Quality of life and prevalence of osteoarticular pain in patients submitted to bariatric surgery

Qualidade de vida e prevalência de dor osteoarticular em pacientes submetidos à cirurgia bariátrica

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ABSTRACT

Objective: To analyze quality of life and observe the prevalence of musculoskeletal pain in patients submitted to bariatric surgery. **Methods:** A prospective, observational and comparative study with 26 individuals aged 18 to 60 years, 25 women, which included two evaluations, one preoperative and the other approximately 42 months after surgery. The Medical Outcomes Study 36-Item Short Form Health Survey (SF-36) and the Human Body Diagram with Visual Analogue Scale were employed. **Results:** The individual samples showed grade III obesity, with a predominance of postoperative overweight, hypertension and diabetes in 65.4% and 42.3% of the samples, with remission of hypertension in 50% and of diabetes mellitus in 38.5% ($p<0.001$). The SF-36 demonstrated improved quality of life, especially in aspects related to motricity; vitality and mental health showed no significant changes. Osteoarticular pain was reported and identified in various sites by the subjects; however, 87.5% of patients in the preoperative period and 88.5% in the postoperative period reported not having any physical therapy orientation, while 65.4% reported being engaged in some type of regular physical activity after surgery ($p<0.001$). **Conclusion:** Morbidly obese individuals have a high probability of suffering from clinical, psychic, and musculoskeletal alterations, compromising their quality of life and showing improvement after bariatric surgery; on the other hand, the psycho-emotional manifestations did not progress in the same way.

Keywords: Pain, postoperative/etiology; Arthralgia/etiology; Obesity; Bariatric surgery; Quality of life

RESUMO

Objetivo: Analisar a qualidade de vida e observar a prevalência de dor musculoesquelética em pacientes submetidos à cirurgia bariátrica. **Métodos:** Estudo prospectivo, observacional e comparativo, incluindo 26 amostras, idade entre 18 e 60 anos, sendo 25 mulheres e compreendendo duas avaliações, uma pré-operatória e outra cerca de 42 meses após a cirurgia, com aplicação do *Medical Outcomes Study 36-Item Short Form Health Survey* (SF-36) e do Diagrama do Corpo Humano com Escala Visual Analógica. **Resultado:** As amostras apresentaram obesidade grau III, com predomínio de sobrepeso após cirurgia, hipertensão e diabetes presentes em 65,4% e 42,3% das amostras, com remissão da hipertensão em 50% e da diabete mellitus em 38,5% ($p<0,001$). O SF-36 evidenciou melhora da qualidade de vida, sobretudo nos aspectos relacionados à motricidade; vitalidade e saúde mental não apresentaram mudanças significativas. A dor osteoarticular esteve presente e foi apontada em diversos pontos pelos sujeitos da amostra; contudo, 87,5% dos pacientes no pré e 88,5% no pós-operatório relataram não ter realizado nenhum acompanhamento fisioterápico, enquanto 65,4% relataram fazer algum tipo de atividade física regularmente após a cirurgia ($p<0,001$). **Conclusão:** Obesos mórbidos apresentam alta probabilidade de sofrer com as alterações clínicas, psíquicas e musculoesqueléticas, comprometendo sua qualidade de vida e apresentando melhora após a cirurgia bariátrica; por outro lado, as manifestações psicoemocionais não tiveram a mesma evolução.

Descritores: Dor pós-operatória/etiologia; Artralgia/etiologia; Obesidade; Cirurgia bariátrica/complicações; Qualidade de vida

INTRODUCTION

Since the 1990s, interest in the contributing factors of obesity has increased and lack of physical exercise, food ingestion and behavior patterns are observed as elements of risk for the population[1].

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Obesity is considered a chronic non-communicable disease and worldwide epidemics, causing approximately 2.5 million deaths a year[2]. It is estimated that in Brazil there are about 10.5 million obese individuals[3].

Obesity is associated with the most severe and morbid clinical, postural, and musculoskeletal conditions, among others, contributing to reduced quality and expectancy of life. Among co-morbidities, the degenerative joint diseases stand out because of acute and chronic pain, discouraging physical activity and negatively influencing the emotional state[4,5].

Musculoskeletal alterations are responsible for the second amount of total expenditures with obese patients, and are surpassed only by cardiovascular complications[6]. The relation with obesity results from osteoarticular alterations caused by excessive body mass, reduced stability, and increased mechanical needs for corporal adjustment[7], and the main postural alterations derive from pro-equilibrium compensation[7-9].There is an overburden on the vertebral spine and lower limbs, leading to arthritis of the joints in the spine, hips, knees, and ankles[6,9].

