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Abstract

The current study investigated the effect of the addition of a novel food source on the development of activity-based anorexia in rats, which is the animal model of exercise-induced anorexia. Previous literature has shown that rats placed on a restricted feeding schedule and given access to a running wheel will have lower average daily food intake and higher weight loss. The hypothesis of the study was that it would take rats in the Tropical Carnival condition longer to lose weight to 75% of their ad libitum body weight when compared to the rats in the standard rat chow condition. The study was a between-subjects design that observed the effect of standard rat chow compared to a novel food source, Tropical Carnival rat food, on the prevalence of activity-based anorexia in rats. No significant differences were found regarding weight loss differences or the amount of revolutions run between the two conditions. Despite the lack of significant results, future research in this area could be crucial in determining a new treatment plan for individuals with exercise-induced anorexia that included the addition of a novel food.

Introduction

Anorexia nervosa is a prominent mental health concern today and is seen more in females when compared to males (Lamanna, et al., 2019; Barbarich-Marsteller, et al., 2013). When a person begins to exercise excessively and restrict the amount of food consumed, anorexia nervosa then becomes characterized as exercise-induced anorexia (Scharner, et al., 2016). Researchers were prompted to examine the causes and behaviors learned by people with exercise-induced anorexia, which led to the development of the animal model of exercise-induced anorexia called activity-based anorexia.

Brown, Avena, and Hoebel (2008) examined whether adding sucrose or saccharin to water or vegetable fat to standard rat chow would increase food intake in an activity-based anorexia model. Results found that vegetable fat increased the amount run and adding sucrose or saccharin to their water induced a greater amount of weight loss in the running group compared to the sedentary group.

Duclos, et al. (2013) also found that running wheel activity was found to be higher in rats with access to saccharin-water in a food-restricted feeding schedule compared to when they received food ad libitum. By further extending the research on activity-based anorexia in rats, researchers will be able to learn more about the development and treatment of exercise-induced anorexia in humans. The hypothesis of this study is that it will take rats in the Tropical Carnival condition longer to lose weight to 75% of their ad libitum body weight when compared to the rats in the standard rat chow condition.

Method

Participants

Eight ten-month old female Sprague-Dawley rats, acquired from Envigo Laboratories in Frederick, Maryland, were used in this study.

Materials

Metal cages with activity running wheels attached to them were used. In the control condition, the rats were given 38 grams (121.6 kcal) of LabDiet ProLab RMH 3000 5P00 rodent lab food. In the experimental condition, the rats received 40 grams (121.12 kcal) of Brown's Tropical Carnival Gourmet Food for Pet Mouse and Rat.

Research Design and Procedure

The study was a between-subjects design with four rats in each condition. After a baseline and habituation period to their new environment, the rats were placed on a restricted feeding schedule. During the restricted feeding time (one hour), the rats were not given access to the wheel. The rats' weight, water intake, food given, food intake (after accounting for any food spillage), and wheel revolutions were measured daily before the rats were given their food. Rats were removed from the study and placed back in their home cages for the recovery period when they reached 75% of their ad libitum body weight.

Results

No significant differences were found regarding the wheel revolutions run and weight loss percentage between the two conditions throughout the duration of the study (see Figure 1). No significant differences were found between the weight at the beginning of the study and the end of the study for both conditions, but results were trending in the expected direction as rats in the Tropical Carnival condition were losing weight more slowly than the rats in the standard chow condition (see Figure 2).

