3178 kids' meals from Canadian chain restaurants were calculated in 2014 (in Toronto, Canada) by subtracting all naturally occurring sugars from the total sugar level.

Results. The average amount of added sugars in restaurant kids' meals (25 ± 0.36 g) exceeded the WHO's proposed daily recommendation for sugar intake. There was a wide range of added sugar levels in kids' meals ranging from 0 g to 114 g. 50% of meals exceeded the WHO's proposed daily sugar recommendation, and 19% exceeded the WHO's current daily sugar recommendation.

Conclusion. There is a wide range of sugar levels in kids' meals from restaurants, and many contain more than a day's worth of sugar.

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Introduction

It is well recognized that excessive sugar consumption is associated with dental caries and obesity (Te Morenga et al., 2013). However, additional adverse effects have recently emerged (Yang et al., 2014). While the Institute of Medicine recommends that up to 25% of total calories can safely come from added sugars (sugars that are not naturally occurring in a food), Yang et al. showed that cardiovascular disease risk increases exponentially as the percentage of total calories coming from sugar increases (Yang et al., 2014). Additionally, studies have shown that added sugars can increase risk for high blood pressure and high triglycerides, even in children (Kell et al., 2014; Te Morenga et al., 2014).

Recently, the World Health Organization (WHO) released draft sugar guidelines recommending that added sugars (including all monosaccharides [such as glucose, fructose] and disaccharides [such as sucrose or table sugar] that are added to food by the manufacturer, the cook or the consumer, as well as sugars that are naturally present in honey, syrups, fruit juices and fruit concentrates) (World Health Organization, 2014), should contribute less than 10% of total energy intake per day. Furthermore, they recommended that intakes totaling less than 5% of total energy may have additional benefits (World Health Organization, 2014). The Heart and Stroke Foundation of Canada also

recommends that an individual's total intake of added sugars should not exceed 10% of total calories, and ideally should be less than 5% (Heart and Stroke Foundation of Canada, 2014). Additionally, the American Heart Association recommends that women should consume no more than 100 cal from added sugars per day, while men should consume no more than 150 cal for added sugars, with an aim to keep levels at approximately 5% of total calories depending on energy intake (Johnson et al., 2009).

Thirty-three percent of added sugars are consumed outside-the-home (Ervin and Ogden, 2013). While restaurant foods have been shown to have a poor nutritional quality (Scourboutakos and L'Abbe, 2012), there are few published studies examining sugar levels (O'Donnell et al., 2008). Thus, the objective of this study was to analyze levels of added sugar in kids' meals from chain restaurants.

Methods

Data was derived from the Food Label Information Program for Restaurants (FLIP-R) database which was created in 2010/2011 (Scourboutakos and L'Abbe, 2012). The database includes nutrition information for all restaurants that provided publicly available nutrition information online and had 20 or more locations in 2010. Of the 85 chain restaurants whose data was included in the database, 33 offered a kids' menu and provided sufficient data for their kids' meals to be calculated. Additional details concerning the construction of the database can be found elsewhere (Scourboutakos and L'Abbe, 2012).

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Kids' meals typically consisted of an entrée, side dish, beverage and dessert. All potential kids' meal combinations were calculated. For example, each entrée was calculated with every potential side dish, beverage and dessert that can be ordered for the set price.

Restaurants reported "total sugar" levels which include both naturally occurring and added sugars. Therefore, estimates of added sugars were calculated by subtracting all naturally occurring sugars (from fruits, vegetables, juices, and dairy foods) from the total sugar data. Estimates for the amount of naturally occurring sugar in a meal were determined using the Canadian Nutrient File and the USDA National Nutrient Database for Standard Reference (Health Canada, 2012; United States Department of Agriculture, 2011).

