SciForschen
Open HUB for Scientific Research

(ISSN 2380-5528)

Obesity: Open Access

Short Communication Volume: 2.1 Open Access

Exercise Training Prior to Weight Reduction Surgery: A Brief Review

Hazzaa M Al-Hazzaa*

Professor Emeritus & Former Director, Pediatric Exercise Physiology Research Laboratory, King Saud University, Riyadh, Saudi Arabia

***Corresponding author:** Professor Emeritus Hazzaa M. Al-Hazzaa, PhD, FACSM, FECSS, King Saud University, P. O. Box 93216, Riyadh, 11673, Saudi Arabia, **E-mail:** halhazzaa@hotmail.com

Received date: 24 Feb 2016; **Accepted date:** 26 Mar 2016; **Published date:** 30 Mar 2016.

Citation: Al-Hazzaa HM (2016) Exercise Training prior to Weight Reduction Surgery. Obes Open Access 2(1): doi http://dx.doi.org/10.16966/2380-5528.116

Abstract

Obesity has become a major global challenge to health care systems. Exercise is considered an integral part of obesity treatment and weight maintenance. Morbidly obese patients, who cannot lose weight through conventional weight loss methods, may be offered a chance to undergo bariatric surgery. However, despite the numerous health benefits of exercise, most preoperative obese patients are insufficiently active. Therefore, the present article briefly reviews the existing evidence for the health benefits and post-operative impact of pre-bariatric surgery exercise programs. The findings of this review indicate that a pre-surgical intervention exercise program targeting obese patients awaiting bariatric surgery is viable and has the potential to enhance their engagement in physical activity postoperatively. Moreover, higher levels of preoperative physical activity or cardiorespiratory fitness were associated with health benefits, lower post-surgical complications and shorter length of stay in the hospital. Also, there is some evidence pointing to the possibility that higher levels of pre-operative physical activity may increase weight loss outcomes following bariatric surgery. Further, aerobic capacity of the obese patient is expected to significantly improve as a result of weight reduction. Patients' self-perceived limitations to perform exercise expected to decrease after the weight reduction surgery. Finally, it is necessary that health care providers offer adequate support to obese patients not just in initiating physical activity but also in maintaining an active lifestyle throughout the treatment period. Considerations for appropriate selection of activities include personal preference, age, present weight, and current level of fitness, joint health and the presence of any comorbidity.

Keywords: Bariatric surgery; Exercise training; Obesity; Physical activity; Weight loss

Physical inactivity is considered a leading risk for non-communicable diseases (NCDs) and overall mortality worldwide [1,2]. In contrast, physical activity has been shown to incur many health benefits including reductions in cardiovascular risk factors, type 2 diabetes and total mortality, improvement in blood lipids profile, bone density and psychological health and a decrease in incidence of some types of cancers [3,4]. The recommended amount of exercise for health benefits has been shown to be at least 150 minutes of moderate to vigorous intensity physical activity per week [3,4]. However, the amount of physical activity needed for weight loss appears to be above 250 minutes per week [5].

Patients with morbid obesity suffer from decreased functional capacity and are at higher risk of multiple comorbidities and total mortality [6]. After exhausting all attempts of weight loss strategies using exercise, diet and lifestyle behavioral changes, obese patients may have the choice to consider bariatric surgery [7], as the procedure is believed to be the most effective treatment for morbid obesity in long-term weight loss [7-9]. Such a weight loss method was shown to induce a dramatic weight loss that sustained for an extended period of time after surgery and accompanied by significant improvements in pre-existing comorbidities [10]. This success has led to a substantial increase in the annual rate of inpatient bariatric surgeries [11].

Studies have revealed that a pre-treatment program focusing on active lifestyle behaviors can facilitate improved post-surgical outcomes [12-14]. Indeed, findings from a randomized control trial showed that participating in a preoperative supervised weight management program resulted in a positive effect on postoperative physical activity level [15]. In addition, evidence suggests that increasing preoperative physical activity levels may decrease surgical complications [6] and improve long-term weight loss maintenance [5]. Further, the American Society for Metabolic and Bariatric Surgery (ASMBS) indicated that pre-surgical behavioral intervention supporting weight loss and lifestyle change is considered the standard of care [9]. Despite the increased benefits associated with pre-operative physical activity programs, most pre-operative obese patients are not sufficiently physically active [16]. In fact, results of one interventional study observed that only 30% of obese participants met the recommended guideline of 150 weekly minutes of moderate to vigorous physical activity in adults [17].

