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## Improvement on the quality of life in patients who underwent bariatric surgery

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**ABSTRACT.** The objective of this study is to compare the scores of health related quality of life (HRQOL) of candidates for bariatric surgery with patients that underwent bariatric surgery at different time intervals. A cross sectional study was performed in the city of Maringá and Paranavaí, Paraná, Brazil, with 44 candidates to bariatric surgery and 63 individuals submitted to it. The group of individuals submitted to bariatric surgery was divided into 3 subgroups according to the elapsed time of surgery. (more than 18 months - G2; at least 19 and maximum 36 months - G3 and more than 36 months - G4). The quality of life related to the health of the patients was assessed by the SF-36 and BAROS. The comparison among groups was performed by using parametric and non-parametric statistic tests. The magnitude of the effects of the bariatric surgery by effect size (ES) was also evaluated. The assessment of HRQOL shows differences among the groups, with lower scores observed in group 4 when compared to group 2. A comparison of mean scores of the domains of the SF-36 shows that the groups formed by people who underwent bariatric surgery have average scores significantly higher than those presented by candidates to bariatric surgery ( $p < 0.05$ ). Though not return to the levels of candidates to bariatric surgery, the scores of the areas "Pain body" and "General health", presented by the groups 2 and 4, as well as those submitted by the groups 2 and 3 for the field "Vitality", suggest a worsening in HRQOL with the passage of time after surgery. The results of this study indicate that people who suffer from morbid obesity have a strong impact on HRQOL and suggest that the implementation of bariatric surgery is able to promote improvements HRQOL important for these people.

**Keywords:** morbid obesity, bariatric surgery, health related quality of life.

### Melhora na qualidade de vida de pacientes submetidos à cirurgia bariátrica

**RESUMO.** O objetivo do presente estudo foi comparar os escores de qualidade de vida relacionada à saúde (QVRS) de candidatos à cirurgia bariátrica (CCB) com os de indivíduos submetidos à cirurgia bariátrica (CB) em diferentes intervalos de tempo pós-cirúrgico. Estudo de corte transversal, realizado nas cidades de Maringá e de Paranavaí - Paraná - Brasil, com 44 CCB e com 63 indivíduos a ela submetidos. O grupo de indivíduos submetidos à CB foi dividido em três (3) subgrupos, de acordo com o tempo decorrido do procedimento cirúrgico (operados em até 18 meses - G2; operados entre 19 e 36 meses - G3 e operados há mais de 36 meses - G4). A QVRS dos pacientes foi avaliada por meio do SF-36 e BAROS. A comparação entre os grupos foi realizada por meio de testes paramétricos e não paramétricos. Avaliou-se também a magnitude dos efeitos da CB pelo tamanho do efeito (TE). A avaliação da QVRS revela diferença entre os grupos: escores inferiores observados no grupo 4, quando comparados aos do grupo 2. O cotejo dos escores médios dos domínios do SF-36 revela que os grupos, formados por pessoas que se submeteram à CB, apresentam escores médios significativamente maiores do que aqueles apresentados pelos CCB ( $p < 0,05$ ). Embora não retornem aos níveis dos CCB, os escores médios dos domínios "Dor corporal" e "Estado geral de saúde", apresentados pelos grupos 2 e 4, assim como os escores apresentados pelos grupos 2 e 3 para o domínio "Vitalidade", sugerem uma piora na QVRS com o decorrer do tempo pós-cirúrgico. Os resultados do presente estudo indicam que pessoas que sofrem com a obesidade mórbida apresentam forte impacto sobre sua QVRS e sugerem que a realização da CB é capaz de promover melhoras importantes na QVRS dessas pessoas.

**Palavras-chave:** obesidade mórbida, cirurgia bariátrica, qualidade de vida relacionada à saúde.

#### Introduction

Assessing quality of life is a complex task, since there is still no fixed definition in the literature of what is 'quality of life.' In order to facilitate their

evaluation, health researchers have used the term 'quality of life related to health' (HRQOL), distinguishing it from the term 'quality of life', with a more general meaning (FONTAINE; BAROFSKY, 2001; KOLOTKIN et al., 2009;

MODI et al., 2010; PEREIRA et al., 2003). Nowadays, two types of instruments have been used to assess HRQOL: generic and specific. The first attempt to assess the HRQOL within the broader aspects of health, whereas the specific include features that are normally affected by a given disease (FITZPATRICK et al., 1992; FLETCHER et al., 1992), for example, the self-esteem obese individuals (KOLOTKIN et al., 2009).

