DOES BARIATRIC SURGERY ALTER PATIENTS' PERCEIVED BARRIERS TO EXERCISE AND THEIR LEVEL OF INTEREST IN FITNESS PROGRAMS?

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Short running head: Barriers to exercise and interest in fitness

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Abstract

Background

Moderate exercise following bariatric surgery is associated with greater postoperative weight loss and improved glucose metabolism and insulin sensitivity. The aims of this study were to assess the level of interest in fitness programs, weekly duration of exercise and self-reported obstacles for exercising in bariatric patients.

Methods

Patients presenting for a bariatric clinic visit were administered a questionnaire which explored their interest in paid internet (IW) and free DVD-based workouts (DW), average duration of exercise sessions per week and their two perceived obstacles to exercise. Chi-square tests were used to assess the significance of relationships.

Results

One hundred and fifty-nine preoperative and 135 postoperative patients were surveyed. Overall, there was more interest in DW than in IW. The mean duration of exercise in the pre-op group was 89± 92.1 minutes/week while the post-op group reported 84.4± 103.7 minutes/week. Time was the most frequent obstacle in both groups. Orthopedic pain or discomfort as an obstacle was reported less frequently in the postoperative population ($p=.001$).

Conclusions

Orthopedic pain was less commonly reported as an obstacle to exercise by the postoperative patients compared to preoperative patients. Time constraints was the most frequently reported barrier and therefore should be addressed by healthcare providers.

Key words: bariatric surgery, interest in fitness, barriers to exercise

Introduction

Patients with morbid obesity seeking bariatric surgery are usually advised to participate in an active lifestyle to optimize weight loss and improve perioperative and postoperative outcomes[1, 2]. Patients who perform moderate exercise after bariatric surgery demonstrate improved outcomes in glucose metabolism and cardiorespiratory fitness compared to those who lead a sedentary lifestyle after surgery[3]. In addition to improving weight loss, physical activity improves body composition by maintaining lean body mass and maximizing fat loss[4]. It is also well established that regular physical activity is critical for long-term weight management as lack of exercise is linked to weight regain postoperatively[5-7]. Exercise leads to improved energy expenditure in patients[8]. Bariatric clinics can assist patients in increasing their physical workouts by providing them with visual home exercise routines (DVDs or internet uploaded files)[9]. Home-, outside-, or gym-based physical exercise have been shown to have similar beneficial results on weight loss[10]. Even though all the benefits of exercise are communicated to all pre- and post-operative bariatric surgery patients, there are studies that show non-adherence to physical workout routines by the majority (more than 60%) of patients following bariatric surgery[11]. Similar results have been reported by preoperative bariatric patients as well[1], which is also concerning since studies show that preoperative exercise can predict postoperative outcomes[12, 13]. Additionally, if preoperative physical activity interest is low, even motivational physical activity interventions cannot increase exercise following surgery[14]. There is limited information regarding the level of interest in exercise in the bariatric population, and the perceived challenges of both preoperative and postoperative bariatric patients that prevent

them from incorporating it in their daily activities. It has only been recently that research has focused on possible differences in physical activity barriers before and after bariatric surgery[15]. Zabatiero et al., in their qualitative study of patients both before and after bariatric surgery, found that some perceived barriers to exercising dropped (e.g., bodily pain), other obstacles emerged after surgery (e.g., loose skin), while some reasons not to exercise remained the same (e.g., lack of time). In order to design interventions that can improve exercise adherence, perceived obstacles- and how these might be different before and after bariatric surgery- must be better understood.

Thus, in this study, we assessed:

A) self-reported level of activity in a preoperative group and a postoperative group of patients and their perceived obstacles to participating in regular exercise; and

B) their level of interest/investment in quality exercise before and after bariatric surgery through questions regarding:

i) internet-based weekly updated exercise workouts created by a physical exercise professional that required a small fee; and

ii) a 10-min DVD-based workout that would be provided without a price.

Materials and Methods

Patients

As part of an effort to better understand our program's fitness needs and preferences, all consecutive adult (≥18 year old) patients with morbid obesity who presented to our suburban hospital seeking either bariatric surgery or postoperative follow-up were administered a brief (1-2 minutes) physical activity questionnaire.

