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Stages of behavior change and physical activity barriers in morbid obese subjects

Estágios de mudança de comportamento e barreiras para a atividade física em obesos mórbidos

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Abstract – The objective of this study was to identify the stages of behavior change (SBC) in physical activity and the prevalence of barriers to physical activity in morbid obese subjects before (retrospective) and after bariatric surgery. An interview was conducted with 30 patients of both gender ranging in age from 23 to 61 years (39.4 ± 10.5 years), who underwent bariatric surgery at the University Hospital of the Federal University of Santa Catarina, Florianópolis. Descriptive statistics and the nonparametric McNemar test were used for data analysis, with the level of significance set at 5%. Most subjects were women (80.0%), married (73.3%), received three minimal wages (53.5%), and had incomplete elementary school (50.0%). The mean body mass index was 46.9 ± 6.39 kg/m^2 before surgery and 32.4 ± 6.09 kg/m^2 after surgery. Analysis of SBC showed that 40.0% of the subjects were in the contemplation stage, 20.0% in the preparation stage, 23.3% in the action stage, and 16.7% in the maintenance stage, indicating that the subjects had the intention to or already performed some physical activity. With respect to physical activity barriers, there was a significant reduction in all physical barriers and in most behavioral barriers after surgery. Bariatric surgery positively contributed to decrease most physical activity barriers, but few subjects were regularly active. The development of programs that permit and encourage physical activity in this population is necessary in order to contribute to weight maintenance, in addition to other health benefits.

Key words: *Bariatric surgery; Behavior; Exercise; Obesity.*

Resumo – *O objetivo do estudo foi identificar os estágios de mudança de comportamento (EMC) para atividade física e a prevalência das barreiras para a prática de atividade física (BPAF) em obesos mórbidos antes (retrospectivo) e depois da cirurgia bariátrica. Uma entrevista foi realizada em 30 participantes de ambos os sexos, com idades entre 23 e 61 anos (39,4 ± 10,5 anos), submetidos à cirurgia bariátrica no Hospital Universitário da UFSC, em Florianópolis-SC. Foi utilizada estatística descritiva e o teste não-paramétrico de McNemar, com nível de significância de 5%. A maioria dos participantes era mulher (80,0%), casada (73,3%), com renda de até três salários mínimos (53,3%) e ensino fundamental incompleto (50,0%). A média do IMC antes da cirurgia foi de 46,9 ± 6,39 kg/m^2 e após 32,4 ± 6,09 kg/m^2. Na análise dos EMC, 40,0% dos indivíduos encontravam-se no estágio de Contemplação, 20,0% em Preparação, 23,3% e 16,7% nos estágios de Ação e Manutenção, respectivamente, apontando que os obesos tinham intenção em praticar ou já realizavam alguma atividade física. Quanto às BPAF, houve diminuição significativa em todas as barreiras físicas e na maioria das barreiras comportamentais após a realização da cirurgia. A cirurgia bariátrica contribuiu positivamente na diminuição da maioria das barreiras para a atividade física, no entanto, eram poucos os indivíduos regularmente ativos. É necessária a criação de programas que possibilitem e incentivem a prática de atividade física para esta população, contribuindo para a manutenção do peso entre outros benefícios à saúde.*

Palavras-chave: Obesidade; Cirurgia bariátrica; Comportamento; Exercício.

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INTRODUCTION

Obesity is a global chronic health problem that reduces the life expectancy of the affected individual[1]. A body mass index (BMI) of 40 kg/m^2 or higher characterizes morbid or severe obesity[2] and the most effective treatment for this condition is bariatric surgery[3]. Although this type of surgery permits significant weight loss and improvement of obesity-related comorbidities, long-term weight regain is observed in some cases[4]. The mechanisms responsible for this weight regain are an increase in energy intake due to enlargement of the stomach, hormonal alterations, and low levels of physical activity[3].

Studies have demonstrated the efficacy of physical activity in weight maintenance after bariatric surgery[5,6] but, at the same time, the lack of this activity is a characteristic of most obese patients undergoing gastroplasty[7]. The adoption of an active behavior is an important strategy for the control of pre- and postoperative weight and is therefore essential for the success of surgical intervention. Among behavioral theories applied to physical activity and exercise, the transtheoretical model of behavior change has been widely used with positive responses. The model is based on important constructs of the social cognitive and learning theory. The stages of behavior change (SBC) related to physical activity comprise cognitive, social and environmental factors[8], and their application consists of the identification of current habits and/or the intention of change in physical activity in the future, with specific strategies for each behavior stage[9]. These stages are divided as follows: a) precontemplation stage (no participation in regular physical activity or intention to change in the next 6 months); b) contemplation stage (no participation in regular physical activity, but intention to change in the next 6 months); c) preparation stage (participation in occasional physical activity); d) action stage (participation in regular physical activity for at least 6 months), and e) maintenance stage (participation in regular physical activity for more than 6 months)[10].

