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Comparing Cardiovascular Disease Related Nutrient Sources Among Popular Convenience Foods by Dietary-Pattern Category: Vegetarian vs. Non-vegetarian

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OBJECTIVE

This cross-sectional study explores how popular convenience foods deviate from heart healthy recommendations grouped by dietary pattern category: vegetarian items vs. non-vegetarian items.

INTRODUCTION

As the diverse American population eats more convenience foods both in and outside the home and emerging dietary-patterns gain popularity (e.g. vegetarian diets), this study compares available cardiovascular disease (CVD) related nutrient values by dietary pattern category: vegetarian items vs. non-vegetarian items[1]. Heart healthy diets like vegetarian diets are typically associated with higher levels of cardio-protective nutrients - potassium, fiber, magnesium, vitamin C, and calcium; and lower levels of cardiovascular disease (CVD)-leaning nutrients- total fats, saturated fatty acids, cholesterol, sodium, according to the 2010 Dietary Guidelines for Americans[2]

FDA defines foods to be good and excellent sources of cardio-protective nutrients when they contain 10% and 20% Daily Value/serving, respectively[3]. Similarly amounts >20% Daily Value/serving of CVD-leaning nutrients are considered high by FDA[3]. There is some evidence suggesting the current ratio of Ω-6: Ω-3* is 15/1-16.7/1 contributing to total mortality and reduced CVD prevention among other chronic diseases plaguing the West[4].

METHODS

Popular Convenience Foods Selection

- Using 24hr recalls among 9255 survey respondents for the 2007-2008 NHANES WWEIA, 125 commercially processed and restaurant foods with added sodium "sentinel foods" were selected (Figure 1) as part of on-going sodium monitoring efforts, representing the popular convenience foods for this report.

Sampling Plan and Nutrient Analysis

- Sentinel foods were sampled nationwide at 12 locations, composited and then sent out for laboratory analysis, using standardized procedures used for the USDA National Food and Nutrient Analysis Program[5]. These include use of valid, approved methods by pre-qualified laboratories and comprehensive quality control procedures (Figure 1). Approximately1228 analytical samples for 97 popular convenience foods were analyzed for sodium and related nutrients values,39 non-vegetarian, 58 vegetarian, between 2010-2013.
- Mostly analytical data using the above methods were used. Some label, manufacturer, and imputed data were used where analytical values were not available. Nutritionally significant levels of CVD related nutrients with daily values were totaled by dietary pattern category according to FDA guidelines for good and excellent sources of cardio-protective nutrients per serving; and high sources of CVD-leaning nutrients (>20%DV per serving).

Grouping food samples by dietary pattern category

- Using ingredients from food labels and restaurant websites, the foods were grouped as either vegetarian vs. non-vegetarian (Figure 1). Label serving sizes in grams were determined from corresponding nutrition facts panel or restaurant websites. For restaurant items average "order" size was used as a serving size (e.g. one order of medium French fries). In this study we defined popular vegetarian convenience foods to contain plant, egg, and/or dairy ingredients but no meat, whereas non-vegetarian foods contain meat ingredients like beef, fish, poultry, or game.

Statistical Analyses

- Mean CVD-leaning nutrients and mean cardio-protective nutrients per label serving size (weighted by brand market share) were determined and summed by dietary pattern category. The significance of differences for the nutrients between the two dietary pattern categories were tested using t-tests and Mann-Whitney tests as appropriate. The sample median linoleic acid to alpha-linolenic acid ratio per 100g were compared using a Mann-Whitney test.

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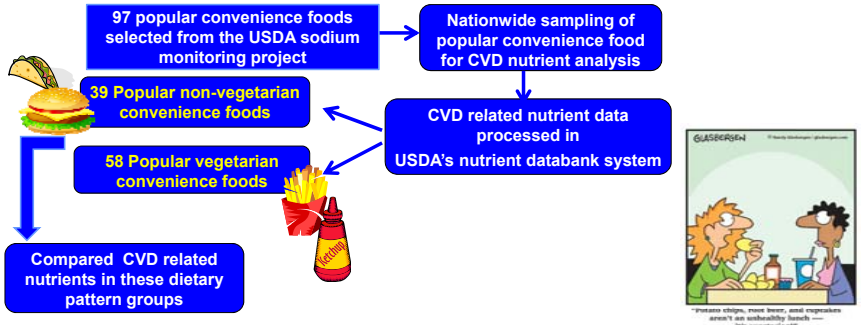

Figure 1: Method for the selection, analysis and grouping of vegetarian and non-vegetarian popular convenience foods.