Methods

Because this questionnaire was initially administered for program development regarding fitness options, demographic and anthropometric data were not considered as important as inclusiveness, brevity and anonymity. Institutional review board approval was obtained after the dissemination of the anonymous questionnaires to examine our patients' responses for research purposes.

The questionnaire was administered over different time periods (September 2015, April 2016 and May 2016) to include more patients and comprised of:

A) The validated Physical Activity "Vital Sign" (PAVS) questions, advanced by the Exercise is Medicine® initiative questionnaire[16, 17]:

1.) On average, how many days per week do you engage in moderate to strenuous exercise (like a brisk walk)? _____days.

2.) On average, how many minutes do you engage in exercise at this level? _____minutes.

B) Questions that explored patients' interest in needs-tailored quality exercise compared to free DVD-based ordinary exercise. The first question assessed their interest in internet-

based workout with new weekly uploaded content from an exercise specialist but with the addition of a 20 USD fee (IW). The second question evaluated their interest in a free 10-minute DVD-based workout (DW). Both options are home-based and were selected as potentially the most effective way our bariatric clinic could intervene and meaningfully help our patients (with videos and internet-based workout plans).

Responses were assessed through a 5-point Likert scale (5-very interested, 4-somewhat interested, 3-neutral, 2-not very interested, 1-not at all interested). For the purpose of the analysis, patients who chose either 4 or 5 in the questionnaire were categorized as interested, while patients who chose either 2 or 1 were categorized as not interested, and all patients who chose 3 were grouped as neutral. Our patients' access to internet was also recorded as it could limit some patients' ability to select the internet-based fitness option.

C) Finally, the questionnaire asked patients to identify their two greatest perceived obstacles to exercise.

Statistical analysis

Ordinal/nominal and continuous variables were calculated with Chi-square and independent t-tests respectively. A p value <0.05 was considered significant. Statistical analysis of the data was performed using the SPSS statistical software, version 24.0 (SPSS Inc., Chicago, IL).

Results

Two hundred and ninety-four patients participated in the survey out of which 159 were preoperative while 135 were postoperative ones. All patients finished the questionnaire except for one from the postoperative population. Average time of postoperative follow-up was 31.2 ± 38.4 months. At the time of the questionnaire administration, the preoperative and postoperative groups were similar in their lack of internet access, and thus inability to prefer the IW. Specifically, presence of access to internet was reported by 141 of the 159 preoperative patients and by 122 of the 135 postoperative patients (p=0.670). The most commonly reported obstacles to exercise, according to both preoperative and postoperative respondents, were time constraints (total=26.6%; preoperative=24.1%, postoperative=29.5%) followed by orthopedic-related discomfort (total=13%; preoperative 18.1%, postoperative=7%). The sole difference in perceived obstacles between preoperative and postoperative patients was orthopedic-related (18.1% vs. 7.0%, respectively, $p<0.001$). Other obstacles were also reported but were found to be similar between the preoperative and postoperative patients (Table 1). The free workout DVD generated more interest than the paid internet alternative in both patient subgroups ($p<0.001$) (Table 2). The mean reported duration of exercise per week was similar between the preoperative and the postoperative patients (89 ± 92.1 minutes/week and 84.4 ± 103.7 minutes/week, respectively, $p=0.717$).

Discussion

This study sought to examine perceived barriers to exercise in both the preoperative and postoperative period as well as gauge level of interest in at-home fitness programs. Our study observed no significant difference in self-reported weekly exercise duration between the preoperative and postoperative groups, despite less orthopedic discomfort reported by the postoperative group. Our participants reported several obstacles to exercise, with the most common obstacles reported involving time constraints (26.6%), orthopedic pain or discomfort (13%), and poor health (12.6%). Participants in our study expressed significantly greater interest in a free 10-minute exercise DVD rather than a low-cost tailored internet-based workout.

Bariatric surgery is a highly effective treatment for morbid obesity, which leads to significant weight loss and improvement or resolution of associated comorbid conditions such as obstructive sleep apnea, type 2 diabetes, orthopedic restrictions, and cardio-metabolic risk factors[18-21]. However, outcomes after weight loss surgery can vary and at least some of the variation can be attributed to patient-related factors[22]. One of the factors dependent on patients' adherence is their degree of physical activity (preoperative and postoperative), which may have significant implications on outcomes after bariatric surgery including weight loss [2, 7, 23, 24]. With the medical benefits of bariatric surgery, and the established benefits of exercise postoperatively[21], it would seem reasonable that physical activity would increase after surgery. Yet, our study and others[1, 11, 25-27], including those studies using objective measurement, suggest that the preoperative vs. postoperative differences in physical activity are non-significant, or modest at best. Of course, this is not limited to the bariatric surgery population; even

when patients report awareness that regular physical activity will reduce the risk of breast cancer recurrence, over 30% report no exercise in the previous 30 days[28].

