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Research Paper

Post- Dinner Satiety with the Paleolithic Diet Compared to Usual Diet

Michael Jones

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Honors Senior Project

Abstract

The Paleolithic (Paleo) Diet mimics the diet consumed by Paleolithic Humans. This diet is low in carbohydrate and high in healthy fats. Because of this, it has been found to be highly satiating. We theorized that consumption of the Paleo diet would result in higher satiety ratings as compared to a usual diet. Men and Women with metabolic syndrome (n=4) consumed their usual diet at both baseline and the wash out period and the Paleo diet with high and sedentary exercise. Satiety was measured with a validation tool twice with usual diet and once with the paleo diet with sedentary exercise. The satiety rating was lower comparing post dinner with 90 minutes post dinner with the Paleo diet (0.25) as compared to the usual diet (0.83) indicating a greater satiety with the Paleo diet. The greater satiety rating with the Paleo diet may explain weight loss of this diet

Introduction

Trouble losing weight is a problem across the nation as over one third of the population is

obese and poor diet is a primary culprit. Obesity is linked to many life-threatening diseases; it is vital to many to lose weight. Individuals seeking weight loss often select a particular diet in efforts to reach their weight loss goals without considering the satiety rating for their diet of choice. Dillon and colleagues defined satiety as “sensations that determine the interval between injective events” In other words, satiety is the amount of time it takes for an individual to feel hungry after consuming a meal. Several studies have shown that despite two foods having the same calorie count, the satiety rating may vary widely. Holt and colleagues demonstrated that bananas were found to be much less satiating than apples or oranges by using a survey 2 hours after eating the specific fruit (Holt). The same study found 35 other foods, some among the same food groups, that had significant variances in their satiety rating despite the same caloric values.

The Paleolithic diet consists of foods that would have been available to the prehistoric human, which includes most naturally occurring foods; the exceptions are primarily: processed foods, grains and dairy. Data confirms that basic human physiology has not changed much in the last 50,000 years, which means that dietary needs have not changed either (Eaton et al). If dietary needs have not changed, then there is a possibility that the Paleolithic diet both have a high satiety rate and aid in weight loss. This diet consists of 4 to 16% more protein than a typical diet (Cordian); so, it may share similar satiety levels to the higher protein diet. Dhillon and colleague found that strong satiety properties of protein are often cited as the primary mechanism for successful weight management in short-term clinical trials (Dhillon et al.). If the Paleolithic diet produces the same effect as the diet used in Dhillon study, the Paleolithic diet may prove to have a high satiety rating as well.

The aim of this study was to determine whether or not the Paleolithic diet has high

satiety ratings as compared to a usual diet. We hypothesized that the high protein content and limitation of processed food components of the Paleolithic diet will confer a higher level of satiety of the subjects compared to their usual diet.

Methodology

Study Subjects

The target population of this study was Grand Valley State University faculty between the ages of 18 and 55. These subjects must have at least 3 of the symptoms of metabolic syndrome which include: blood pressure $>130/85$ mmHg, waist circumference >88 cm (women) >102 cm (men), HDL (high density lipoprotein) <50 mg/dL(women) < 40 mg/dL (men), triglycerides >150 mg/dL or fasting blood glucose >110 mg/dl. Additional exclusion criteria included: free of disease including diabetes and orthopedic injuries, ability to provide a letter from your physical or a medical provider clearing you to engage in physical activity, tobacco free, free of recreational drug or alcohol abuse, not afraid of water and free of medications known to affect weight, energy expenditure or interfere with physiological responses of evaluation or training.

Satiety of food

Subjects were asked to fill out a survey (Appendix A) of 4 questions 3 times during the final week of both the usual and Paleolithic diets. This survey was used to judge their level of satiety during the study. Subjects ranked their responses from starving (1) to very satisfied (5). The questions include d(holt):

- How did you feel before dinner?

- How did you feel immediately following dinner?
- How did you feel 90 minutes after dinner?
- Did you feel like eating more (nothing - whole meal)?