The obesity is a multifactorial disease with increasing prevalence in many countries worldwide (ABUBAKARI et al., 2008; CZERNICHOW et al., 2009; MONTEIRO et al., 2007; OGDEN et al., 2006). It is associated with several chronic diseases and is responsible for increased mortality (PISCHON et al., 2008; WHITLOCK et al., 2009), besides being related to many psychological problems (CHEN et al., 2009; JORM et al., 2003; STRINE et al., 2008) and lower HRQOL (FONTAINE; BAROFISKY, 2001), making it one of the major public health problems worldwide (WHO, 2002). This association tends to worsen with increasing levels of obesity (DIXON et al., 2003; FONTAINE; BAROFISKY, 2001; WHITLOCK et al., 2009), generating greater concern with quality of life of individuals affected by the disease.

Given the need to assess the impact of obesity in people's lives, many instruments, both generic and specific, have been used. Among the generic instruments, we highlight the WHOQOL-100 (WHOQOL, 1995, 1998a), the WHOQOL-Bref (WHOQOL, 1998b) and the Medical Outcomes Study 36-Item Short-Form Health Survey - SF-36 (WARE JR; SHERBOURNE, 1992). Several validated questionnaires have been specifically developed to assess the impact of HRQOL in obese individuals, are the 'Impact of Weight on Quality of Life' (KOLOTKIN et al., 2001), 'Obesity Specific Quality of Life' (LE PEN et al., 1998), the 'Obesity Related Well-being' (MANNUCCI et al., 1999), 'Obesity Adjustment Survey' (BUTLER et al., 1999) and 'Health Related Quality of Life' (MATHIAS et al., 1994, 1997). With the growing number of bariatric surgeries in several countries and faced with the need to evaluate their effects on HRQOL, the Bariatric Analysis and Reporting Outcome System (BAROS) was shown to be an important instrument for such population. This questionnaire measures the patient's well being regarding to weight loss, medical conditions and HRQOL after bariatric surgery. For the evaluation of changes of HRQOL is used the instrument developed by Oria and Moorehead (1998). This instrument have been considering the most important tool for assessment

of bariatric surgery and the changes promoted by it (KHAWALI et al., 2012; TAYYEM et al., 2011).

Previous studies have attempted to clarify the impact of obesity and the effects of bariatric surgery on quality of life (FONTAINE; BAROFISKY, 2001; KOLOTKIN et al., 2009; LIER et al., 2011; SWALLEN et al., 2005). However, few studies have been conducted with this purpose in Brazil (KHAWALI et al., 2012). Therefore, this study aimed to compare HRQOL scores assessed by SF-36 of candidates for bariatric surgery with patients who underwent surgery. Also, to compare HRQOL scores assessed by BAROS on patients that underwent bariatric surgery between different time intervals after surgery.

## Material and methods

A cross-sectional study with 127 volunteers recruited in the region of Maringá, Paraná State, Brazil was conducted. Candidates were recruited if they met the following inclusion criteria: 1) have undergone bariatric surgery or have been waiting for its realization by the Health Public System, 2) 18 years of age and older, and 3) have consented to participate. The study included patients living in Maringá and region within a radius of 85 km. The procedures for collection, analysis and presentation of results used in this study were approved by the Standing Committee on Ethics in Human Research of the State University of Maringá (Register Number 318/2007) and all participants signed an informed consent.

## Sample

Study participants included 64 candidates for bariatric surgery (group 1) and 63 patients that underwent the techniques of mixed bariatric surgery. In order to compare the results of bariatric surgery on psychological factors at different times after surgery, these patients were divided into three subgroups: group 2 (G2), consisted of 25 people who underwent surgery for weight loss for no more than 18 months (mean  $9.8 \pm 4.4$  months), group 3 (G3), consisted of 17 people who had surgery for at least 19 and maximum 36 months (mean  $25.2 \pm 5.1$  months) and group 4 (G4) consisted of 21 people operated for more than 36 months (mean of  $75.1 \pm 31.3$  months).