RESULTS

- Vegetarian items were lower for all 7 CVD-leaning nutrients, and higher in calcium, vitamin C (p<0.0001) comprising mostly of fried items, savory-snacks, sweet-baked products, and condiments, see Table 1.
- Non-vegetarian convenience foods had more fiber, magnesium, and potassium (p<0.001) comprising mostly of mixed dishes with vegetable or bean ingredients, see Table 1
- Popular non-vegetarian convenience foods contained more items with CVD-leaning nutrients but also more cardio-protective nutrients than popular vegetarian foods in nutritionally significant amounts, see Table 2.
- The Ω-6: Ω-3* ratio was greater among non-vegetarian samples per 100g (p<0.0001) vs. vegetarian items, see Table 3.

Table 1: A comparison by dietary pattern category for content of CVD-leaning nutrients (red) and cardio-protective nutrients (green) among popular convenience foods

Nutrient	Vegetarian N	Vegetarian Weighted Mean (SD) per Label Serving	Non-Vegetarian N	Non-Vegetarian Weighted Mean (SD) per Label Serving	p^1 (serving)
Total fat	589	5.39 (±20.59)	505	10.51 (±45.64)	*
Saturated fat	285	1.74 (±9.02)	290	3.05 (±15.52)	*
Trans fat	343	0.13 (±1.46)	253	0.19 (±1.07)	*
Sodium	706	378.53 (±1562.58)	572	690.58 (±2212.37)	*
Cholesterol	150	14.08 (±125.70)	204	54.06 (±305.74)	*
Phosphorus	688	94.99 (±545.27)	477	195.46 (±484.21)	*
Omega 6 Fatty Acids	271	1.86 (±8.25)	276	2.66 (±23.17)	
Potassium	688	150.41 (±703.35)	477	307.14 (±935.71)	*
Calcium	699	67.71 (±556.75)	477	62.68 (±230.31)	*
Vitamin C	136	4.81 (±118.29)	89	4.43 (±65.43)	*
Magnesium	700	16.47 (±64.91)	477	30.15 (±96.38)	*
Omega 3 Fatty Acids	341	0.24 (±1.54)	257	0.29 (±2.86)	
Fiber	264	1.77 (±10.57)	126	3.27 (±21.53)	*

[1] Significant difference for each nutrient per serving by dietary pattern category (p<0.01) (independent t-tests and Mann-Whitney tests)

***omega-6 (linoleic acid) to omega-3 (alpha-linolenic acid) ratio**

Table 2: Number of popular convenience foods with high, good or excellent amounts of cardiovascular disease related nutrients according to FDA criteria[5].

Nutrient	Vegetarian (n=58) High	Good	Excellent	Non-Vegetarian (n=39) High	Good	Excellent
Total fat	5			14		
Saturated fat	6			11		
Sodium	16			24		
Phosphorus	6			15		
Cholesterol	6			6		
Magnesium		4	1		36	2
Calcium		6	5		9	2
Potassium		8	2		7	2
Fiber		4	8		7	8

Table 3: Omega6:Omega3 Ratio is higher among popular non-vegetarian convenience foods

	Non-Vegetarian N Samples	Median	CI 95%	Vegetarian N Samples	Median	CI 95%
Ω-6: Ω-3*	268	13.1	14.2-19.4	338	8.4	15.7-23.8

p<0.0001 (Mann-Whitney test)

CONCLUSION

- Popular vegetarian convenience foods with added sodium may contain smaller amounts of CVD-leaning nutrients than non-vegetarian convenience foods, but may not be better sources of cardio-protective nutrients.
- Popular non-vegetarian convenience foods contained more items with CVD-leaning nutrients greater than 20% daily value per serving and more cardio-protective nutrients greater than 10% daily value per serving than popular vegetarian foods.
- Ω-6: Ω-3 was greater among non-vegetarian items but both dietary pattern categories contained median ratios more than 8:1, which is exceeds literature review estimates of a 4:1 ratio for secondary CVD prevention. The ratio seen in this study's vegetarian group is likely due to the major presence of fried items[4].

SIGNIFICANCE Understanding the nutrient profile of popular convenience foods with added sodium is useful to dietitians for planning meals on a budget and consumer education for cardiovascular disease prevention.

REFERENCES

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