However, the effectiveness of behavior change strategies has been shown to be enhanced by the identification of perceived barriers. These perceived barriers include motives, reasons or excuses reported by the subject and are a negative factor in the decision-making process that may directly interfere with the change, adoption and maintenance of the intended behavior, in this case, physical activity[11,12]. Therefore, the objective of the present study was to identify SBC related to physical activity and the prevalence of perceived barriers to physical activity (PBPA) in morbid obese subjects before and after bariatric surgery.

METHODOLOGICAL PROCEDURES

A cross-sectional, descriptive and retrospective study was conducted. The sample consisted of 30 subjects undergoing bariatric surgery at the Hospital of Universidade Federal de Santa Catarina (HU/UFSC), Florianópolis, Santa Catarina, including 24 (80%) women and 6 (20%) men ranging in age from 23 to 61 years (39.4 ± 10.5 years). The subjects of the sample were selected based on their accessibility. Patients with a postoperative period of up to 3 years were included.

Data were collected by interview performed before the visit to the nutritionist of HU/UFSC, which lasted about 15 min and consisted of the following items: 1) personal and sociodemographic data: gender, marital status, educational level, occupation, household income, and pre- and postoperative BMI; 2) SBC related to physical activity[10]: precontemplation, contemplation, preparation, action, and maintenance; 3) PBPA: environmental, social, behavioral, and physical barriers, modified from Martins and Petroski[11].

The following definition was applied for the identification of SBC: Subjects accumulating at least 30 min of daily physical activity on five or more days of the week, which can be continuous (1 x 30 min) or cumulative (2 x 15 min or 3 x 10 min), were classified as physically active[13]. The subjects were then asked the following question: With respect to your physical activity habits, would you say that you are "physically active for more than 6 months" (maintenance); "physically active for less than 6 months" (action); "not physically active but that you intend to become active in the next 30 days" (preparation); "not physically active but that you intend to become active in the next 6 months" (contemplation); "not physically active and that you do not intend to become active in the next 6 months" (precontemplation).

Barriers were identified in a dichotomous manner (yes/no) considering the period before (retrospective) and after (current) bariatric surgery. The following subdivisions were analyzed:

Environmental barriers: inadequate climate; lack of space for physical activity; lack of equipment; insufficiently safe environment; inadequate conditions at the place of residence.

- *Social barriers*: extensive working hours; family commitments; domestic tasks; lack of encouragement from family or friends; lack of financial resources; lack of knowledge/guidance about physical activity; lack of company.
- *Behavioral barriers*: moodiness; fear of hurting oneself; concern about appearance; lack of interest; concern about clothes during physical activity.
- *Physical barriers*: lack of physical skills; physical limitations; physical tiredness; mild pain and malaise.

All participants signed a free informed consent form. The project was approved by the Ethics Committee on Human Research of UFSC (process 283/2007).

The data were submitted to descriptive statistics and are reported as mean, standard deviation, and absolute (N) and relative (%) frequency. Differences in PBPA before and after surgery were analyzed by the nonparametric McNemar test at a level of significance of 5%. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS), version 15.0.

RESULTS

Approximately 56.6% of the interviewed subjects lived in the metropolitan region of Florianópolis and the remaining subjects were from other municipalities in Santa Catarina. Most subjects (80%) had undergone surgery less than 1 year ago. Of these, 50% were in the 6-month postoperative period. The overall mean BMI was 46.9 ± 6.39 kg/m^2 before surgery and 32.4 ± 6.09 kg/m^2 after surgery. With respect to marital status, 73.3% of the subjects were married. Regarding occupation, 63.3% of the participants reported to be working and 70% of them had a formal sector job. Half the interviewed subjects did not complete elementary school and 53.3% reported a monthly household income of up to three minimal wages.

Table 1 shows the SBC classification of the participants. None of the subjects was in the precontemplation stage, indicating that the subjects had the intention to participate in physical activity (contemplation and preparation) or already performed some physical activity (action and maintenance).

With respect to PBPA, 56.7% of the interviewed subjects reported environmental barriers before surgery, with the most cited barrier being the "lack of equipment" (n = 11). Comparison before and after surgery showed no significant reduction in any of the barriers ($p \leq 0.05$) (Figure 1).

Table 1. Stages of behavior change related to physical activity of subjects undergoing bariatric surgery.

