



Effect of a Pre-Dinner Walnut Snack on Nutrient Intake Among University Students



Michelle E. LaCasse¹, Mackenzie J. Weis¹, Lauren S. DeVaan¹, Gabrielle L. Schnellman¹, Elizabeth M. Gile¹, Molly D. Ahmann¹, Ted Wilson¹, and Tisha L. Hooks²

University of Winona Biology Department¹ and Math Statistics²

INTRODUCTION:

Problems with weight management are global, with weight gain being especially problematic for first year university students (Boyce and Kuijer, 2015). There is a correlation between weight gain of first year students and those of the same age range who did not attend college, a phenomenon called the "Freshman 15" (Boyce and Kuijer, 2015; Gow et al, 2010; Vadeboncoeur et al, 2015). When comparing freshman year to sophomore year, absolute weight, body mass index, percent of body fat, fat mass, and waist circumference all tend to increase. (Gow et al, 2010).

There are many possible causes of weight gain in college freshman, including overindulgence of large cafeteria food options, decreased metabolism, and unhealthy snack habits. Up to 20% of freshman weight gain can be attributed to college buffet style meals and consumption of junk food, in addition to another 20% from personal snack choices (Levitsky et al, 2004). Typical university cafeteria services provide food in an all-you-can-eat manner, which can lead to the tendency to over eat. In 2014 alone, 76% of dining halls on university campuses provided the all-you-can-eat buffet style meal, with little to no guidance about healthy snacks (Schilling 2014).

It is known that healthy snack choices can lower the chances of unhealthy eating habits. Walnuts may be a healthier, nutrient dense snack that may lead to improved eating habits and improve overall student nutrition. This study observed the nutritional ingestion from a large meal (1,760 cal) among college students after the consumption of a nutrient-dense walnut snack, versus an isocaloric gummi candy snack or no snack.

A pre-meal walnut snack could lead to an improved meal nutrition and weight management in adulthood.

MATERIALS & METHODS:

Winona State University students (n=36; age 18-20) were recruited for this WSU IRB approved study. Non-eligible participants included those with diabetes, liver/heart disease, smoking habits, eating disorders (i.e. anorexia nervosa, bulimia nervosa, binge-eating disorder), or walnut allergies. On study days, participants engaged in a 6 hour fast from food and beverages (excluding water). Those with a blood glucose level under 110 mg/dl were subjected to a snack treatment, which was followed by an additional 1.5 hour fast before being served the standard meal.

Subjects were randomly assigned to the three snack choices in a single crossover design: 1) 190 cal of California Walnuts (CW) (Figure 1), 2) 190 cal of gummi candy (GC), or 3) no snack (NS; control) on three consecutive nights. Participants were assigned to separate rooms by snack treatment so that no communication occurred between groups. Pre-meal participants were also isolated from post-meal participants to ensure that the sight or smell of food would not affect eating choice. The standardized 1,760 Calorie meal that was intended to model buffet eating was prepared by Chartwells Dining Service (Figure 1).

Digital images were collected before and after meal ingestion for determination of nutrient intake (Table 1 and 2). Data was expressed as LSM ± SD with significance evaluated following ANOVA with Tukey HSD for post hoc analysis.

RESULTS:

FIGURE 1. DIGITAL IMAGES OF STANDARD MEAL GIVEN TO PARTICIPANTS (LEFT).



FIGURE 2. CALIFORNIA WALNUT SNACK NUTRITION FACTS.

Nutrition Facts	
Serving Size 1oz. (28g / about 1/4 cup)	
Amount Per Serving	
Calories	190
% Daily Value*	
Total Fat 18g	23%
Saturated Fat 15g	8%
Trans Fat 0g	
Polyunsaturated Fat 13g	
Monounsaturated Fat 2.5g	
Cholesterol 0mg	0%
Sodium 0mg	0%
Total Carbohydrate 4g	1%
Dietary Fiber 2g	7%
Total Sugars 1g	
Incl. 0g Added Sugars	0%
Protein 4g	

TABLE 1. NUTRITION VALUES OF EACH ITEM OFFERED IN LARGE STANDARD MEAL (1760 CAL) GIVEN TO PARTICIPANTS ON THREE CONSECUTIVE NIGHTS.

Standardized Food Item on Meal Tray	Portion Size	Weight (oz)	Weight (g)	Calories	Cal Fat	Tot Fat (g)	Sat Fat (g)	Cholesterol (mg)	Na+ (mg)	Tot Carb (g)	Diet Fiber (g)	Sugar (g)	Protein (g)
Soda, Sierra Mist, Fountain	12 fl oz	13.04	369.6	150	0	0	0	0	35	40	0	40	0
Pepperoni Pizza	3 slice	8.64	245	440	160	18	10	55	680	47	2	3	23
Chicken Nuggets	8 oz	8	226.8	460	190	21	3.5	75	1110	37	2	1	29
French Fry Potatoes	4 oz	4	113.4	230	120	13	1.5	0	350	26	2	0	2
Ketchup	1 oz	1	28.35	30	0	0	0	0	260	8	0	6	0
Macaroni and Cheese	6 oz	6	170.1	330	160	18	10	50	890	31	1	5	12
Sugar Cookies	1 each	1	28.35	120	50	5	2.5	5	105	18	0	10	1
TOTAL:				1760	680	75	27.5	185	3430	207	7	65	67

TABLE 2. EFFECT OF PRE-MEAL SNACK TREATMENT ON NUTRIENT INGESTION, SIGNIFICANCE INDICATED BY DIFFERENT SUPERScript LETTERS (P<0.05).

Snack	Total Fat (g)	Sat. Fat (g)	Cholesterol (mg)	Dietary Fiber (g)	Protein (g)	Carbo-hydrates (g)	Sugar (g)	Sodium (mg)
NS	41.5±1.9 ^A	15.1±0.8 ^A	103.6±5.7 ^A	3.59±0.2 ^A	36.0±1.9 ^A	107.2±4.8 ^A	36.1±2.7 ^A	1910±98 ^A
GC	40.7±1.9 ^A	14.3±0.8 ^{AB}	100.0±5.7 ^{AB}	3.56±0.2 ^{AB}	34.5±1.9 ^A	107.7±4.8 ^A	35.4±2.7 ^A	1890±98 ^{AB}
CW	36.8±1.9 ^B	13.4±0.8 ^B	92.4±5.7 ^B	3.13±0.2 ^B	31.9±1.9 ^B	101.7±4.8 ^A	35.7±2.7 ^A	1720±99 ^B

MAIN POINTS:

- 1) Total fat intake after walnut snack was less than after gummy and no snack.
- 2) Saturated fat intake after walnut snack was less than after no snack.
- 3) Cholesterol intake after walnut was less than after no snack.
- 4) Dietary fiber intake after walnut snack was less than after gummy and no snack.
- 5) Protein intake after walnut snack was less than after no snack.
- 6) Consumption of snacks prior to the standard dinner had no effect on total carbohydrate and sugar ingestion.
- 7) Sodium intake after walnut was less than after no snack.

CONCLUSION:

Consumption of a nutrient dense snack, such as walnuts, prior to a meal led to a decrease in total fat, saturated fat, cholesterol, and sodium ingestion. Surprisingly, it also led to a reduction in protein and carbohydrate ingestion. An understanding of how walnut consumption impacts nutrient intake during a subsequent dinner could lead to improvements in weight management and improved health habits among students that carry forward into adulthood. This is beneficial to clinicians seeking a healthy and nutrient dense snack to add into a patient diet with unhealthy fat, saturated fat, dietary fiber, protein, cholesterol, and sodium values.



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