Chronic pain is the primary cause of suffering, incapacitation for work, and severe psychosocial and economic disorders, compromising quality of life[8].

In face of this troublesome scenario, currently the number of bariatric operations is constantly increasing[10]. The scope of bariatric surgery includes reduction of co-morbidities and improved quality of life, and not merely weight reduction. Weight loss *per se* is not a predictor of improved quality of life; it is linked to a set of factors associated with changes in lifestyle that lead to improvement of osteoarticular problems[11].

OBJECTIVE

To analyze quality of life and prevalence of musculoskeletal pain, physical and functional capacity of the group during each stage, based on pre- and postoperative data regarding bariatric surgery.

METHODS

A prospective, observational, and comparative study was performed, with the use of informed consent. Twenty-six patients, aged between 18 and 60 years (25 females) were enrolled, with mean initial age of 44.8 years and mean final age of 48.3 years. The study included a preoperative evaluation and another about 42 months after surgery, with monitoring of clinical charts, application of the Medical Outcomes Study 36-Item Short Form Health Survey (SF-36) questionnaire and of the Human Body Diagram with Visual Analogue Scale (VAS), with both numerical and facial scales, for analysis of musculoskeletal pain. Non-parametric and linear regression statistical tests were applied, with $p<0.05$ and the use of Statistical Package for Social Sciences (SPSS) V16, Minitab 15, and Excel Office 2007 software.

RESULTS

The mean weight measured was 128kg in the preoperative phase and 82kg in the postoperative phase (±13.2kg). The body mass index (BMI) before surgery was 49.2 and postoperatively, 32 (±5.3 in both, with $p<0.001$). Grade III obesity was present in 96.2%, maintained at 11.5% after surgery ($p<0.001$); 38.5% were overweight ($p<0.001$).

Psychiatric disturbances (depression, suicidal thoughts, and desire to die) under treatment and use of medication were identified in 34.6% of the sample during the first phase and in 11.5% during the second ($p=0.048$).

Hypertension occurred in the first phase in 65.4% of the sample and in 11.5% during the second phase. Diabetes was initially present in 42.3%, in contrast with 3.8% after surgery ($p<0.001$ for both).

Results of the SF-36 in the pre- and postoperative correlation showed significance in functional capacity (36.5-85.6), physical aspect (27.9-84.6), and pain (45.3-77.1), all with $p<0.001$. For the general health status (43.6-53.8), and social aspect (45.2-58.7), both with $p=0.002$, and emotional aspect with (37.2-75.6),with $p=0.005$. For vitality (VT), which was 51.7 at both time points, and mental health (MH, 53.4-54.8), there were no statistically relevant results (Table 1).

As to quantification of pain with the VAS, there was intense pain the knees in 42.3% of patients on the left (L) and 30.8% on the right (R), and moderate pain in 23.1% for both joints during the first phase. During the second phase, the results were 3.8% on the left side and 7.7% on the right for intense pain, and 23.1% (left) and 11.5% (right) for moderate pain, with $p<0.001$ for intense pain (left) and $p=0.035$ (right), respectively, at the two time points (Table 2).

Low back pain was intense in 30.8% on the right side of the body and in 26.9% on the left, in the preoperative phase, and was reduced to 0.0% in both sides.

In the hips initially there was 15.4% of intense pain on both sides, with a reduction to 0.0% on the right side ($p=0.037$) and to 7.7% on the left. During the postoperative phase, the values were 3.8% for moderate pain on the left side, and 7.7% on the right.

For the ankles, before surgery, there was intense pain in 26.9% on the right and 30.8% on the left, which was reduced to 0.0% on both sides postoperatively ($p=0.004$ for the right and $p= 0.002$ for the left) (Table 3).