Stage of behavior change	N	(%)
Maintenance	5	16.7
Action	7	23.3
Preparation	6	20.0
Contemplation	12	40.0
Precontemplation	-	-

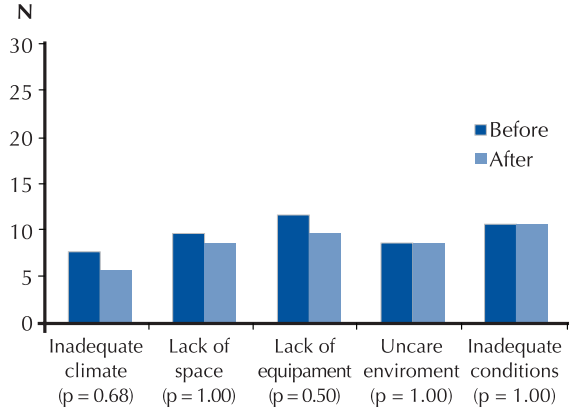

Figure 1. Environmental barriers to physical activity in subjects before and after bariatric surgery.

Social barriers were reported by more than 80% of the subjects studied. The most cited barrier was "extensive working hours" (n = 17). There was a reduction in all barriers after surgery, but none of them was statistically significant (Figure 2).

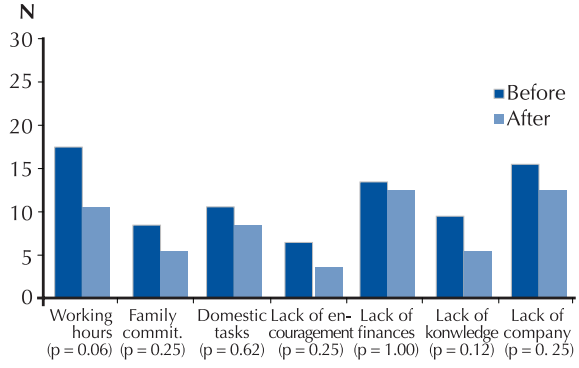

Figure 2. Social barriers to physical activity in subjects before and after bariatric surgery.

Figure 3 shows the prevalence of behavioral barriers, which were reported by 96.7% of the sample before surgery and by 60% after surgery. "Concern about appearance" and "concern about clothes during physical activity" were the most reported (n = 24) among all barriers including environmental,

social and physical barriers. A significant reduction in these barriers was observed after surgery ($p < 0.01$). "Lack of interest" and "moodiness" also showed an important decrease after surgery.

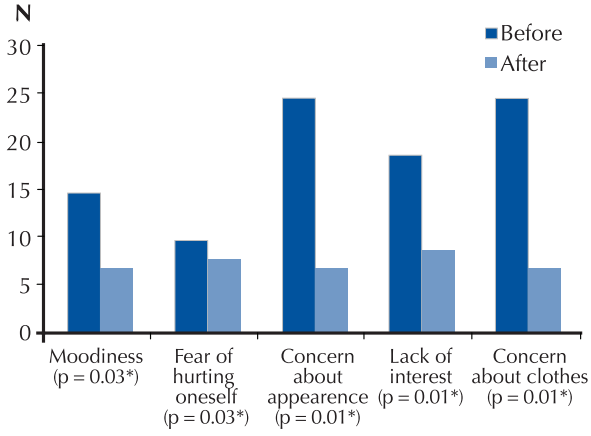

Figure 3. Behavioral barriers to physical activity in subjects before and after bariatric surgery. *Significant ($p \leq 0.05$, McNemar test).

Finally, a significant reduction was observed in all items of physical barriers after surgery, with these barriers being reported by 93.3% of the subjects before surgery and by 60% after surgery. "Physical tiredness" was the most frequently reported barrier (n = 23), which was reported by only 11 subjects after surgery. "Lack of physical skills" presented the lowest prevalence after surgery, with only three reports (Figure 4).

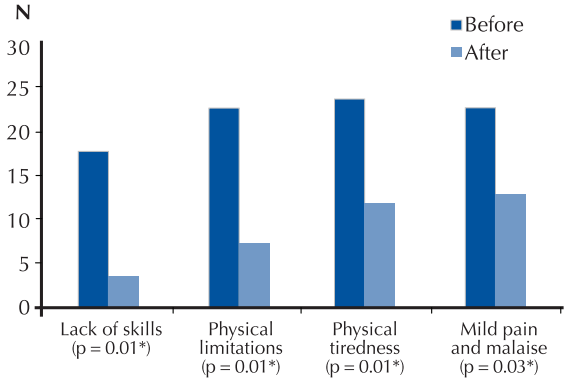

Figure 4. Physical barriers to physical activity in subjects before and after bariatric surgery. *Significant ($p \leq 0.05$, McNemar test).

DISCUSSION

The objective of the present study was to evaluate SBC and PBPA in obese adults submitted to bariatric surgery. National and international studies investigating this population and aspects of SBC and barriers to physical activity are scarce.

