



EXERCISE TRAINING AND WEIGHT LOSS: AN OVERVIEW

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ABSTRACT:

Obesity is the result of excess energy intake compared to energy expenditure. In order to lose weight, a negative energy balance must be evoked and to maintain lost weight, energy balance must be maintained. Energy balance is the key concept for weight loss and maintenance. Exercise requires energy in the form of calories as a fuel, with the specific energy requirements dependent at least on weight and fitness level of the person, and the duration, intensity, and type of the exercise. There are various researches which show different modalities for weight loss i.e., Pedometer-based step goal, Aerobic exercise training only, Resistance training only, Aerobic and resistance training only and caloric restriction combined with aerobic exercise training. . Exercise of approximately 150–200 minutes per week with an energy equivalent of approximately 1000–2000 kcal/wk has been shown to be effective for weight maintenance and is superior to lesser amounts of exercise. Weight and resistance training may improve metabolism over time. Although, resistance ET alone contributes to the reduction of body fat, the effect on overall weight loss is minimal. Caloric restriction appears to have a more profound and consistent effect on weight loss compared to exercise training alone. Caloric restriction combined with aerobic exercise training achieves 9 kg-13 kg of weight loss. caloric restriction combined with moderate-to-vigorous aerobic exercise could attenuate the muscle loss which was consistent with the findings of previous studies that synergy of diet and exercise appeared more effective in improving muscle loss than dietary approaches in isolation.

KEYWORDS:

EXERCISE TRAINING, CARDIORESPIRATORY FITNESS, CARDIOVASCULAR DISEASE, CALORIE RESTRICTION.

ENERGY BALANCE

Obesity has proven to be a very complex, difficult disorder to treat (Bray, 1976), but in principle the problem of obesity is a simple matter of energy balance. The accumulation of body weight involves input greater than output. Likewise, decreasing body weight requires decreasing input relative to output.

Obesity is the result of excess energy intake compared to energy expenditure. In order to lose weight, a negative energy balance must be evoked and to maintain lost weight, energy balance must be maintained.

In summary, energy balance is the key concept for weight loss and maintenance. Ultimately, energy expenditure must exceed intake for weight loss and must equal intake for weight maintenance. Long-term restriction of energy intake has proven difficult and generally results in weight re-gain over time. Exercise has been shown to provide an energy expenditure that is not fully compensated with other components of the energy balance equation and thus provides a stimulus for weight loss and maintenance.

The basic reason for studying exercise is because exercise is the major voluntary form of caloric expenditure (Bray, 1976). Exercise requires energy in the form of calories as a fuel, with the specific energy requirements dependent at least on weight and fitness level of the person, and the duration, intensity, and type of the exercise.

Garrow (1978) divides the factors that influence energy

expenditure into two classes, resting metabolic factors and muscular work factors. Under metabolic factors, Garrow (1978) and Bray (1976) included diet, lean body mass, temperature, hormones, drugs and possibly stress, age, and sex. Thus there are a number of factors outside of physical activity that influence basal metabolism and thereby energy expenditure. A muscular work factor, or physical activity, represents the other major factor influencing energy expenditure, and it is affected by such variables as level of activity, body weight, training level, clothing, and possibly diet. Muscular work involves several classes of physical activity. One major type of physical activity is work-related behaviors, and numerous epidemiological research studies (Morris, 1975) have classified activity on the basis of estimating work caloric expenditure.

DIFFERENT MODALITIES OF EXERCISE TRAINING FOR WEIGHT LOSS

There are various researches which show different modalities for weight loss i.e., Pedometer-based step goal, Aerobic exercise training only, Resistance training only, Aerobic and resistance training only and caloric restriction combined with aerobic exercise training.

Pedometer based step goal achieves only 0-1 kg of weight loss. Aerobic exercise training only achieves weight loss of 0-2 kg. Resistance training only does not achieve any

weight loss. Aerobic and resistance training only achieves 0-2 kg of weight loss but only with extremely high volumes of aerobic exercise training. Caloric restriction combined with aerobic exercise training achieves 9 kg-13 kg of weight loss.