Data was weighted so that each restaurant was equally represented. Descriptive statistics for added sugars were calculated for all meals and for each category of meal components (entrée, side dish, beverage and dessert). Because data was weighted, standard errors were the most appropriate measure of variance. Added sugar levels were evaluated as a percentage of total energy based on the daily estimated energy requirement recommendations for a sedentary 4–8 year old boy, which is equivalent to the recommendations for a moderately active 4–8 year old girl (1800 kcal/day). This estimate is from the "Dietary Guidelines for Americans" which derive these estimates using the Estimated Energy Requirements from the Institute of Medicine Dietary Reference Intake macronutrients report (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2005). Based on the WHO's recommendation this would be 45 g of added sugar per day according to the 10% recommendation and 22.5 g based on their proposed (5%) recommendation. Lastly, the proportion of meals that exceeded the WHO's current recommendation (<10% of total energy should come from added sugar) and proposed recommendation (<5% of total energy should come from added sugar) was tabulated (World Health Organization, 2014). All statistical analysis was conducted in 2014 using SAS version 9.3 software (2010; SAS Institute Inc.).

Results

3178 meals from 10 fast-food and 7 sit-down restaurants were analyzed. The amount of added sugars in an average kids' meal (25 ± 0.36 g) exceeded the WHO's proposed daily recommendation for sugar intake (Table 1). There was a wide range of added sugar levels in kids' meals ranging from 0 g to 114 g.

50% of meals exceeded the WHO's proposed daily sugar recommendation (<5% of total energy should come from added sugar), and 19% exceeded the WHO's current daily sugar recommendation (<10% of total energy should come from added sugar) (Fig. 1). Beverages on average contained 16 ± 20 g. Beverages with the highest sugar content were typically soft drinks, fruit juices with added sugars and chocolate milk.

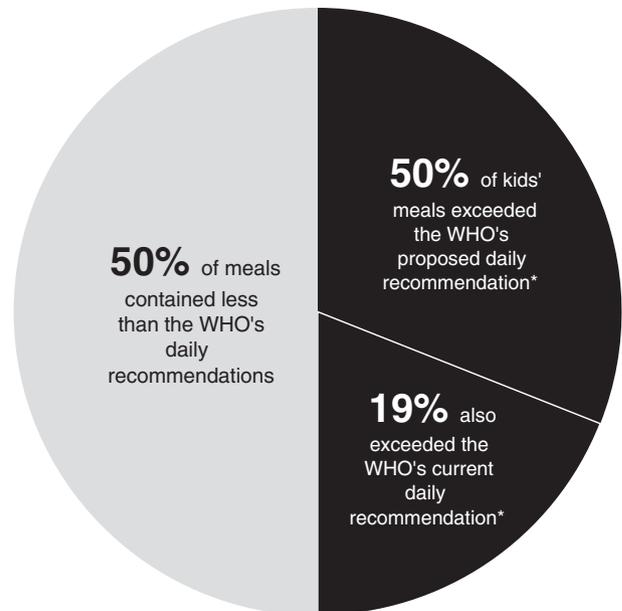


Fig. 1. Proportion of kids' meals that exceeded the WHO's current and proposed added sugar recommendations. *The WHO's proposed recommendation (<5% of total calories should come from added sugars) and current recommendation (<10%) were calculated using the daily estimated caloric requirements for a sedentary 4–8 year old boy or a moderately active 4–8 year old girl (1800 kcal/day), according to the "Dietary Guidelines for Americans" which derive these estimates using the Estimated Energy Requirements from the Institute of Medicine Dietary Reference Intake macronutrients report. Proportions are based on weighted frequencies. All data was collected in 2010 and analyzed in 2014 in Toronto, Canada.

Desserts on average contained 12 ± 7 g of added sugar. Entrées on average contained 3 ± 6 g. The highest ranking entrées were chicken nugget meals containing honey mustard dipping sauces, as well as rib meals and sandwiches with sweet sauces. Side dishes on average contained 0.6 ± 2 g of added sugars.

Discussion

Many kids' meals contained excessive amounts of added sugar and often exceeded the WHO's daily sugar recommendation. Even though the majority of added sugars were found in beverages and desserts, this study showed that some entrées and side dishes also contained excessive amounts of added sugars.

We found that the average amount of added sugars in a kids' beverage equals approximately 3.5% of total calories (70% of an entire days'

Table 1

Added sugars in kids' meals from chain restaurants.