Eighty percent of the participants in the present study were women. The higher prevalence of women undergoing bariatric surgery also reported in other studies[14,15] might be explained by social factors such as society's beauty standards[16], but mainly by hormonal factors, including the higher body fat percentage of women compared to men[17]. The present results regarding household income and educational level are in agreement with the literature, with obesity being more prevalent among social classes characterized by lower income and lower educational level[15,18,19].

With respect to physical activity habits analyzed based on SBC, about 40% of the interviewed subjects reported to be physically active. Of these, 23.3% were in the action stage and 16.7% were in the maintenance stage. Similar results have been reported in a study involving 87 bariatric surgery candidates from the Virginia Commonwealth University Medical Center, United States, in which 34.5% were in the action stage, 13.8% in the maintenance stage and none of the participants were in the preparation stage[20]. These findings show that, even if the number of practitioners is small, the intention to become physically active exists among both candidates for and subjects undergoing bariatric surgery. Dumith et al.[21] suggested that adults with a BMI > 30 kg/m^2 are more motivated to adopt an active behavior than normal weight subjects (BMI < 25 kg/m^2), and are therefore more likely to be in the contemplation and preparation stages, i.e., they intend to become active within the next 6 months or 30 days, respectively.

PBPA were analyzed to identify factors that could negatively influence physical activity, comparing the retrospectively reviewed answers obtained before surgery with those obtained after surgery. A reduction was observed in all barriers, except for two items of environmental barriers that continued to be the same. These results are expected since the environment is not directly influenced by surgery. Kottke et al.[22] demonstrated the importance of creating favorable environments so that individuals choose walking or cycling for their daily activities, thus contributing to the prevention of obesity. According to Sallis and Glanz[23], residents of neighborhoods who have good access to recreation facilities are more likely to be physically active and less likely overweight or obese.

With respect to social barriers, "extensive working hours" was the most frequently cited barrier before surgery and its significant reduction might be explained by the absence from work of some patients due to the need for surgical recovery,

considering that half the subjects underwent surgery less than 6 months ago. Also regarding social barriers, similar to the present findings Reichert et al.[24] identified a high prevalence of barriers related to the lack of financial resources and lack of company in a study conducted in southern Brazil. Economic disparities are more prevalent in developing countries than in developed countries, where access to weight loss programs, gyms and medications can be difficult[25]. However, there are activities that can be performed without any cost, such as walking.

Concern with esthetics (appearance and clothes), which was reported by most of the interviewed subjects, is a major factor interfering with the lack of physical activities. Many obese subjects do not perform exercise because of concerns with their body image, in addition to physical limitations that impair the participation in conventional programs[26]. In the present study, physical limitations, tiredness and pain were frequently reported before surgery and showed a significant reduction with decreasing body weight. According to Almeida[27], morbidly obese women present greater limitations in physical activity and poorer general health than normal weight subjects. The presence of generalized pain and chronic fatigue can also lead to a reduction of physical activity and to the lack of motivation to follow healthy diets, facilitating additional weight gain[25]. Other studies[28,29] identified major losses in the physical functioning of morbid obese subjects, which also interfered with psychosocial function and quality of life in general.

Bariatric surgery was effective in reducing physical activity barriers, especially physical and behavioral barriers, demonstrating that weight loss also permits a reduction of obesity-related tiredness, pain and physical limitations. In addition, weight loss seems to contribute to the improvement of body image and to reduce the lack of interest in physical activities. However, adherence to some activity is still low.

The behavior change model itself might be an option of encouragement that potentiates the benefits of physical activity and minimizes possible barriers. Furthermore, public investments in the creation of favorable environments, together with the development of programs designed to encourage the adoption of healthy behaviors, are fundamental for the weight maintenance and improvement of health and well-being not only of individuals undergoing bariatric surgery but of the general population.

The limitations of the present study include 1) representativeness of the sample and access to participants. The subjects could be contacted only once a week over a period of 2 months. This fact also impaired more complete statistical analysis and comparison between groups (gender, income, postoperative period, being active or not, etc.). 2) Application of a retrospective interview is limited by the fact that the interviewed subject may not remember some events, but is an important tool for the identification of changes caused by some event, in this case, bariatric surgery. Despite these limitations, this is the first Brazilian study investigating SBC and physical activity barriers in morbid obese subjects.

CONCLUSION

The identification of PBPA is important to understand the factors that impair physical activities and thus permits the development of strategies designed to minimize these obstacles. Bariatric surgery positively contributes to a reduction of most barriers, particularly physical and behavioral barriers, by reducing weight and related morbidities. Nevertheless, analysis of SBC showed that the number of physically active subjects is low, but an intention to perform physical activity exists among inactive subjects.

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