It is indicated that reduced cardiorespiratory fitness levels among obese patients was related to increased short-term complications and length of stay in hospital after bariatric surgery [6]. Cardiorespiratory fitness was evaluated, through measurement of peak oxygen uptake, in a group of patients with morbid obesity (BMI=48.7 kg/m^2) prior to laparoscopic Roux-en-Y gastric bypass surgery [6].The results revealed a significantly ($p=0.02$) higher complication rate (16.6% versus 2.8%) among patients with low (below 15.8 ml/kg.min) as opposed to high (above 15.8 ml/kg.min) fitness levels [6]. The length of hospital stay was also much longer among patients with less peak oxygen uptake compared to those with higher cardiorespiratory fitness [6]. It is well acknowledged that increasing physical activity levels leads to improvement in cardiorespiratory fitness and therefore exercise training should be part of any pre-bariatric surgery behavioral change program in order to reduce postoperative complications. Other studies have also found similar results to the previous findings showing that higher post-surgical risks and a longer length of stay in the hospital were associated with low pre-operative

peak oxygen uptake or low anaerobic threshold, as measured by graded cardiopulmonary exercise tests [18,19].

A pre-surgical exercise intervention among obese patients awaiting bariatric surgery has the potential to enhance their engagement in physical activity. Findings from Bond et al. [20] revealed that physical activity readiness and physical activity levels (using the International Physical Activity Questionnaire) improved among the gastric bypass patients at the second visit just 1-2 weeks prior to surgery compared to the first one, which was three months prior to operation. Furthermore, higher levels of engagement in preoperative physical activity were shown to associate with improved weight loss outcomes following bariatric surgery [21,22]. However, a recent randomized clinical trial examined the effect of a supervised weight management program before obesity surgery in 55 patients enrolled in the study. Researchers did not find an important difference in weight loss compared with those who underwent a medically supervised weight management program [15]. The results indicated that participation in the weight management program resulted in a positive influence on postoperative physical activity level, despite no significant postoperative difference in weight loss [15]. A meta-analysis study that included six non-randomized studies, totaling 492 participants, observed an initial weight loss of 21 kg among the physically active participants and 22 kg weight loss among those inactive subjects, however, after 2.7 years, the weight loss reached 15 kg in the physically active group whereas that in the physically inactive group was only 7 kg [23].

Although the evidence-based recommendations for the amount of exercise that induces weight loss and long term maintenance in adults is believed to be equal to 250 or more minutes per week [5], there are no standard physical activity recommendations for obese patients awaiting bariatric surgery. The ASMBS recommendations to enhance cardiorespiratory fitness decrease the risk of surgical complications and improve postoperative recovery include light aerobic exercise and resistance training for 20 minutes per day, 3 to 4 days per week preoperatively [24]. The American Heart Association also recommends similar exercise prescription of low- to moderate-intensity physical activity for at least 20 minutes per day for 3 to 4 days per week [25]. However, the joint guidelines from the ASMBS, the Obesity Society, and the American Association of Clinical Endocrinologists recommend that all postoperative patients to follow a healthy lifestyle, including physical activity for at least 30 minutes per day [7].

Furthermore, unsupervised high intensity exercise may not be safe for obese patients with high cardiovascular risks. However, there has been a growing body of evidence indicating that high intensity interval training appears to be comparable or even superior to moderate intensity continuous exercise in improving cardio-metabolic health outcomes [26]. Such type of exercise training could provide health benefits in a time-efficient manner. However, there is a scarcity of studies that utilized high intensity exercise on obese patients waiting for bariatric surgery. In addition, studies used such mode of exercise have mixed findings. In a study conducted on patients with type 2 diabetes, high intensity interval walking was shown to be feasible and highly effective [27]. The findings showed that visceral fat decreased in the interval walking group but not in the control group or low intensity continuous walking. Also, improvement in the glycemic control was seen in the interval walking group, while it was either worsened in the control group or not changed in the continuous walking group [27]. However, not all studies observed greater effects for high intensity interval training compared with moderate level of physical activity. A recent study involving obese participants revealed that high intensity interval training and moderate-intensity continuous training of similar caloric expenditure exerted similar body composition, metabolic and cardiovascular improvements [28]. Moreover, another study involved previously sedentary overweight or obese young men has also shown that both exercise conditions were related to temporal improvements in body fat percent, total cholesterol, triglycerides, insulin sensitivity and aerobic power with no clear advantage between the two training protocols [29]. In addition, adults with excess body fat may greatly benefit from a program of resistance exercise [5,30]. Such resistance training can also improve muscular strength and endurance, something that can help obese patients in their daily living activities [5].