AEROBIC EXERCISE AND WEIGHT LOSS

Current American College of Sports Medicine (ACSM) recommendations state that exercise programs need to exceed 225 min/wk in order to possibly induce clinically significant weight loss. Thomas et al. performed an analysis of weight change from 15 aerobic Exercise Training(ET) interventions, and concluded that the major factors limiting the expected weight loss from aerobic ET were dietary compensation and low aerobic ET dose.

Vigorous intensity aerobic ET has been shown to have enhanced health benefits for important risk factors, including visceral fat, measures of glucose/insulin metabolism, and Cardio respiratory Fitness (CRF), compared to moderate intensity aerobic ET. In terms of weight change, when different intensities of ET are matched for caloric expenditure or ET dose, both vigorous and moderate intensity aerobic ET result in similar amounts of weight loss.

Exercise is perhaps the greatest predictor of weight maintenance. Exercise of approximately 150–200 minutes per week with an energy equivalent of approximately 1000–2000 kcal/wk has been shown to be effective for weight maintenance and is superior to lesser amounts of exercise. For those able to complete even greater amount of exercise (i.e. 2,500 kcal/wk), it appears that weight maintenance is enhanced compared to less exercise.

The ACSM position stand on Physical Activity(PA) intervention strategies to promote weight loss and weight regain emphasizes the distinction between the minimum levels of PA to maintain health (150 min/wk) and higher levels of PA to prevent weight regain (200 min/wk). Therefore, obese individuals who have successfully lost weight require a substantial amount of PA to maintain this weight loss.

RESISTANCE EXERCISE AND WEIGHT LOSS

Resistance training, whether done via body weight, resistance bands or machines, dumbbells or free weights, not only helps us build strength, but also improves muscle size and can help counteract age-related muscle loss. Weight and resistance training may improve metabolism over time. Also, lifting weights is typically more effective than cardio at increasing the number of calories you burn after a workout.

Resistance ET and isometric exercises are important and sometimes overlooked aspects of an ET program that have many health benefits including increasing/maintaining muscular strength with aging (prevention of sarcopenia) and preserving bone mineral density. Although, resistance ET alone contributes to the reduction of body fat, the effect on overall weight loss is minimal.

CALORIE RESTRICTION AND WEIGHT LOSS

Dr. Bennett found that the main clinical implication is that restricting your window of eating (i.e., eating over less time, having more fasting time) may not reduce weight gain over time. While eating more medium or large meals is associated with weight gain over time and more smaller meals are associated with weight loss over time.

From the present literature, caloric restriction appears to have a more profound and consistent effect on weight loss compared to exercise training alone. Therefore, clinicians may be tempted to advocate the use of caloric restriction in weight management plans. Importantly, PA contributes to the negative energy balance seen with caloric restriction. From a clinical perspective, both Cardio respiratory Fitness (CRF) and Physical Activity (PA) levels are established independent risk factors for Cardiovascular Disease (CVD), Type 2 Diabetes mellitus (T2DM) and all-cause mortality.¹⁰ Caloric restriction without exercise does not improve CRF levels. As mentioned previously, ET has been shown to provide numerous health benefits even in the absence of weight loss. Therefore, if a patient is utilizing caloric restriction to lose weight, clinicians should always encourage an active lifestyle

CALORIC RESISTANCE COMBINED WITH AEROBIC EXERCISE AND WEIGHT LOSS

Exercise, including resistance and aerobic exercise, can promote muscle protein synthesis, restoration of intracellular lipid, and glycogen deposition in the liver and skeletal muscles. Although resistance exercise is widely recognized to be more effective than aerobic exercise in increasing muscle mass, one study reported that no significant differences in total muscle mass amongst resistance training groups and controls when combined with dietary restriction resistance in obese adolescents were observed. Xinyueet. al., study showed that caloric restriction combined with moderate-to-vigorous aerobic exercise could attenuate the muscle loss which was consistent with the findings of previous studies that synergy of diet and exercise appeared more effective in improving muscle loss than dietary approaches in isolation. This study demonstrated that caloric restriction combined with moderate-to-vigorous aerobic exercise can reduce weight while maintaining lean mass.

It suggested that a daily energy intake restriction of 500 kcal combined with 90 min of moderate-to-vigorous aerobic exercise per week could help adult women with normal BMI but abnormal body fat percentage achieve longer-term weight management and moderate the increase in appetite caused by the decrease in calorie intake to a certain degree.

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