## Evaluations

These instruments performed the quality of life assessments: Bariatric Analysis and Reporting Outcome System (BAROS) (ORIA; MOOREHEAD, 1998) and Medical Outcomes Study 36 - Item Short Form Health Survey - (SF-36) (WARE JR;

SHERBOURNE, 1991). These questionnaires have easy application and provide considerable parameters that have to be assessed after bariatric surgery. All the measurements and evaluations were made in State University of Maringá - Brazil and Association of obese and operated post bariatric surgery of Paranavaí in the period June 2009 to January 2010. All the instruments were applied by professionals previously trained.

#### **Bariatric Analysis and Reporting Outcome System (BAROS)**

The BAROS is a questionnaire developed specifically for assessing the quality of life of patients who underwent bariatric surgery (ORIA; MOOREHEAD, 1998). This questionnaire evaluates many aspects of life (weight loss, changes in medical conditions and evaluation of changes of 5 scales of quality of life). Weight loss is measured in percentage, while the medical conditions refer to improvement of obesity-associated co-morbidities (hypertension, diabetes, sleep apnea). The measurement of quality of life is held by the account of patients in relation to improvement or worsening in five scales (general health, welfare, physical activity, work capacity and sexual interest). This part of the instrument is also known as 'Moorehead-Ardelt Quality of Life Questionnaire' and can be used independently or incorporated into the BAROS (MOOREHEAD et al., 2003). The average time spent to answer this questionnaire was approximately 2 minutes. The questionnaire defines five outcome scores (failure, fair, good, very good and excellent), based in a scoring table proposed by Oria and Moorehead (1998).

#### **Medical Outcomes Study 36 - Item Short Form Health Survey (SF-36)**

The SF - 36 is a generic instrument for assessing HRQOL, comprising 36 items divided into eight areas of functioning (physical capacity, limitations due to physical health problems, bodily pain, general health perception, vitality, social functioning, limitations due emotional problems and mental health). A score was generated for each of the areas, which can range from zero to 100. The closer to zero is the domain score, the more compromised quality of life in that area and the closer to 100, the lower the commitment (WARE JR.; SHERBOURNE, 1991). The SF-36 was previously validated in Brazil (CICONELLI et al., 1999). This questionnaire was answered by all the groups

(operated and non-operated). The time spent to answer the questionnaire was on average 7 minutes.

#### **Statistical analysis**

The data were organized in Microsoft Excel 2007 spreadsheet and analyzed using the statistical package 'Statistical Package for Social Sciences' – SPSS 14.0. The 'Shapiro-Wilk' test verified the normality of data. The descriptive analysis included measures of central tendency, dispersion, amplitude (mean, standard deviation, minimum and maximum), absolute and relative frequencies. The statistical inference was performed by parametric and nonparametric tests, and comparisons between groups performed by the test of One Way Analysis of Variance (ANOVA) or 'Kruskal-Wallis' test. In the event of an indication for the test of difference among the groups, was realized the 'Bonferroni's' Post-Hoc test or 'Mann-Whitney' U, to check to which groups had such a difference. Statistical significance was pre-set at  $p < 0.05$ . This test was used to verify possible differences in questionnaires scores between groups.

The magnitude of the effects of bariatric surgery in score of HRQOL was also evaluated by the effect size (ES) calculated according to the following example:  $ES = (\text{Average } (G1) - \text{Mean } (G2)) / \text{standard deviation } (G1)$  for each of the groups (G2, G3 and G4). In order to avoid the effect sizes based in small samples, was applied to the results given by the correction factor:  $CF = 1 - (3 / (4m - 9))^{-1}$ , where CF is the correction factor in the difference between sample sizes G2, G1 and the constant number 2, in other words,  $m = \text{sample size of the } G2 - G1 \text{ sample size} - 2$ . The ES were evaluated according to criteria proposed by Cohen (1988): trivial (0 to < 0.2), small (0.2 to < 0.5), moderate (0.5 to < 0.8) and large ( $\geq 0.8$ ).

#### **Results**

Table 1 shows the sociodemographics and anthropometrics characteristics of candidates for bariatric surgery and patients operated in different surgical intervals.