Research findings showed that physical activity appeared to be experienced positively among adults with severe obesity [31]. However, despite experiencing well-being and health benefits after physical activity, obese patients face numerous difficulties related to their capacity and determination to stay active after weight loss surgery. Therefore, support for obese patients is necessary not only just during the initial physical activity program but also to maintain an active lifestyle throughout the treatment period. Consequently, the health care providers should offer patients the necessary help and support to comply with the exercise prescription, by providing them with assistance and guidance in selecting the appropriate type of activity along with the most feasible monitoring technique. Considerations for appropriate selection of activities include personal preference, age, present weight, and current level of fitness, the status of patient's joint health and the presence of any comorbidity. Walking, for example, is a weight-bearing activity and is simple and very practical to adopt in any exercise program. However, the presence of lower joint problems may make waking less attractive for the patient. In this case, patients may choose an alternative activity with less impact on their joints, such as cycling, swimming or elliptical exercise. Irrespective of the type of physical activity, obese patients have higher energy costs of activity compared with lean individuals, and this can be observed even with non-weight bearing exercise, such as during unloaded and loaded cycling [32]. However, after bariatric surgery, aerobic capacity of the obese patient significantly improves as a result of weight reduction and a decrease in self-perceived limitations to perform exercise and an increase in self-perceived physical fitness is apparent after the weight reduction surgery [33].

It can be concluded from this brief review that exercise training as part of a pre-surgical intervention involving obese patients awaiting bariatric surgery is viable and has the potential to enhance their engagement in physical activity postoperatively. Furthermore, higher levels of preoperative physical activity levels or cardiorespiratory capacity were associated with health benefits, lower post-surgical complications and shorter length of stay in the hospital. There is also some evidence pointing to the possibility that higher levels of pre-operative physical activity may increase weight loss outcomes following bariatric surgery. Also, after bariatric surgery, aerobic capacity of the obese patient is expected to significantly improve as a result of weight reduction. Patients' self-perceived limitations to perform exercise appear to decrease after the weight reduction surgery. In addition, it is necessary that health care providers offer adequate support to the obese patients not just in initiating physical activity but also in maintaining active lifestyle throughout the treatment period. There are many considerations for appropriate selection of activities, including personal preference, age, present weight, and current level of fitness, joint health and the presence of any comorbidity.

References

1. World Health Organization (2015) Physical activity Fact Sheet. Accessed December 21, 2015.
2. Lee I-M, Shiroma EJ, Lobelo F, Puska P, Blair SN, et al. (2012) Impact of physical inactivity on the world's major non-communicable diseases. Lancet 380: 219-229.
3. United States Department of Health and Human Services (2008) Physical activity guidelines for Americans. Washington, USA.

4. World Health Organization (2010) Global recommendations on physical activity for health. Geneva, Switzerland.

5. Donnelly JE, Blair SN, Jakicic JM, Manore MM, Rankin JW, et al. (2009) American College of Sports Medicine Position Stand. Appropriate physical activity intervention strategies for weight loss and prevention of weight regain for adults. Med Sci Sports Exerc 41: 459-471.

6. McCullough PA, Gallagher MJ, Dejong AT, Sandberg KR, Trivax JE, et al. (2006) Cardiorespiratory fitness and short-term complications after bariatric surgery. Chest 130: 517-25.

7. Mechanick JI, Kushner RF, Sugerman HJ, Gonzalez-Campoy JM, Collazo-Clavell ML, et al. (2009) American Association of Clinical Endocrinologists, the Obesity Society, and American Society for Metabolic & Bariatric Surgery medical guidelines for clinical practice for the perioperative nutritional, metabolic, and nonsurgical support of the bariatric surgery patient. Obesity (Silver Spring) 17: S1-S70.

8. Eldar S, Heneghan HM, Brethauer S, Schauer PR (2011) Bariatric surgery for treatment of obesity. Int J Obes (Lond) 35: S16-S21.

9. Yumuk V, Tsigos C, Fried M, Schindler K, Busetto L, et al. (2015) European Guidelines for Obesity Management in Adults. Obes Facts 8: 402-424.

10. Douglas IJ, Bhaskaran K, Batterham RL, Smeeth L (2015) Bariatric Surgery in the United Kingdom: A Cohort Study of Weight Loss and Clinical Outcomes in Routine Clinical Care. PLoS Med 12: e1001925.

11. Nguyen NT, Vu S, Kim E, Bodunova N, Phelan MJ (2015) Trends in utilization of bariatric surgery, 2009-2012. Surg Endosc.

12. Brandenburg D, Kotlowski R (2005) Practice makes perfect? Patient response to a prebariatric surgery behavior modification program. Obes Surg 15: 125-132.