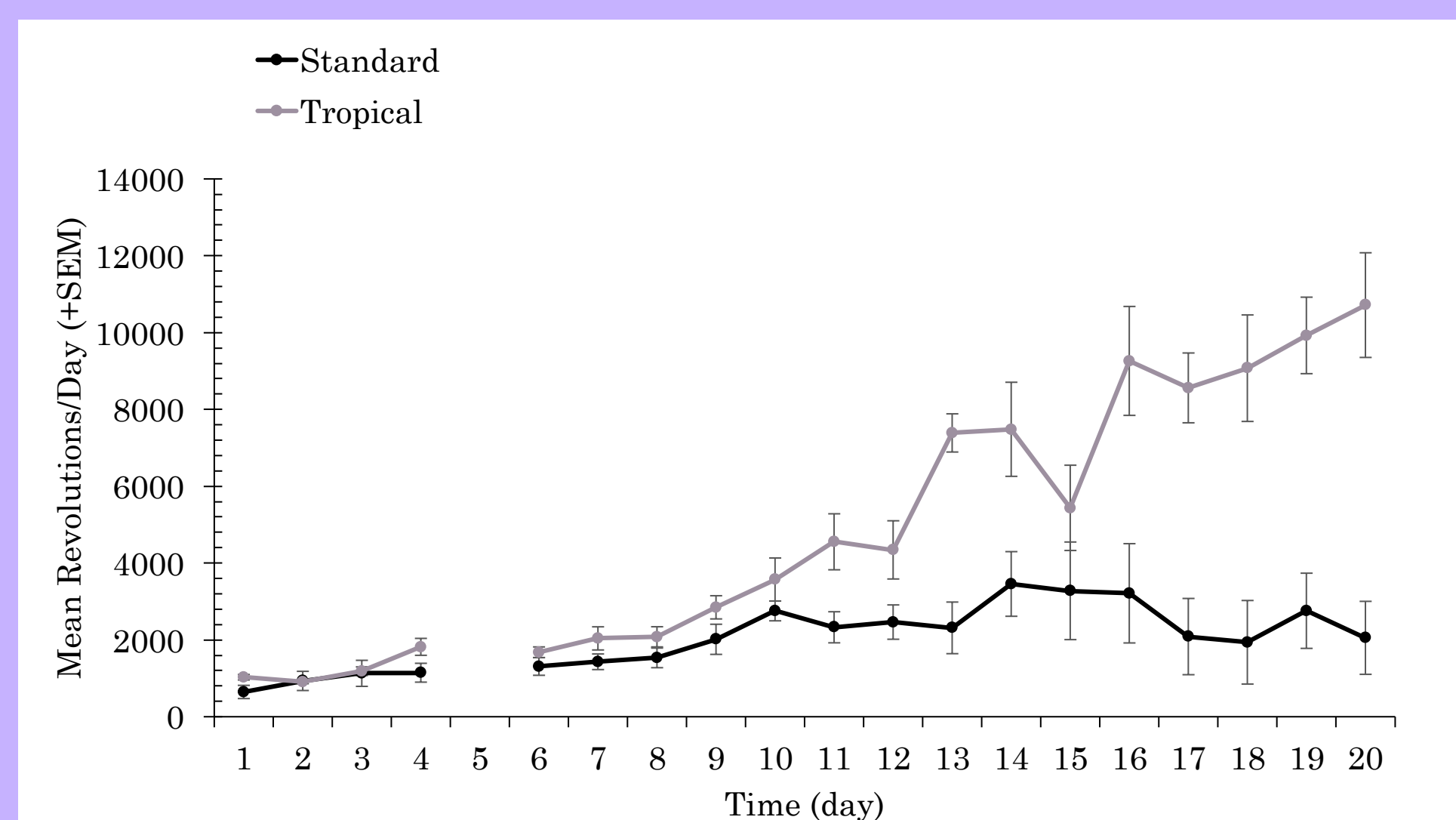


Figure 1. Mean values of wheel revolutions run throughout the duration of the study for the standard chow condition and Tropical Carnival condition. Error bars represent standard error.