Added sugars (g)	n	Mean ± SE/SD ^a	% of total energy ^b	Minimum	25th percentile	Median	75th percentile	Maximum
Entire meal (entrée + side dish + beverage + dessert)	3178	25 ± 0.4	6%	0	9	22	37	114
Components of the meal								
Entrées	85	3 ± 6	0.5%	0	0	1	3	33
Side Dishes	56	0.6 ± 2	0%	0	0	0	0.1	12
Beverages	33	16 ± 20	4%	0	0	11	28	73
Desserts	35	12 ± 7	3%	0	8	14	16	30

Entrées include: hamburgers, chicken nuggets, tacos, sandwiches, hot dogs, and macaroni & cheese. Side dishes include French fries, onion rings, applesauce, vegetables, salads, and soup. Beverages include soft drinks, juice, and milk. Desserts include ice cream, cookies, jello, and baked goods.

All data was collected in 2010 and analyzed in 2014 in Toronto, Canada.

^a SE/SD, For the "entire meal" standard error was reported because this is a weighted mean (data was weighted so that each restaurant is equally represented), however, standard deviation was reported for the "components of the meal" because this data was not weighted.

^b Daily estimated energy requirements were conservatively estimated based on the recommendations for a sedentary 4–8 year old boy, which is equivalent to the recommendations for a moderately active 4–8 year old girl (1800 kcal/day). This estimate is from the "Dietary Guidelines for Americans" which derive these estimates using the Estimated Energy Requirements from the Institute of Medicine Dietary Reference Intake macronutrients report.

worth of sugar). Meanwhile, the amount of sugar in an average kids' dessert adds an additional 3%. Thus, the amount of sugar in an average kids' beverage and dessert surpasses the 5% recommendation. Therefore, when children select entrées and side dishes that also contain added sugars (such as those with sweet dipping sauces), their meal will far surpass the daily recommendation for added sugars.

Only one other study has investigated added sugar levels in restaurants, and similarly found that kids' meals contained 22 g of added sugars (O'Donnell et al., 2008).

In light of the childhood obesity epidemic, improving the nutritional quality of kids' meals is an important priority. While restaurants have made efforts to offer healthier choices—that include fruit and milk instead of dessert and soft drinks—these healthier options are still being offered alongside unhealthy options. Whether or not children are actually choosing the healthier menu options is unknown. Thus, efforts to improve this situation should not only focus on making healthy options available, but also consider ways to incentivize healthier choices. Examples of this are the San Francisco and Santa Clara County toy ordinances, which restrict the distribution of toys with meals that fail to meet nutritional criteria (Anon., 2010; Otten et al., 2012). Additionally, research has shown that children are more likely to select a healthier meal when toys are only given with meals meeting nutritional criteria (Hobin et al., 2012).

Currently, no chemical analytic methods exist to distinguish between added and naturally occurring sugars. Thus, our study conservatively estimated added sugar levels. Therefore, due to the lack of available data, the proposed inclusion of added sugars in the Nutrition Facts Table in both Canada and the United States will greatly aid future research in this area (Health Canada, 2014; U.S. Food and Drug Administration, 2014).

Overall, this study sheds light on the emerging issue concerning sugar in the food supply and demonstrates the need for policy action to address this situation.

Author contributions

Dr. Mary L'Abbe and Mary Scourboutakos had full access to all the data and take responsibility for the integrity of the data and accuracy of the data analysis.

Study concept and design: Scourboutakos, L'Abbe.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Scourboutakos.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Scourboutakos.

Study supervision: L'Abbe.

Conflict of interest

None reported.

Funding

Vanier Canada Graduate Scholarship (MS); Cancer Care Ontario and Canadian Institutes of Health Research Training Grant in Population Intervention for Chronic Disease Prevention: A Pan-Canadian Program

(Grant #: 53893) (MS); CIHR and Canadian Stroke Network Operating Grant Competition 201103SOK, University of Toronto, Earle W. McHenry Chair unrestricted research grant from the University of Toronto (ML).

Acknowledgments

The authors have no conflicts of interest.

