

# Pilot Test of A Bites-Focused Weight Loss Intervention

## Abstract

**Introduction:** To combat high obesity prevalence, many weight loss programs have emerged in recent years. One approach, which encourages individuals to count their number of daily bites rather than calories, has been proposed as a weight loss tool. However, it is unknown to what extent a bites approach that focuses on a modest reduction in bites over time would help participants lose weight. The purpose of this study was to pilot test a simple bites-focused weight loss intervention on a Midwestern university campus.

**Methods:** Participants were recruited during fall 2015 and were asked to count and report daily bites for one week. Daily bite totals were averaged by week to obtain a weekly bite baseline. Then, for four additional weeks, participants were encouraged to reach and remain at a new bite goal (a 20-30% reduction in their personal bite count). Using SAS v 9.4 and MS Excel, paired t-tests were conducted to determine whether reduction in weight was significant.

**Results:** Of the 61 participants who started this study, 41 participants completed it. On average, participants lost 1.6 kg from baseline to the end of the study ( $p < 0.0001$ ). Those in the 20% reduction group lost about as much weight (1.8 kg) as those in the 30% reduction group (1.4 kg) ( $p < 0.3813$ ).

**Conclusion:** With minimal coaching, no required change in exercise, and limited change in food choices, participants lost a statistically significant amount of weight over the course of this study. However, further research is needed to determine whether this would hold true in a larger population and to what extent food quality and nutrition might be incorporated in a bites diet program.

**Keywords:** Bite counting; Portion control; Obesity; Weight loss; Diet

## Research Article

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## Introduction

Rising prevalence of overweight and obesity in recent decades [1-3] has led to the development of programs and initiatives that focus on weight loss [3,4]. Counting and tracking calories is a principle found at the core of many weight loss programs. However, this method has been criticized for placing less value on food quality than on quantity [5]. Additionally, even with the advent of mobile technologies designed for counting and tracking calories, using this weight loss method may be difficult to implement or sustain [6].

Counting and tracking daily bites, or the number of times the hand goes to the mouth with food, could serve as a simple alternative for quantifying food intake. The concept of bite counting or tracking has shown promise in previous research and has been suggested as a weight loss tool [7-9]. While variations exist in how bites-based weight loss has been approached in the past, the process generally involves simple monitoring and limiting of bites [9]. With basic modifications, bites counting could also be personalized to account for healthy, but more calorie-dense, foods, by allowing the dieter to not count certain foods in bite totals. The purpose of this study was to pilot test bite counting and percentage-based bites reduction as a weight loss approach. A secondary purpose of this study was to determine whether reducing bites by 20% or 30% would prove more

effective in reducing weight.

## Materials and Methods

### Recruitment

Individuals were recruited to participate in this study from August through September 2014 on the campus of a large, private university. Flyers and campus-wide emails originating from a campus wellness office were used as recruiting tools. Inclusion criteria included being between the ages of 18 and 65 and having a BMI over 25. Exclusion criteria included being pregnant or nursing or the use of prescription drugs that might hinder one's ability to remain healthy while reducing the amount of food intake. Among 111 interested individuals, 100 were eligible to participate in the study. After a brief description of the study objectives and activities, 39 individuals declined to participate. Of the remaining 61 individuals, 16 dropped out during the first week, due to personal/unspecified reasons ( $n=9$ ), the difficulty of counting bites ( $n=4$ ), or medical reasons ( $n=3$ ). Four (4) individuals dropped out after the end of the first week. Three others either had missing data from one or more weigh-ins or a large amount of missing bites count data that made it difficult to include them in analysis. The final study sample included 41 participants.

## Study Design Procedure

Participation in the study lasted five weeks beginning in September of 2014. On the first day of the study, participants met with a research assistant (RA) in a central office on the campus for a 15-minute, individual orientation session. RAs explained to participants the requirements for their participation in the study, gathered an informed consent, provided study ID numbers, and recorded participants' height in meters and weight in kg (both measures were taken twice and an average of the two was recorded).

Participants were instructed to continue to maintain their existing or normal diet in terms of food selection and portions while counting the number of instances of lifting food to the mouth and the number of gulps of non-water liquid consumed each day. At the close of each day, study participants either texted or emailed their bite total to an RA. In addition, reports of daily moderate or vigorous physical activity in minutes were also texted or emailed to the assigned RA. Research assistants encouraged participants to text or email their daily bite totals and thanked participants for counting and sending in bite totals when received, but otherwise refrained from coaching.

At the end of the first week, RAs recorded each participant's weight and then issued a "bite goal." The individual's average number of bites in the first week and study ID number determined this goal. Study IDs with odd ending digits were assigned a 30% reduction in bites, while those ending in even digits were assigned a 20% reduction. Over the next four weeks, participants were weighed each week and continued to keep track of their bites and report them to an RA at the conclusion of each day. Participants

were allowed to learn how much they weighed or how much weight they had lost since baseline. When appropriate, RAs offered minimal reassurance to continue counting and answered questions about participation in the study. At the end of the five weeks, participants were given their final weights, as well as total weight loss achieved from the beginning of the study to the end of the study period. Participants received a \$25 gift card at their final weigh-in for compensation of their time and efforts in the study.