Despite the evidence that higher levels of physical activity improve outcomes, there is limited research identifying patient-perceived objective and subjective barriers on motivation and interest to exercise in the bariatric population. Similar to our results, difficulty finding time to exercise is a consistently reported barrier in qualitative studies, whether before or after bariatric surgery [15, 29]. While it makes sense that bariatric surgery does not change patients' schedules (hence, the time barrier does not change), previous research and the present study identify this perceived barrier as a target worthy of intervention.

Despite lower orthopedic discomfort, the level of physical activity in the postoperative group was not greater than that of the preoperative group. The rewards of both exercise and dramatic weight loss overlap, including elevated energy levels, improved mood, better overall health, and enhanced functioning in certain areas of cognitive functioning. Thus, the resultant rewards of weight loss from bariatric surgery may undermine a patients' incentive to participate in exercise. It is also possible that patients become more engaged in non-exercise activities following surgery with improvement of their overall health, the kind of activity not captured in the PAVS.

In contrast to a study using a fully-automated "virtual coach" to increase physical activity wherein over 90% of participants with overweight or obesity reported benefit[30], less than half of our participants expressed an interest in an internet-based workout (40%). There are several possible reasons why our participants expressed significantly greater interest in a free 10-minute exercise DVD rather than a low-cost tailored internet-based

workout. Slightly over 10% of our study's population reported no home access to the internet. Another reason for this could be the difference in expense ($20/month) though cost was not often reported to be an obstacle for engaging in physical activity in both the preoperative group and the postoperative group (4.6% and 9%, respectively). Another possibility is that it reflects some degree of pessimism about increasing activity level by patients who have, and/or have had, obesity and related diseases[14], therefore they selected a less involved option.

Not all studies have shown negligible differences in physical activity before and after bariatric surgery[21, 31]. King et al., using objective measurements, showed that steps per day increased from a median of 7563/day preoperatively to 8788/day one year postoperatively[31]. Since our postoperative group had their surgery an average of over 2.5 years previously, it may be that, over time, activity levels begin to fall. Another difference is that our design involved a between-groups comparison, whereas King and colleagues used a within-subjects longitudinal design.

With the low interest in virtual training expressed by the majority of our participants in our study, the present results contributed to our program's decision to add an in-house fitness specialist to our team. Our study adds to the literature by highlighting the exercise obstacles reported by patients who are in a bariatric surgery program. To counteract such barriers, it is important for the bariatric team to create an individualized presurgical plan. Given the obstacles mentioned by our patients in the present study, a potentially fruitful approach may be to work on reducing sedentary time, rather than focusing on exercise per se. At least in adolescents, less sitting time has been associated with greater weight loss years after undergoing a gastric bypass[32]. In their qualitative study, Greenwood-

Hickman et al. found a high degree of acceptability among older adults when exploring how to reduce sedentary time[33]. In contrast to our sole focus on barriers, Greenwood-Hickman and colleagues added the concept of "motivators" to their work, such as setting up reminders to stand up, learning about the benefits of less sitting, and increasing time with active friends.

Our observational study comes with some limitations. It was accomplished in a single setting, potentially limiting generalizability. We specifically focused on comparison of the use of a free workout DVD with a paid internet-based subscription as literature had shown that the use of technological modalities to promote exercise reduced obstacles perceived by the patient. [1] However, there are other exercise formats which may be offered to the patients. Our small sample size may not have allowed us to capture some infrequently reported barriers to exercise, however, we feel the number of cases we observed was adequate to capture any important obstacles that may affect the ability of patients to exercise. The assessment of physical activity was entirely self-reported with the PAVS questionnaire, rather than based on objective measurement with accelerometers. Furthermore, the preoperative and postoperative groups were separate cohorts of patients, which limited the power of our analyses to between-group analysis rather than within-group analysis. Finally, the demographics of the patients and type of surgical interventions were not recorded which did not allow us to investigate their role as confounders. Future work in a bariatric surgery population should further investigate the best motivators for physical activity, explore the benefits of emphasizing a reduction in sedentary behavior, compare the level of engagement in virtual vs. in-person fitness training, and test interventions to address the barrier of limited time to exercise.