References

- Ordinance amending Article 8 of the San Francisco Health Code by adding Sections 471.1 through 479.9 to set nutritional standards for restaurant food sold accompanied by toys of other youth focused incentive items. Available at: http://www.sfbos.org/ftp/uploadedfiles/bdsupvrs/committees/materials/lu092710_101096.pdf (Accessed: March 8 2014).
- Ervin, R., Ogden, C., 2013. Consumption of added sugars among US adults, 2005–2010. In: US Department of Health and Human Services (Ed.), Centers for Disease Control and Prevention, United States.
- Health Canada, 2012. Canadian Nutrient File (CNF). Available at: <http://webprod3.hc-sc.gc.ca/cnf-fce/index-eng.jsp> (Accessed: March 23 2014).
- Health Canada, 2014. Improving Nutrition Information on Food Labels: Health Canada's Proposed Changes to the Look of the Nutrition Facts Table and the List of Ingredients. Available at: <http://www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition-facts-valeur-nutritive-fs-fr-eng.php> (Accessed: July 28 2014).
- Heart and Stroke Foundation of Canada, 2014. Heart and Stroke Foundation of Canada Position Statement – Sugar, Heart Disease and Stroke. Available at: http://www.heartandstroke.com/site/c.iklQLcMWJtE/b.9201361/k.47CB/Sugar_heart_disease_and_stroke.htm (Accessed: Nov 8 2014).
- Hobin, E.P., Hammond, D.G., Daniel, S., Hanning, R.M., Manske, S., 2012. The Happy Meal(R) effect: the impact of toy premiums on healthy eating among children in Ontario, Canada. *Can. J. Public Health* 103 (4), e244–e248.
- Johnson, R.K., Appel, L.J., Brands, M., et al., 2009. Dietary sugars intake and cardiovascular health: a scientific statement from the American Heart Association. *Circulation* 120 (11), 1011–1020.
- Kell, K.P., Cardel, M.I., Bohan Brown, M.M., Fernandez, J.R., 2014. Added sugars in the diet are positively associated with diastolic blood pressure and triglycerides in children. *Am. J. Clin. Nutr.* 100 (1), 46–52.
- O'Donnell, S.I., Hoerr, S.L., Mendoza, J.A., Tsuei Goh, E., 2008. Nutrient quality of fast food kids meals. *Am. J. Clin. Nutr.* 88 (5), 1388–1395.
- Otten, J.J., Hekler, E.B., Krukowski, R.A., et al., 2012. Food marketing to children through toys: response of restaurants to the first U.S. toy ordinance. *Am. J. Prev. Med.* 42 (1), 56–60.
- Scourboutakos, M.J., L'Abbe, M.R., 2012. Restaurant menus: calories, caloric density, and serving size. *Am. J. Prev. Med.* 43 (3), 249–255.
- Te Morenga, L., Mallard, S., Mann, J., 2013. Dietary sugars and body weight: systematic review and meta-analyses of randomised controlled trials and cohort studies. *BMJ* 346, e7492.
- Te Morenga, L.A., Howatson, A.J., Jones, R.M., Mann, J., 2014. Dietary sugars and cardiometabolic risk: systematic review and meta-analyses of randomized controlled trials of the effects on blood pressure and lipids. *Am. J. Clin. Nutr.* 100 (1), 65–79.
- U.S. Department of Health and Human Services, U.S. Department of Agriculture, 2005. *Dietary Guidelines for Americans 2005*. U.S. Government Printing Office, Washington, DC.
- U.S. Food and Drug Administration, 2014. Proposed Changes to the Nutrition Facts Label. Available at: <http://www.fda.gov/food/guidanceregulation/guidancedocumentsregulatoryinformation/labelingnutrition/ucm385663.htm> (Accessed: July 28 2014 2014).
- United States Department of Agriculture, 2011. USDA National Nutrient Database for Standard Reference. Available at: <http://ndb.nal.usda.gov/> (Accessed: March 23 2014).
- World Health Organization, 2014. Media Center – WHO opens public consultation on draft sugars guideline. Available at: <http://www.who.int/mediacentre/news/notes/2014/consultation-sugar-guideline/en/> (Accessed: March 9 2014).
- Yang, Q., Zhang, Z., Gregg, E.W., Flanders, W., Merritt, R., Hu, F.B., 2014. Added sugar intake and cardiovascular diseases mortality among US adults. *JAMA Intern. Med.* 174 (4), 516–524.