Table 2 presents the mean scores of each of the scales of the Moorehead-Ardelt Quality of Life Questionnaire and the average total score, followed by their standard deviations ( $\pm$  SD) of the Bariatric Analysis and Reporting Outcome System (BAROS) of each formed groups of patients undergoing bariatric surgery.

**Table 1.** Sociodemographic information of patients waiting for bariatric surgery and patients operated in different intervals post surgery.

	Group 1 (n = 64)		Group 2 (n = 25)		Group 3 (n = 17)		Group 4 (n = 21)	
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range
Age (years)	37.7 (11.4)	(20 - 64)	42 (12.3)	(24-60)	44.8 (6.4)	(31-54)	47.9 (10)	(35-78)
Gender (number, %)								
Women	81.80%		88%		88.20%		95.20%	
Men	18.20%		12%		11.20%		4.80%	
Preoperative Weight (kg)	120 (22.9)	(75.8-166.9)	118.5(21.1)	(89-180)	127.5 (27)	(85-189)	121.7(16.7)	(98-158)
Preoperative BMI (kg m <sup>-2</sup> )	45.6 (7.11)	(32 - 61.7)	45.9(6.2)	(35.6-56.7)	51.4 (10.5)	(37.8-80.7)	46.8(6.5)	(36.9-61.7)

BMI= Body Mass Index.

**Table 2.** Comparison of quality of life scores assessed by the 'Moorehead-Ardelt Quality of Life Questionnaire' and the 'BAROS' in patients undergoing bariatric surgery at different time intervals.

Quality of life	Group 2 (n = 25)	Group 3 (n = 17)	Group 4 (n = 21)
Self-Esteem	0.94 (±0.17)	0.88 (±0.22)	0.90 (±0.21)
Physical	0.28 (±0.18) <sup>D</sup>	0.26 (±0.21)	0.16 (±0.17) <sup>B</sup>
Social	0.29 (±0.20)	0.34 (±0.20)	0.24 (±0.21)
Work	0.39 (±0.16)	0.29 (±0.27)	0.33 (±0.18)
Sexual	0.21 (±0.25)	0.22 (±0.26)	0.14 (±0.26)
Total Score Moorehead-Ardelt	2.11 (±0.64)	2.0 (±0.81)	1.76 (±0.53)
Total Score BAROS	5.32 (±1.23) <sup>D</sup>	4.69 (±1.26)	4.12 (±1.26) <sup>B</sup>

B = significant difference compared to group 2, C = significant difference compared to group 3; D = significant difference compared to group 4.

The time of surgery did not affect the results of the Moorehead-Ardelt scales, as well as its total score. The exception is the physical scale, in which we observed a significant difference between groups 2 and 4; this result suggests a decline in quality of life related to physical appearance, from G2 to G4. When evaluating the quality of life by BAROS, we observed the same trend observed in the scale of the Moorehead-Ardelt physics: there is difference between the two groups, with lower scores observed in group 4 compared to group 2.

The results suggest that the surgical procedure has been able to promote significant improvements in quality of life of the patients. However, there was a decrease (not significant) in the distribution of people classified with quality of life Excellent / Very Good and increased (not

significant) for those classified as good quality of life, according to data obtained from patients undergoing surgery for different intervals of time, suggesting a decrease in quality of life health-related G2 G4.

Table 3 shows the comparison of scores of quality of life related to health of the SF-36, among the candidates for bariatric surgery and patients who underwent surgery at different time intervals.

The results presented indicate that the domains 'by limiting physical' and 'body pain' are the most affected in people with obesity grade II and III, and suggest, moreover, that bariatric surgery provides significant improvement in the quality of life related to health for people who go through surgery for weight loss.

The comparison of mean scores of the domains of the Medical Outcomes Study 36-Item Short Form Health Survey - SF-36 between groups reveals that those who underwent bariatric surgery have significantly higher average scores than those who are candidates for surgery ( $p < 0.05$ ).

Though the levels of candidates for bariatric surgery did not decrease, the mean scores of domains 'body pain' and 'General health', presented by groups 2 and 4, as well as those submitted by groups 2 and 3 for the domain 'vitality' suggest a deterioration in quality of life over time after surgery.

**Table 3.** Comparison of scores of quality of life related to health of the SF-36 among candidates for bariatric surgery and patients who underwent surgery at different time intervals.

