ALTER G Case Study

Obesity

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Who: 44-year-old obese female using the AlterG Anti-Gravity Treadmill during a 14-week walking program

What: Physical activity can be difficult, painful, and frustrating for the obese. A protocol that is able to allow these individuals to sustain physical activity over a period of time is crucial for success to their weight loss goals.

Why: Body weight support allows the user to increase caloric expenditure by continuing exercise for extended periods of time, and helps with increasing exercise tolerance for the deconditioned.

Introduction

This pilot study was conducted with one super obese (BMI: 69.2) Caucasian 44 year-old female utilizing the AlterG Anti-Gravity Treadmill during a 14 week walking program. The participant had experienced lifelong obesity, beginning in early teenage years, and was currently experiencing several medical conditions resulting in the need for the following medications: Omepraze (a proton pump inhibitor for acid reflux), Hydrochlorothiazide (high blood pressure), and Metformin (anti-diabetic drug for Type 2 diabetes and metabolic syndrome). In regards to known intolerances and other medical conditions, the participant reported having knee OA, Irritable Bowel Syndrome (IBS) and indicated lactose intolerance. The participant was also intolerant to orange juice, cinnamon, and aspartame. The participant was a non-smoker, who does not consume alcoholic beverages, nor take vitamin supplements.

Goals

Unfortunately for the obese, increasing physical activity on a regular basis is difficult, painful, and frustrating, especially if the mode of activity is walking. Thus, it was important to find a protocol that allows obese individuals to sustain physical activity over a period of time to enhance overall health, expend calories, and experience the joy moving in a safe and pain-free environ- ment. Based on this information, the goals for treatment with the AlterG Anti-Gravity Treadmill were to: Increase caloric expenditure to be demonstrated through weight loss

- Increase exercise tolerance
- Increase exercise confidence
- Improve ability to perform activities of daily living
- Decrease rating of perceived exertion (RPE) at a given exercise intensity
- Decrease pain during exercise
- Decrease heart rate (HR) at a given exercise intensity
- Improve mental health

History

This research design incorporated an evaluative case-study approach where detailed qualitative and quantitative data were collected over 14 weeks on one super obese Caucasian female (44 years of age; 1.65 m; 188.6 kg; BMI: 69.2) as she participated in a 3 session per week walking program using the AlterG Anti-Gravity Treadmill.

Physician, University Review Board, and participant approval were obtained, a medical history completed, resting blood pressure and heart rate determined, and complete blood labs (cell count, chemistry panel, glucose, and lipid profiles) were secured prior to commencing exercise. The participant was also interviewed to develop a patient history relating to lifetime dietary patterns and physical activity levels.

Materials

Repeated assessments during the study included the following:

a) Subjective ratings of physical and mental health
b) Anthropometric measures
c) Heart rate
d) Rating of perceived exertion (RPE) and rating of pain
e) Step counts
f) Diet history and daily food journals

Pre- and post-intervention ratings of physical and mental health were determined using the SF-36v2 (Quality Metric Health Outcomes Solutions, Lincoln, RI). Anthropometric measures consisted of body circumferences of the chest, upper arm, waist, hips, thighs, calves, knees, and ankles, as well as body weight. Weight and lower extremity circumferences were recorded once per week, while measurements of the chest, upper arm, waist, and hips were reported approximately every four weeks. The participant also logged daily food intake. This information was entered into Diet Analysis Plus 9.0 CD-ROM and was analyzed bi-weekly.

During the walking exercise sessions, heart rate (HR) was monitored using a Polar 600 Heart Rate Monitor. Rating of Perceived Exertion (RPE) was determined using the Borg scale of 6–20, as was pain on a scale of 0 – 10, with 0 representing no pain and 10 the most intense pain imaginable. The ACSM metabolic equations were used to estimate caloric expenditure for each session. A Yamax SW200 pedometer was initially placed on the back waistband of the participant to accommodate a more vertical position; however, contact from the seal of the AlterG prevented the pedometer from accurately recording step counts. As a result, overall step counts were determined by counting the exact steps taken per minute at each walking speed employed during the study. The participant demonstrated no adverse hypertensive events during physical activity.

AlterG Walking Program

Week 1 – Day 1

The initial exercise session (day 1) was conducted to determine a comfortable walking speed at a pain-free level, subjectively determined by the participant. There were no appropriate-sized AlterG shorts available for the participant to wear. The air cushion opening alone was large enough to form a tight seal around her hips (up to 40% weight bearing, at which point leaks developed). After she was fitted into the treadmill, the speed was set at a comfortable pace of 2.4 km/hr. Heart rate and BP were recorded before the AlterG LBPP device was activated. The AlterG was then activated and used to support 10% of the participant's body weight while HR and BP were again recorded. This procedure was repeated in 10% increments of body weight until the participant reported pain free walking at 60% of body weight.

Week 1 – Day 2

Prior to beginning the walking sessions (which occurred on day 2), knee, calf, and ankle joint circumference

measurements were obtained to determine baseline levels for joint edema/swelling. The participant also provided subjective accounts of pain, function of daily activities, or other accounts from the past two days.

The participant's exercise began with a 5 min warm up at 2.4 km/hr and LBPP at 60% of body weight. Speed gradually increased to 3 km/hr at 60% of body weight for another 10 min of walking, after which a 5 min cool-down ended the exercise session. Speed was gradually decreased to 2.4 – 2 km/hr by the conclusion of the cool-down period.

Heart rate, RPE, pain, and the talk test (determines ease of communication/walking intensity) were initially measured at 1 min intervals and extended to 5 min when the subject demon- strated an ability to exercise without complications. Intensity levels were kept in the moderate range 40 – 59% of heart rate reserve (HRr), based on age predicted maximum HR. Walking at 60% body weight allowed walking with pain to be < 1 on a scale of 1 - 10.