## Statistical analysis

Descriptive statistics were used to report all measures gathered. Average number of bites per individual was also reported to evaluate the recommended number of bites in order for individuals to lose weight. To evaluate weight loss from pre-test to post-test and between the distinct treatment groups, a paired t-test was used ( $p < 0.05$ ). This analysis evaluated the primary purpose of this study, which was to explore the efficacy of bite counting for weight loss. Secondly, weight loss of individuals who reduced daily bites by 20% was compared against those that reduced daily bites by 30% ( $p < 0.05$ ).

## Results and Discussion

### Demographics

Among the 41 participants who completed this study, the majority were Caucasian. Participants ranged in age from 18 to 66 and primarily included individuals who had either attended some college or had Master's degrees (Table 1). Average BMI at the beginning of the study was 29.9 (Table 2), which was 1.2 units higher than an age-adjusted national average BMI as reported for the years 2009-2010 [2].

**Table 1:** Demographics.

Variable		N	%	Mean	SD	Range
Age		-	-	43.29	16.65	18-66
Gender	<i>Female</i>	20	48.8	-	-	-
Education	<i>Some College</i>	13	31.7	-	-	-
	<i>4-year college</i>	1	2.4	-	-	-
	<i>Masters</i>	13	31.7	-	-	-
	<i>Doctoral</i>	5	12.2	-	-	-
	<i>Professional</i>	2	4.9	-	-	-
Student	<i>Yes</i>	12	29.3	-	-	-
Income	<i>&lt;\$20,000</i>	6	14.6	-	-	-
	<i>\$20,000-49,000</i>	2	4.9	-	-	-
	<i>\$50,000-89,000</i>	14	34.2	-	-	-
	<i>&gt;\$90,000</i>	19	46.34	-	-	-
Race/Ethnicity	<i>Caucasian</i>	38	92.68	-	-	-
	<i>Hispanic</i>	2	4.88	-	-	-
	<i>Asian</i>	1	2.44	-	-	-
Baseline Weight (kg)		-	-	89.56	14.26	67.9-131.5
Baseline Height (meters)		-	-	1.73	0.09	1.53-1.95
Daily Bite Goal Compliance	<i>(average%)</i>			69.3	32.7	17.9-100
Goal Compliant for Month	<i>&gt;75% of time</i>	16	39.0			

**Table 2:** Pre/post-intervention weight and weight loss

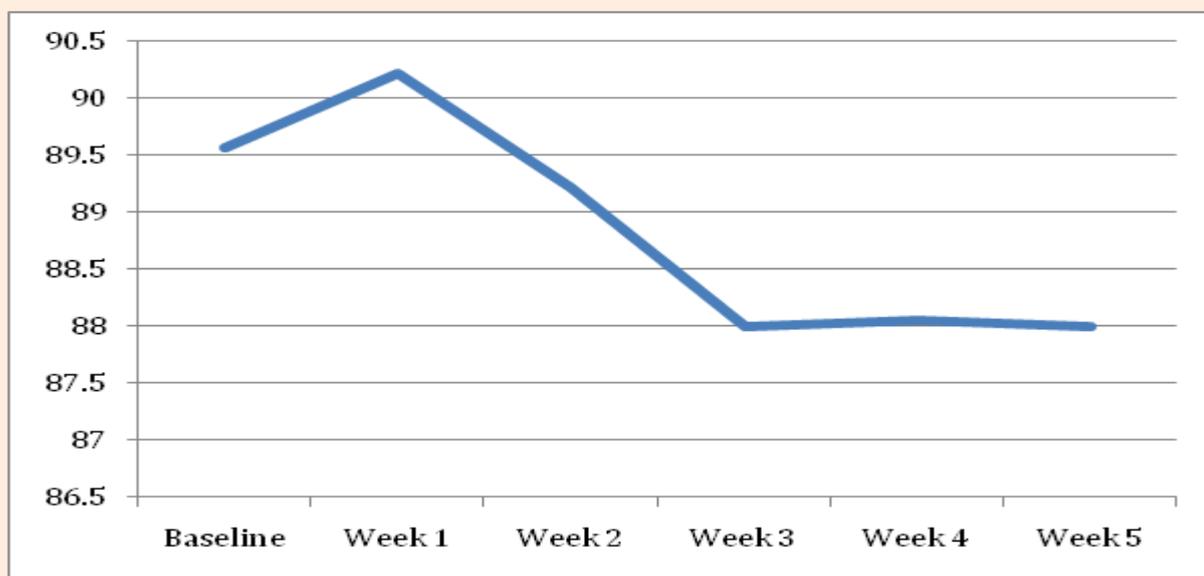
Variable	Pre	Post	Difference	P-value
Weight (kg)	89.56	88.00	1.56	<0.0001
BMI	29.90	29.38	0.52	<0.0001