Table 1. Analysis of comparison of SF-36 questionnaire results in the pre- and postoperative periods

SF-36		Mean	Median	Standard deviation	1º. Quartile	3º. Quartile	n	CI	p value
Functional capacity	Preop	36.5	32.5	23.9	20.0	45.0	26	9.2	<0.001
	Postop	85.6	92.5	18.3	80.0	100.0	26	7.0	
Physical aspect	Preop	27.9	0.0	42.6	0.0	50.0	26	16.4	<0.001
	Postop	84.6	100.0	39.4	100.0	100.0	26	15.2	
Pain	Preop	45.3	41.0	22.9	31.0	51.8	26	8.8	<0.001
	Postop	77.1	92.0	28.3	62.0	100.0	26	10.9	
General status	Preop	43.6	40.8	14.2	35.0	52.0	26	5.4	0.002
	Postop	53.8	52.0	11.8	45.5	57.0	26	4.5	
Vitality	Preop	51.7	55.0	12.6	45.0	60.0	26	4.8	0.875
	Postop	51.7	55.0	13.0	50.0	58.8	26	5.0	
Social aspect	Preop	45.2	50.0	18.4	25.0	50.0	26	7.1	0.002
	Postop	58.7	62.5	15.3	50.0	62.5	26	5.9	
Emotional aspect	Preop	37.2	16.7	42.5	0.0	66.7	26	16.3	0.005
	Postop	75.6	100.0	45.8	100.0	100.0	26	17.6	
Mental health	Preop	53.4	56.0	14.8	52.0	60.0	26	5.7	0.482
	Postop	54.8	56.0	15.2	56.0	60.0	26	5.8	

CI: confidence interval.

Table 2. Comparison between pre- and postoperative periods in distribution of the Visual Analogue Scale for pain in the knees

Knee		Preoperative		Postoperative		p value
		n	%	n	%	
R	Mild	0	0.0	1	3.8	0.313
	Moderate	6	23.1	3	11.5	0.271
	Severe	8	30.8	2	7.7	0.035
L	Mild	0	0.0	0	0.0	-
	Moderate	6	23.1	6	23.1	1.000
	Severe	11	42.3	1	3.8	<0.001

R: right; L: left.

Table 3. Comparison between pre- and postoperative periods in distribution of the Visual Analogue Scale for pain in the ankle

Ankle		Preoperative		Postoperative		p value
		n	%	n	%	
R	Mild	0	0.0	0	0.0	-
	Moderate	3	11.5	1	3.8	0.298
	Severe	7	26.9	0	0.0	0.004
L	Mild	0	0.0	0	0.0	-
	Moderate	3	11.5	2	7.7	0.638
	Severe	8	30.8	0	0.0	0.002

R: right; L: left.

In the shoulder joint, during the preoperative period, there was moderate pain on both sides, with 23.1% on the right and 26.95% on the left. The percentage after surgery was maintained in the right shoulder and dropped to 15.4% on the left (Table 4).

Table 4. Comparison between pre- and postoperative periods in distribution of the Visual Analogue Scale for pain in the shoulder

Shoulder		Preoperative		Postoperative		p value
		n	%	n	%	
R	Mild	1	3.8	0	0.0	0.313
	Moderate	6	23.1	6	23.1	1.000
	Severe	2	7.7	0	0.0	0.149
L	Mild	1	3.8	1	3.8	1.000
	Moderate	7	26.9	4	15.4	0.308
	Severe	2	7.7	0	0.0	0.149

R: right; L: left.

On the Human Body Diagram, there was a difference between pre- and postoperative reports, with a greater incidence of pain in the knees: 53.8% for the right and 69.2% for the left, compared to 23.1% in both knees after surgery ($p<0.001$). Next came low back pain with 50% (right) and 53.8% (left) preoperatively, reduced to 15.4% on both sides postoperatively (p value for the right=0.008; p value for the left=0.004). Ankles showed 38.5% for the right and 42.3% for the left for complaints and a drop to 3.8% after surgery (p value for the right=0.002; p value for the left <0.001). Pain was recorded in the hip joint with 38.5% on both sides of the body before surgery, with a reduction of 7.7% for the right side (p=0.008) and 11.5% for the left (p=0.048). The shoulder joint was shown to be the most important point for complaints of pain, with 34.6% on the right and 38.5% on the left, but it continued at 23.1% on the right and 19.2% on the left (Table 5).

Tabela 5. Comparison between pre- and postoperative periods in distribution of the Human Body Diagram for joint pain

With pain		Preoperative		Postoperative		p value
		n	%	n	%	
Neck	R	8	30.8	4	15.4	0.188
	L	8	30.8	4	15.4	0.188
Lumbar	R	13	50.0	4	15.4	0.008
	L	14	53.8	4	15.4	0.004
Sacral	R	8	30.8	3	11.5	0.090
	L	8	30.8	4	15.4	0.188
Ankle	R	10	38.5	1	3.8	0.002
	L	11	42.3	1	3.8	<0.001
Shoulder	R	9	34.6	6	23.1	0.358
	L	10	38.5	5	19.2	0.126
Hip	R	10	38.5	2	7.7	0.008
	L	9	34.6	3	11.5	0.048
Knee	R	14	53.8	6	23.1	0.023
	L	18	69.2	6	23.1	<0.001

R: right; L: left.