Conclusions

We found that fewer postoperative patients report orthopedic obstacles to exercise when compared to the preoperative sample. Despite this, there was no significant difference in self-reported physical activity between the preoperative and postoperative groups. More research is needed to help develop effective strategies to address physical activity barriers such as the perceived or objective lack of time.

Disclosures

The authors have no conflicts of interest or financial ties to disclose.

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Table 1. Distribution of responses on obstacles to exercise between preoperative and postoperative patients

N	*Preoperative patients' responses (%) 159*	*Postoperative patients' responses (%) 135*	*p value*
Time constraints	***24.1***	***29.5***	***0.24***
Health issues	***13.6***	***11***	***0.51***
Embarrassment	***6.3***	***3***	***0.16***
Lack of enjoyment	***3.8***	***4***	***0.91***
Sweating	***2.1***	***2***	***0.94***
Cost issues	***4.6***	***9***	***0.1***
Inconvenience	***4.2***	***4.5***	***0.89***
Transportation	***2.1***	***1.5***	***0.91***
Unsure of what to do	***3.8***	***6.5***	***0.28***
Lack of energy	***5.9***	***7***	***0.79***
Lack of motivation	***3.8***	***6***	***0.39***
Orthopedic reasons	***18.1***	***7***	0.001
Others	***7.6***	***9***	***0.72***

Table 2. Comparison of patients' interest in paid internet-based workout with free DVD-based workout

	Paid Internet-based Workout (IW)		**Free 10-minute DVD-based workout (DW)**			
N	Pre-Operative Patients 159	Post-Operative Patients 134	Pre-Operative Patients 159	Post-Operative Patients 134	p value	
					Pre-Operative	Post-Operative
Not interested	59 (37%)	59 (44%)	21 (13%)	24 (18%)	*<0.001*	*<0.001*
Neutral	35 (22%)	28 (21%)	11 (7%)	16 (12%)	*<0.001*	*0.03*
Interested	65 (41%)	47 (35%)	127 (80%)	94 (70%)	*<0.001*	*<0.001*
p-value	0.46*		0.14**		-	

*comparison of preoperative and postoperative interest in paid internet workout access
** comparison of preoperative and postoperative interest in DVD based workout

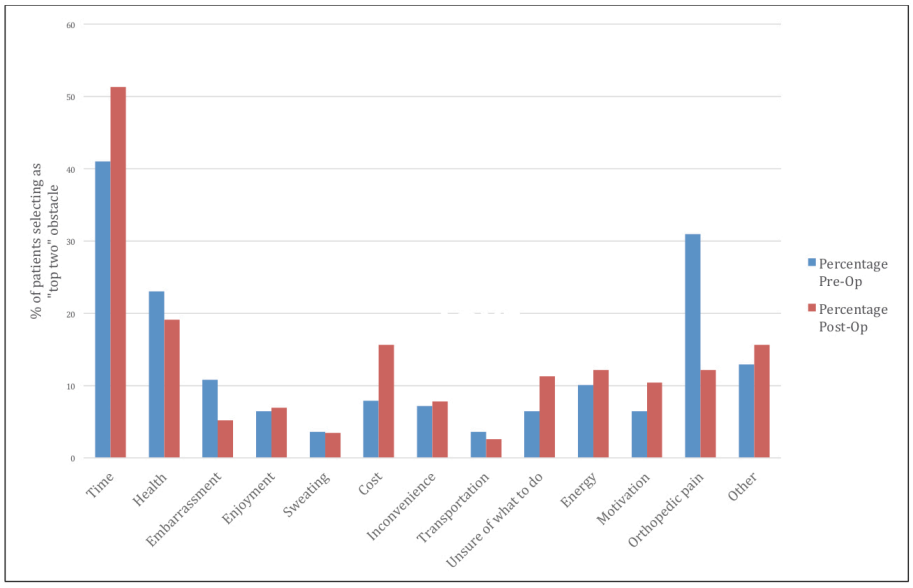

Figure 1 Comparison of obstacles to exercise in pre-operative and post-operative bariatric patients