Calls were made to subjects to remind them to complete the survey and bring the survey in at their next appointment. Each subject's satiety scores were averaged for every question at the 3 measured time periods (before meal, immediately after meal and 90 minutes after meal) with the Paleolithic diet and their usual diet.

Dietary Intake

24-hour recalls were recorded and analyzed from the participating subjects using the Nutritional Data System for Research (NSDR) software. The NSDR software allows for the input of data for time of consumption, quantity of food, method of preparation and the specific food item. The data recorded with the NSDR software uses a multiple-pass approach, increasing the accuracy of the dietary report. Three 24-hour recalls (2 weekdays and 1 weekend day) were collected with their usual diet and again with the Paleolithic diet.

During their usual diet, the 24 hour recalls were used to determine usual caloric requirements, eating events and macronutrient intake. The recalls during the usual diet period were used to determine if the subjects had reverted to their normal eating habits during the Paleolithic portion of the study. During the Paleolithic diet period, the purpose of the 24 hour recalls were to determine caloric intake, eating events and macronutrient intake for compliance to the Paleolithic diet.

Diet plans

Participants had their satiety tested with both a Paleolithic diet and their usual diet. The Paleolithic diet attempts to mimic the diet used by the cavemen. Therefore, this diet excludes all foods that have been processed, including grains, dairy or any food that has been manufactured. This diet is also referred to as “the hunter/gather diet” because the food choice primarily consists of foods that can be gathered by hand including fruits, vegetables, nuts and non-processed meats.

24-hour recalls were used to insure that the subjects were eating a Paleolithic style diet during the designated period and also eating their normal diet during the baseline and washout periods. Twelve subjects are required for this study to be accurate (at the $\alpha = 0.05$ level of significance). Therefore, 15-20 subjects will be attempted to be recruited with a goal of 15.

		Baseline	Washout	Paleo
Subject 1	Before Dinner	0.6666	-1.6666	-2.5
	After Dinner	3	2.6666	1.5
	90 minutes After Dinner	2.6666	2	1.5
	Satiety Rating	0.3334	0.6666	0
Subject 2	Before Dinner	-0.6666	0	-1
	After Dinner	3	3	2.3333
	90 minutes After Dinner	1.6666	1	1.6666
	Satiety Rating	1.3334	2	0.6667
Subject 3	Before Dinner	-2.6666	0.3333	-1
	After Dinner	3	3	2.3333
	90 minutes After Dinner	1.6666	2.3333	1.6666
	Satiety Rating	1.3334	0.6667	0.6667
Subject 4	Before Dinner	-1.3333	1.6666	-1.6666
	After Dinner	2.6666	1	1
	90 minutes After Dinner	0.6666	0.3333	1
	Satiety Rating	2	0.6667	0