Similar results were observed in the cervical and sacral segments, with intense or moderate pain on both sides in 15.4% and a drop to 7.7% on both sides postoperatively. A reduction to 0.0% (p=0.037) was seen for intense pain in the sacral segment for the right and left sides, and for moderate pain to 7.7% for the right and to 11.5% for the left.

Nevertheless, despite complaints of pain, 87.5% of the samples before and 88.5% after surgery reported not having been submitted to any physical therapy orientations; 65.4% reported engaging in some type of regular physical activity after surgery, compared with 13.3% in the preoperative phase (p<0.001).

Linear regression analysis was applied, observing the relation between weight-associated low back pain (p<0.033 initially), strongly influenced by the mental health aspect (p<0.023 initial and p<0.028 final), with R^2 for the initial model of 61.6% and 36.0 in the final model.

DISCUSSION

Studies such as that performed by Ferreira showed that the occurrence of emotional disorders in people with severe obesity problems is high, with depression, anxiety, and compulsive eating as the most frequent[12]. About 70% of the samples studied by Marchesini[13] during the pre- and post-gastroplasty phases showed some kind of alteration related to mental health.

According to Gigante et al.[14], the obese individuals showed a 2.5% risk of developing systemic arterial hypertension (SAH) compared to those who had normal weight. They are also at risk of developing diabetes, with a 20-fold increase for BMI between 30 and 34.9kg/m^2 and 38-fold for BMI >35kg/m^2[15].

According to other authors, the correlation between the two time points gives a better idea as to how obese patients see life and its repercussions after weight reduction. The results obtained by the SF-36 showed improvement in quality of life, especially in motricity, similar to the data from the studies by Dixon et al.[16]; this is also comparable to the data observed for factors VT and MH, which showed results of 33.4 to 54.4 in VT and 58.8 to 67 in MH. Despite the differences found in this study and the comparison with literature, the values are still not very expressive, proving that the compromise of vitality and mental health did not show significant alterations, even with loss of weight.

In line with Yeng et al.[8], the interpretation of pain involves various aspects related to sensitive, cognitive, behavioral and cultural conformations, with a clear influence of socioeconomic factors, family dynamics, and coping strategies and thoughts, which makes pain inherent to each individual with their personal history and life experience.

Studies located pain primarily in the lower limbs due to the mechanical stress and overload suffered by the local bones and joint structures[6,15].

Marks[17] accompanied 100 patients with history of uni- and bilateral preoperative osteoarthritis. Of these, 75% reported pain in the knees *versus* 44% after surgery, which are data consistent with the authors.

In the lower limbs, particularly the ankles, the connection between overweight and arthopathy and arthralgia was investigated. In a study performed by the American Orthopedic Foot and Ankle Society, it was noted that 40.8% of the participants reported not having suffered pain before gaining extra weight[18,19].

Soccol et al.[20] discovered the presence of ankle arthralgia with 46.51% of complaints in the preoperative phase, a value reduced to 6.97% postoperatively, which is consistent with the results found here.

A study carried out by Hooper et al.[21] focused on determining the prevalence points of musculoskeletal pain in 48 obese patients before and after surgery, and observed 110 complaints of low back pain before and 69 after surgery.

Melissas et al.[22] followed up 50 candidates for bariatric surgery. Twenty-nine patients reported preoperative low back pain in contrast with ten patients in postoperative phase. These studies confirmed the findings described in the cases indicated in this study suggesting that with weight reduction there is a drop in

the overload due to the structural alterations suffered by this region resulting from obesity[6-9].

Larsson[23] studied 43 patients involved in a diet intervention program in which 13 initially reported neck pain and 11 maintained their complaints after 64 weeks, despite a small drop in weight. Neck pain may be linked to soft tissue disturbances, regional joint immobility, structural abnormalities, joint degeneration, psychic stress, or traumas.

In this ample survey, no reports were found of studies that identified the site or intensity of pain in the sacral region.

According to Hitt et al.[24], obese patients have greater probability of suffering from back pain as compared to those who are not obese, with 1470-fold greater chances for grade I, 1993 for grade II, and 1505 for grade III.

