The Association Between Added Sugars Intake and the Healthy Eating Food Index-2019 Among Canadians: Analyses From the Canadian Community Health Survey – Nutrition 2015 Public Use Microdata File

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Introduction

- There is continuing debate regarding the association between added sugars intake and overall diet quality, and such data remain a research gap for the Canadian population.
- The US Dietary Guideline for Americans 2020-2025 recommends limiting added sugars to less than 10% of energy intake based on menu modeling to ensure nutrient needs are met without exceeding energy intake requirements[1].
- One of the measures for diet quality is to score dietary patterns based on how closely they are aligned with national dietary guidelines.
- Healthy Eating Food Index (HEFI)-2019 assesses the extent to which Canadians' eating habits align with 2019 Canada's Food Guide (CFG) recommendations on healthy food choices ("what to eat") [2].

Purpose

- This study aimed to assess the association between the intakes of added sugars in Canada and HEFI-2019 scores as an indicator of diet quality.

Methods

- The 24-hour dietary recalls of Canadians 2 years and older (n=19,783, first-day) from the 2015 Canadian Community Health Survey (CCHS)-Nutrition Public Use Microdata File were used to calculate added sugars (AS) intake (as a percentage of energy intake, %EI) and HEFI scores (Table 1).
- The linearity between AS intake (by quintiles) and total HEFI scores was tested after adjusting for age, sex, education level, type of smoker, and misreporting status.
- Descriptive statistics were obtained for those with different ranges of AS intakes across HEFI score quintiles (Q1-lowest to Q5-highest).

Table 1. The Healthy Eating Food Index-2019 Scoring Criteria[2]

#	Component name	Measurement (ratio)	Maximum Points	Unit	Standard for minimum score	Standard for maximum score
1	Vegetables and fruits	Total vegetables and fruits[a]/ total foods[b]	20	RA/RA	No vegetables and no fruits	≥0.50
2	Whole-grain foods	Total whole-grain foods[c]/ total foods[b]	5	RA/RA	No whole-grain foods	≥0.25
3	Grain foods ratio	Total whole-grain foods[c]/ total grain foods[d]	5	RA/RA	No whole-grain foods	1.0
4	Protein foods	Total protein foods[e]/total foods[b]	5	RA/RA	No protein foods	≥0.25
5	Plant-based protein foods	Plant-based protein foods[f]/ total protein foods[e]	5	RA/RA	No plant-based protein foods	>0.50
6	Beverages	(Plain water including carbonated + unsweetened beverages)[g]/total beverages[h]	10	g/g	No water and no unsweetened beverages	1.0
7	Fatty acids ratio	(Mono- + polyunsaturated fat)/ total saturated fat	5	g/g	≤1.1[i]	≥2.6[j]
8	Saturated fats	Total saturated fat/energy	5	%E (kcal/kcal)	≥15%E[k]	<10%E
9	Free sugars	Total free sugars/energy	10	%E (kcal/kcal)	≥20%E[k]	<10%E
10	Sodium	Total sodium/energy	10	mg/kcal	≥2.0[k]	<0.9[l]

Results

1. About 65% of Canadians had added sugars intakes below 10% of total energy intake (Table 2).

Table 2. Added sugars intake categories and their frequency distributions. *With bootstrap (BRR) and weight applied.

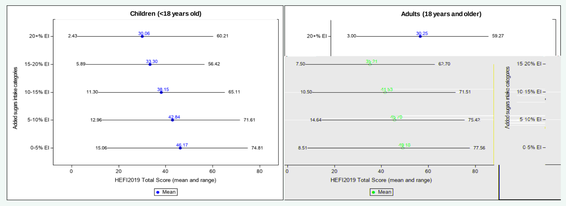
Ranges of Added Sugars Intakes (%EI)	Frequency (n)	Percentage (%) (weighted*)
< 5.0	6271	36.3
5.0-10.0	5737	28.5
10.0-15.0	3643	17.5
15.0-20.0	1942	9.3
>20.0	1939	8.5

Results

2. There was a negative association between added sugars intakes and total HEFI-2019 scores, and the association was non-linear (r^2=0.32, p<0.001) after adjusting for age, sex, education level, type of smoker, and misreporting status.

3. Within each AS intake category, there was a wide distribution of HEFI scores for both children and adults (Figure 1).

Figure 1. The ranges of HEFI scores across AS intake categories among Canadians aged 2 years and older. [2]

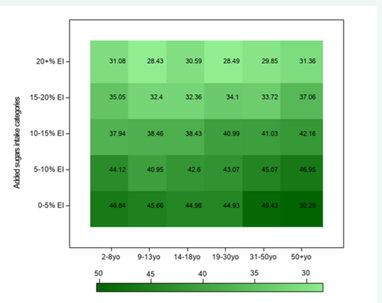


4. All Canadians 2 years and older were categorized into quintiles based on their HEFI scores, and their distributions within each AS intake category is shown in Figure 2. Most of those with AS intakes greater than 15 %EI had HEFI scores in the lowest quintile (Q1), indicative of low adherence to CFG (64% for > 20% EI group and 44% for 15-20 %EI group). However, this pattern is not evident in lower AS intake ranges. Specifically, for individuals with AS intakes between 5-10 %EI and 10-15 %EI, the distribution of total HEFI scores is more balanced across the middle three quintiles (Q2 to Q4).

Figure 2. Frequency distribution (%) of the five HEFI quintiles within each AS intake category among Canadians aged 2 years and older.

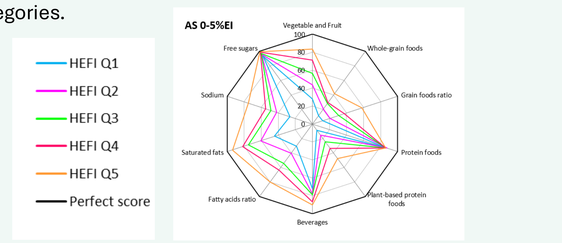
5. A general trend was observed that within each AS intake category, the mean HEFI score was lower among adolescents and higher among older adults (Figure 3).

Figure 3. Heatmap of mean HEFI scores by age groups and AS intake categories



6. Within each AS intake category, while the free sugars scores were similar, greater differences were observed in the scores (shown as % of max points) of fruits and vegetables, sodium, saturated fat, fatty acid ratio, and grain foods ratio, which help explain the large variations of HEFI scores in Figure 1. Interestingly, there were minimal variations in protein food scores, suggesting a stable contribution across HEFI quintiles and AS intake categories (Figure 4).

Figure 4. HEI component scores (% to the max score) by added sugars intake categories.



Conclusions

- Large variations in total HEFI-2019 scores were observed amongst those with similar added sugars intakes, suggesting that added sugars alone is not a good indicator of diet quality.
- The non-linear negative association between added sugars and HEFI scores suggests greater benefits of sugars reduction for those at higher AS intake categories. Importantly, the overall nutrient composition and the matrix of food should be considered when adjusting dietary choices.
- This research fills an important gap in understanding the relationship between added sugars and diet quality, and highlights the need to continue the research and consumer education with respect to the multi-dimensional food choices in the context of diet quality.

References:

1. https://www.dietaryguidelines.gov/resources/2020-2025-dietary-guidelines-online-materials
2. Brassard D et al. 2022. Development of the Healthy Eating Food Index (HEFI)

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