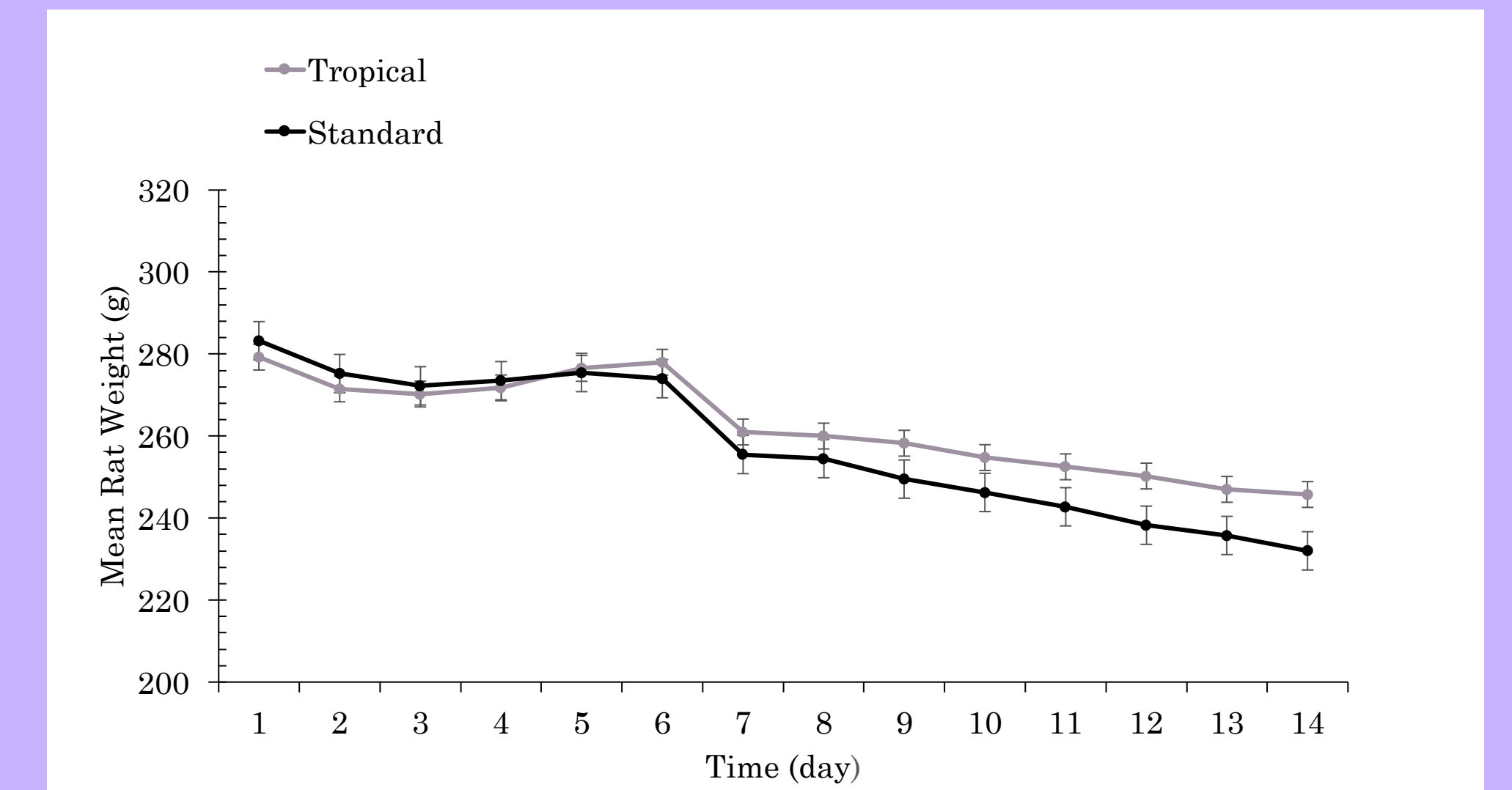


Figure 2. Weights in both the standard chow condition and the Tropical Carnival through the duration of the study. Error bars represent standard error.

Discussion

The hypothesis of the study was not supported by the results. There were not significant differences in the amount of wheel revolutions run, the percentage of weight lost, nor the total weight lost between the first day of baseline and Day 14, but the results were trending in the expected direction. This suggests that with more time and more subjects there may be a significant difference in the effect of the Tropical Carnival food compared to the standard chow on weight loss and the amount of running wheel activity. The makeup and the taste of the foods were substantially different and while the rats were given five days of a baseline trial to get used to being in the wheel and eating the Tropical Carnival food, the rats on the standard chow had already been habituated to that food for as long as they have been in the animal lab. Most of the rats did not reach the criteria for removal out of the study until twice the amount of days seen in previous literature (Duclos, et al., 2013). While Dixon, et al. (2003) found that rats in the activity-based anorexia condition reached the 75% weight loss cut off in eight days, the current study did not support this finding. The least amount of days needed to reach the 75% body weight loss cut off was 14 days, many of the other rats in the study went until Day 20 before reaching this point. The goal of future research should be examining the addition of a novel food to the activity-based anorexia model and having more subjects to observe whether a novel food could decrease the amount of wheel revolutions run. These findings could lead to a new treatment plan for people with exercise-induced anorexia as changing their diet could help decrease an excessive exercise regimen.

See handout for References.

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