The obese individuals show alteration and dislocation of the center of gravity with greater range of motion, primarily vertical, and an increased anterior pelvic inclination, leading to greater dislocation of their body area and accentuated body work, causing overload of the joints in the pelvic girdle and lower limbs during all phases of movement[7,9]. There is an increase in joint stress and in the factors by which pain and discomfort are produced during walking with both feet[25].

Weight reduction favors ambulation and decreases this overload; such factors are suggestive for lessening postoperative complaints of pain in the hip joint.

Soccol et al.[20] followed up 31 women in the preoperative phase and after gastroplasty by means of the 6-minute walking test and noted 13 preoperative complaints of hip pain and 7 after weight reduction. The authors also observed that patients without lower limb arthralgia walked more before surgery when compared to those who presented with pain, with no significant differences after the operation[26].

Pain symptoms are the most eminent characteristic of hip osteoarthritis[24]. It is worth mentioning that this study did not have the objective of diagnosing osteoarthritis.

Bankoff et al.[26] highlighted breast weight as a contributing factor for the scapular region to be affected. Considering that in the present study the sample was made up basically by women, this may be a factor when associated with the constant use and overload of this joint and increase of adipose tissue in the upper limbs, forcing it to distance from the trunk, and may explain the prevalence of pain in the right shoulder, which remained stable and with moderate intensity, even with reduction of weight.

Ipso facto, it is an indisputable fact that pain is not only linked to excess weight, but also to postural issues as well as the poor use of joints, always forced to maximal effort, with high medium- and long-term costs.

In the broad literature search, no consistent studies were found focused on mapping and quantifying pain pre- and postoperatively in obese bariatric patients. More in-depth studies would be necessary for this.

Greater levels of obesity favor the appearance of pain in various locations of the body. Imbalanced synergism, due to alterations in the musculoskeletal system, compromises most movements and modifies the points of strength, balance and action, leading to structural and functional changes[26].

Despite the complaints of pain presented in the sample, only one small group had physical therapy treatment. Considering that the morbidly obese are highly compromised biomechanically, in order to correct this lack of harmony and realign the musculoskeletal structure, altered as a result of the increased overload on segments and the postural modifications, a global structural rearrangement is necessary.

This body work may be carried out by a physical therapy program appropriate for the needs of each individual and initiated before surgery. It is important that it be maintained after surgery, preparing the body for the numerous alterations and musculoskeletal and biomechanical modifications that the body will undergo during the new phase of weight loss and accommodation.

Fjeldstad et al.[27] consider the physical therapy orientation necessary for training and reeducation appropriate for these individuals, bearing in mind the co-morbidities and clinical complications that appear as well as the functional and postural consequences of obesity.

Some authors, such as Suerland et al.[28], defend the idea that follow-up by a multidisciplinary team is the gold standard for effective treatment and bariatric success in the morbidly obese.

Anandacoomarasamy et al.[29] asserted that obesity is related to structural and functional limitations. Three weeks after implementation of the reduction and specific training of balance, the postural stability improves and there is a reduction in the risks of falling during activities.

Despite the considerable increase in physical activity after surgery, it is noted that many patients do not adhere to this benefit, which studies proved to be extremely important for loss and maintenance of weight. Besides directly affecting improvement of the physical capacity, it also is useful in the functional capacity and is related to psychosocial benefits[30]. Consequently, if it is not well directed and applied, there is a tendency to promote worsening or even to trigger future problems.

Hitt et al.[24] utilized multiple regression analysis to determine the relation between the BMI and the origin and category of body pain, demonstrating that the increase of one point in the BMI can elevate by 0.16 the reference of body pain in the sites reported.

In this study it was possible to observe the relation between low back pain and weight, which was strongly influenced by the mental health aspect. However, the relation between pre- and postoperative pain, regardless of weight reduction, demonstrated little relevance, emphasizing MH as the most important point of the sample. As to the relation with intensity of pain, this will be the object of another study.

CONCLUSION

Morbidly obese individuals showed a high probability of suffering from clinical, psychic, and musculoskeletal alterations that compromise their quality of life, and demonstrated improvement after bariatric surgery; on the other hand, psycho-emotional manifestations did not evolve in the same manner. Even without the structural compromise and pain presented, the participation of professionals specialized in treating these alterations is still not very significant, and compliance with physical activity is still low, discarding its benefits and implications. In spite of advances and of the research already performed, studies that effectively related obesity, pain, mental health, and the influence of bariatric surgery in these aspects are still necessary.

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