Table 1: Satiety Rating Data and Calculation

Results

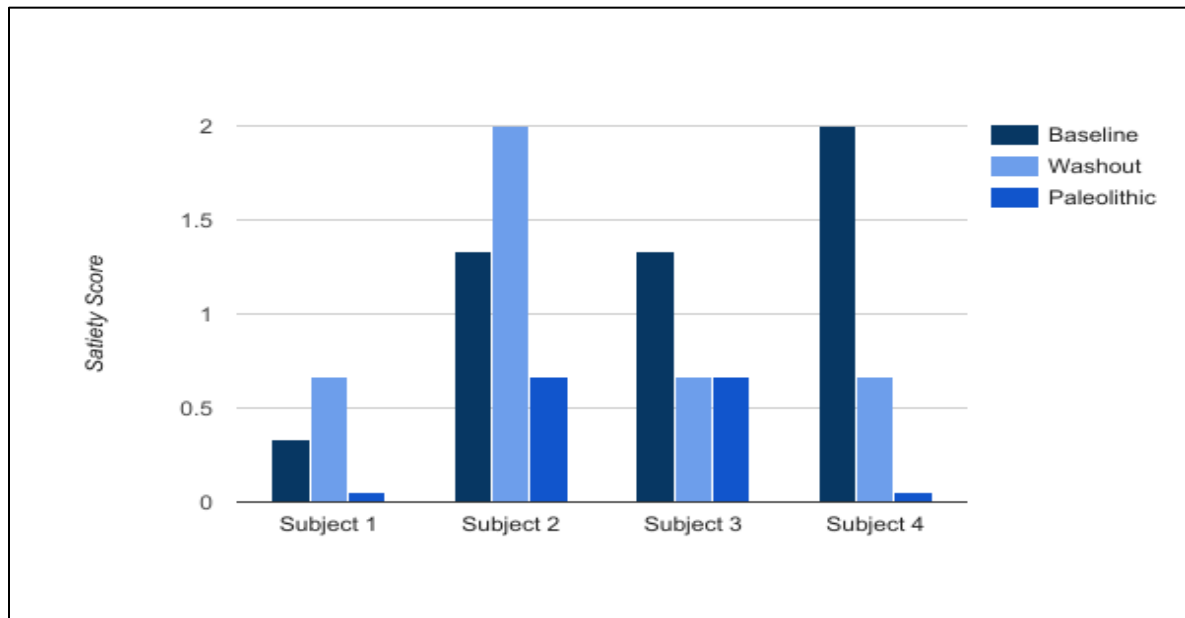
The after-dinner satiety and the 90 minutes after dinner satiety ratings were subtracted from each other in order to determine the overall satiety rating of each subject. The results show that, the satiety rating was lower comparing post dinner with 90 minutes post dinner with the Paleo diet (0.25) as compared to the usual diet (0.83) indicating a greater satiety with the Paleo diet.

Discussion

This study shows that there was a positive trend between the consumption of the Paleolithic diet and an increase in satiety scores. This is seen in the average means between the satiety scores of the Paleolithic versus non-Paleolithic diets. The non-Paleolithic diet had a

mean satiety score of 0.83 compared to the Paleolithic's satiety score of 0.25. A lower number for the satiety score shows an increased satiety as this rating is showing the increase in hunger over a 90-minute period.

Figure 1: Satiety Score of the Paleolithic Diet Compared to the Everyday diet



Speculated Reasoning

The increase in satiety could be a cause of several things. The first being the difference in processed foods. While performing the 24-hour dietary recalls, it was observed that the subjects were consuming very highly processed foods such as McDonalds, Wendy's, and Burger King. Many of the subjects were consuming these fast foods multiple times per day. After switching their diets to the Paleolithic diet, a diet with no processed foods, it would make senses that their satiety scores would dramatically increase.

Scientific Literature Comparison

These findings are similar to the other literature. In several studies, satiety scores were

found to be increased with higher protein and unsaturated fat consumption (Douglas, Jönsson). In his study, Douglas found that an increase of protein content also increases an individual's satiety. His intention was to find a diet that helps with weight loss and weight management. Due to the increase in satiety involved with protein intake, his results were positive. My results were very similar to the results found in our study as after consuming the Paleolithic diet. A study performed by Jönsson aimed to test the satiety of the Paleolithic diet as a whole. Their study was also successful, finding an increase in satiety. This study attributed it to the increase in healthy fats as well as the decrease in processed grains. When creating diet plans for the subjects consuming the Paleolithic diet, the goal was to eliminate carbs and replace these foods with both healthy fats and proteins. Therefore, our findings and speculated reasoning match previous scientific literature referenced in this paper.

Limitations

While the results were positive, there were an inadequate number of subjects to determine statistical significance in the satiety difference between the two diets. Since it was difficult to find subjects to participate in the 16-week study, only 4 subjects have to date participated in the study.

Conclusion

Our results of greater satiety with the Paleolithic diet were similar to other findings. Therefore, this diet pattern may be helpful for weight loss. A strength of this study was each subject was their own control and satiety was measured multiple times. A limitation of our study is the small sample size, however this is just preliminary data of the first study subjects in an on-

going study.

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