**Intervention**

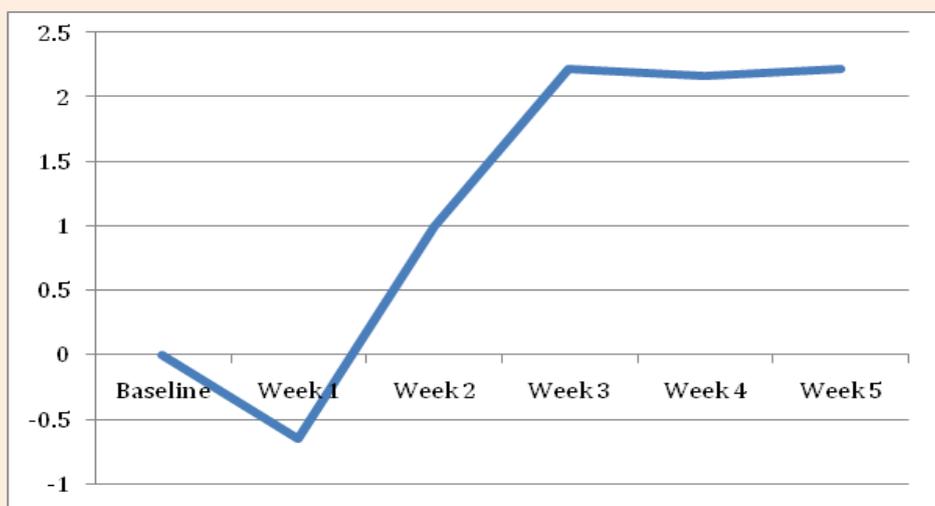
Approximately two-thirds (67.2%) of participants completed the full five weeks of the intervention. Of those, individuals were compliant to their bite goals each day 69.3% of the time on average, while 39.0% (16 individuals) were compliant to their bite goals more than 75% of the four-week period (Table 1). Low levels of compliance and the high drop-out rate were somewhat expected, since many diet programs have been perceived as difficult to maintain over time [10]. Participants that were able

to manage counting bites for at least one week continued to participate through the remainder of the study. This may indicate that participating in this kind of diet plan required a high initial level of motivation or commitment but that maintenance of that diet over time was possible.

The difference between pre-test and post-test weight was 1.56 kg, or 3.4 lbs (P <0.0001), while the difference between pre-test and post-test BMI was 0.52 (P <0.0001). The average amount of weight loss was significant and neared the CDC’s recommendation for “healthy” weight loss [11]. Levels of exercise in the current study sample did not significantly change over the course of the study. While average weight increased for the first week, participants lost over two kilograms on average by week two and then maintained that loss during the fourth and fifth weeks of the intervention (Figures 1 & 2).



**Figure 1:** Participant weight (kg).



**Figure 2:** Cumulative participant weight loss, compared to baseline (kg).

Whereas counting bites is not a time-consuming endeavor, it does allow an individual to be conscious of their eating habits, which is an idea that somewhat resembles “mindful eating” diet theory [12]. Nevertheless, this is the first attempt to pilot bite counting as a weight loss approach. Future research will benefit from a larger, randomly selected study sample, increased duration of the intervention, a control group, and a longer follow up period in which the impact of counting bites on weight is measured.

In this study, reducing the number of bites taken seems to have had a short-term effect on weight loss. Reducing by 30% as opposed to 20% did not appear to impact weight loss significantly. Those reducing bites by 30% may have overcompensated for the bites reduction with more calorie-dense foods, while those reducing by 20% may have found the reduction more manageable without overcompensation. Based on these data, it is possible that a smaller reduction in bites may be just as effective in spurring weight loss as a more aggressive bite reduction target. However, this hypothesis would benefit from additional testing on a larger scale.

### Limitations

This study has several limitations. Participant attrition is a limitation of this pilot study. Approximately one-third of participants dropped out of the study. Participants who chose to participate in this study may have had a greater desire to lose weight than non-participants, which could potentially limit the generalizability of the findings. In addition, this study was conducted in the fall, and it is unknown whether changes in season may have affected eating patterns or weight loss generally. The study sample was not representative of the general population as the majority of participants were Caucasian; all had completed at least some college, and many had a family income of greater than \$50,000 per year. However, the study sample was reflective of the local population where the study was conducted. In addition, participants were recruited from the campus of a private religious university, and the influence of religious values on strict adherence to bite counting is unknown. Future research in this area should focus on replications of the study methodology with samples that are more representative of the general population.

Finally, while this study tracks weight loss due to reduction in bites, it is unclear how bites reduction affects overall wellness and nutrition. Future research studies on this topic may benefit from an analysis of food choices and how an approach to eating that involves counting bites may impact food selection.

### Conclusion

In this pilot study, participants who completed the full five-week intervention experienced a statistically significant mean

decrease in weight of 1.6 kg ( $p < 0.0001$ ). Further research should seek to determine whether that finding holds constant in other populations, determine ways in which adhering to the bites diet might be simpler, and also understand how the bites diet affects nutrition and eating patterns over time.

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