Subsequent Sessions

Exercise sessions then consisted of the participant walking at a comfortable speed with enough LBPP support to reduce knee pain to <1. Exercise HR, pain level and RPE were used to deter- mine when to increase exercise intensity. Time and speed were increased and LBPP reduced as tolerated. Exercise sessions were terminated if HR reached 65% of HRr, an RPE of 15 or higher was declared, or the participant was unable to comfortably converse in simple sentences. This exercise prescription was followed 3 days per week.

Week	Exercise Program	% BW	Speed (mph)	Time
1	Walking	60	2.0	6 min
2	Walking	60	2.0	7 min
3	Walking	60	2.0	10 min
4	Walking	60	2.0	15 min
5	Walking	60	2.0	20 min
6	Walking	60	2.0	25 min
7	Walking	60	2.3	30 min
8	Walking	60	2.3	35 min
9	Walking	65	2.3	40 min
10	Walking	70	2.3	40 min
11	Walking	70	2.3	40 min
12	Walking	70	2.3	45 min
13	Walking	70	2.3	50 min
14	Walking	70	2.3	50 min

*A 5 min warm up (1.5 mph, 0% incline, 60% BW) and cool down (1-1.5 mph, 0% incline, 60% BW) was implemented
*Frequency held constant at 3x/week
*Incline held constant at 0%

Results

As the walking program progressed, the intensity and duration were gradually increased, which indicates that exercise tolerance was improved (figure 1).

As she became comfortable walking the participant increased exercise confidence by eventually walking without gripping the bar supports; on occasion, she reverted back to gripping the bar when she became tired. Pain was not a limiting factor during exercise as the participant recorded <1 on a 1-10 pain scale. She also reported a small reduction in pain during normal overground walking, after her sessions on the AlterG. Weight loss occurred (figure 2) due to increased caloric expenditure (figure 3) combined with improved nutritional habits. Increased ability to perform activities of daily living was also reported.

As a result of her training sessions, the subject's exercise tolerance time increased threefold, while caloric expenditure increased tenfold. There was no increase in heart rate, RPE, or perceived pain. While a training effect was observed, (a total physical activity and exercise tolerance increase of > 180 min/wk), the potential overall workload was reduced due to supporting a percentage of her body weight on the AlterG Anti-Gravity Treadmill. This provision resulted in an insufficient increase in caloric expenditure to reach the estimated 1800 – 3360 kcal/wk that has been proposed as necessary for weight loss by the American College of Sports Medicine. As such, LBPP treadmill walking was initially beneficial for improving our participant's physical activity and exercise tolerance, but not for promoting significant weight loss. If exercise tolerance (e.g., walking time and speed) were to continue to improve and the portion of body weight supported by LBPP reduced, caloric expenditure would increase sufficiently to aid in weight reduction.

Overall, the potential of the AlterG as an adjunct treatment modality for obese individuals is promising. Based on findings from this case study, the AlterG may be beneficial in an initial exercise prescription regimen for obese individuals. While the multidisciplinary treatment of morbid obesity includes behavioral, nutritional, medical, and perhaps surgical treatments, the AlterG Anti-Gravity Treadmill may allow/encourage the addition of physical activity that might otherwise be avoided. The results of this pilot study suggests that additional studies are warranted to further investigate optimal exercise prescription protocols using the AlterG and its use as a supplement modality in an exercise program.

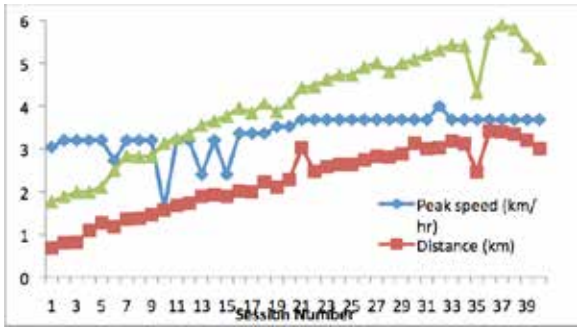

Figure 1. Increase in workload across 14 wk of AlterG Anti-Gravity Treadmill walking.

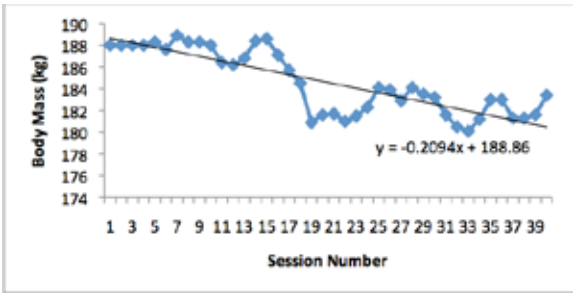

Figure 2. Weight loss across14 wk of AlterG Anti-Gravity Treadmill walking.

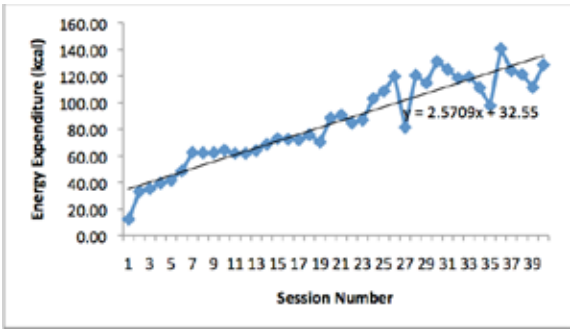

Figure 3. Exercise energy expenditure across14 wk of AlterG Anti-Gravity Treadmill walking