13. Miller GD, Hale E, Dunlap G (2015) Current Evidence for physical activity in the bariatric surgery patient for weight loss success. J Obes Weight Loss Ther 5: 274.

14. Al-Hazzaa HM (2016) Physical activity prescription before bariatric surgery: Feasibility, health impacts and practical implications. Saudi J Obesity 4.

15. Parikh M, Dasari M, McMacken M, Ren C, Fielding G, et al. (2012) Does a preoperative medically supervised weight loss program improve bariatric surgery outcomes? A pilot randomized study. Surg Endosc 26: 853-861.

16. King WC, Bond DS (2013) The importance of preoperative and postoperative physical activity counseling in bariatric surgery. Exerc Sport Sci Rev 41: 26-35.

17. Bond DS, Thomas JG, King WC, Vithiananthan S, Trautvetter J, et al. (2015) Exercise improves quality of life in bariatric surgery candidates: results from the Bari-Active trial. Obesity 23: 536-542.

18. Hennis PJ, Meale PM, Grocott MP (2011) Cardiopulmonary exercise testing for the evaluation of perioperative risk in non-cardiopulmonary surgery. Postgrad Med J 87: 550-557.

19. Hennis PJ, Meale PM, Hurst RA, O'Doherty AF, Otto J, et al. (2012) Cardiopulmonary exercise testing predicts postoperative outcome in patients undergoing gastric bypass surgery. Br J Anaesth 109: 566-571.

20. Bond DS, Evans RK, DeMaria EJ (2006) Physical activity stage of readiness predicts moderate-vigorous physical activity participation among morbidly obese gastric bypass surgery candidates. Surg Obes Relat Dis 2: 128-132.

21. Baillot A, Mampuya WM, Comeau E, Méziat-Burdin A, Langlois MF (2013) Feasibility and impacts of supervised exercise training in subjects with obesity awaiting bariatric surgery: a pilot study. Obes Surg. 23: 882-891.

22. Browning MG, Baugh NG, Wolfe LG, Kellum JK, Maher JW, et al. (2014) Evaluation of pre- and postoperative physical activity participation in laparoscopic gastric banding patients. Obes Surg 24: 1981-1986.

23. Anderson JW, Konz EC, Frederich RC, Wood CL (2001) Long-term weight-loss maintenance: a meta-analysis of US studies. Am J Clin Nutr 74: 579- 584.

24. American Society of Metabolic and Bariatric Surgery (2015) Public and Professional Education Committee Bariatric Surgery: Postoperative Concerns.

25. Poirier P, Cornier MA, Mazzone T, Stiles S, Cummings S, et al. (2011) Bariatric surgery and cardiovascular risk factors: a scientific statement from the American Heart Association. Circulation123: 1683-1701.

26. Gibala MJ, Little JP, Macdonald MJ, Hawley JA (2012) Physiological adaptations to low-volume, high-intensity interval training in health and disease. J Physiol 590: 1077-1084.

27. Karstoft K, Winding K, Knudsen SH, Nielsen JS, Thomsen C, et al. (2013) The effects of free-living interval-walking training on glycemic control, body composition, and physical fitness in type 2 diabetic patients: a randomized, controlled trial. Diabetes Care 36: 228-236.

28. Martins C, Kazakova I, Ludviksen M, Mehus I, Wisloff U, et al. (2015) High-Intensity Interval Training and Isocaloric Moderate-Intensity Continuous Training Result in Similar Improvements in Body Composition and Fitness in Obese Individuals. Int J Sport Nutr Exerc Metab.

29. Fisher G, Brown AW, Bohan Brown MM, Alcorn A, Noles C, et al. (2015) High Intensity Interval- vs Moderate Intensity- Training for Improving Cardiometabolic Health in Overweight or Obese Males: A Randomized Controlled Trial. PLoS One 10: e0138853.

30. Drenowatz C, Hand GA, Sagner M, Shook RP, Burgess S, et al. (2015) The prospective association between different types of exercise and body Composition. Med Sci Sports Exerc 47: 2535-2541.

31. Wiklund M, Olsén MF, Willén C (2011) Physical activity as viewed by adults with severe obesity, awaiting gastric bypass surgery. Physiother Res Int 16: 179-186.

32. Wasserman K, Hansen J, Sue D, Casaburi R, Whipp B (1999) Principles of Exercise Testing and Interpretation. 3rd edition, Lippincott Williams &Wilkins, Baltimore, MD 96-98.

33. Lund MT, Hansen M, Wimmelmann CL, Taudorf LR, Helge JW, et al. (2015) Increased post-operative cardiopulmonary fitness in gastric bypass patients is explained by weight loss. Scand J Med Sci Sports.