Domains of SF-36	Group 1 (n = 64)	Group 2 (n = 25)	Group 3 (n = 17)	Group 4 (n = 21)
Functional Capacity	47.5 (±27.4) <sup>B,C,D</sup>	82.6 (±21.7) <sup>A</sup>	74.1 (±32.7) <sup>A</sup>	80.0 (±19.3) <sup>A</sup>
Effect Size	-	1.32	0.99	1.22
Physical Aspects	31.8 (±35.5) <sup>B,C,D</sup>	84.0 (±28.8) <sup>A</sup>	88.2 (±25.2) <sup>A</sup>	85.0 (±24.9) <sup>A</sup>
Effect Size	-	1.52	1.63	1.54
Pain	32.5 (±23.8) <sup>B,C,D</sup>	72.2 (±29.0) <sup>A,D</sup>	63.8 (±33.0) <sup>A</sup>	58.4 (±27.6) <sup>A,B</sup>
Effect Size	-	1.72	1.35	1.12
General State of Health	47.1 (±25.9) <sup>B,C,D</sup>	87.6 (±17.5) <sup>A,D</sup>	84.2 (±17.9) <sup>A</sup>	79.7 (±17.7) <sup>A,B</sup>
Effect Size	-	1.61	1.47	1.29
Vitality	44.0 (±26.4) <sup>B,C,D</sup>	78.2 (±20.5) <sup>A,C</sup>	64.7 (±19.6) <sup>A,B</sup>	68.3 (±17.3) <sup>A</sup>
Effect Size	-	1.34	0.80	0.95
Social Aspects	57.5 (±32.9) <sup>B,C,D</sup>	86.5 (±26.0) <sup>A</sup>	85.4 (±19.4) <sup>A</sup>	80.6 (±24.5) <sup>A</sup>
Effect Size	-	0.91	0.87	0.72
Emotional Aspects	41.7 (±33.8) <sup>B,C,D</sup>	84.0 (±29.1) <sup>A</sup>	66.7 (±45.6) <sup>A</sup>	68.3 (±39.7) <sup>A</sup>
Effect Size	-	1.29	0.76	0.81
Mental Health	51.3 (±26.3) <sup>B,C,D</sup>	76.0 (±21.8) <sup>A</sup>	67.8 (±23.3) <sup>A</sup>	69.4 (±20.7) <sup>A</sup>

A = significant difference compared to group 1, B = significant difference compared to group 2, C = significant difference compared to group 3, D = significant difference compared to group 4.

## Discussion

In relation to the results of SF-36, this study showed a strong impact of morbid obesity on quality of life related to health and became even more worrisome when we observed that the domain scores for Role Physical Limitation, Body Pain and Limitation due to Emotional Aspects are worse than those of patients with chronic renal failure (PEREIRA et al., 2003). The domains Body Pain, General Health, Vitality and Mental Health, in turn, are worse than those of patients with lung cancer (FRANCESCHINI et al., 2008) and worse in all areas when compared to patients who underwent cancer surgery lung with intent to cure (MYRDAL et al., 2003) and the Mexican American elderly (GRAHAM et al., 2007). The candidates for surgical weight loss in this study showed that the SF-36 score showed similar results in regards to Functional Capacity, Limitation on Physical Aspects, General Health, Vitality and Social Aspects of Limitation in the fields below and Bodily Pain, limitations due to Emotional Aspects and Mental Health compared to those found in other studies (ALGER-MAYER et al., 2008; BURGMER et al., 2007; MASHEB et al., 2007). On the other hand, the results of our study showed lower scores in all domains of the SF-36 compared to a Dutch study with patients undergoing bariatric surgery (HÖRCHNER; TUINEBREIJER, 1999).

Although morbid obesity causes a strong impact on quality of life related to health, the results of this study suggest important improvements in HRQL after bariatric surgery, confirming results found in other studies (BURGMER et al., 2007; KARLSSON et al., 2007; LIER et al., 2011), although these studies are looking ahead, while this is a cross sectional study. The trend of improvement in HRQOL occur more sharply in the first year after surgery, which coincides with a dramatic weight loss (SJÖSTRÖM et al., 2004), can be observed in all studies reviewed.

The fact that we verified the declining trend of the scores of some BAROS scales and the SF-36 is considered normal, because, according to Karlsson et al. (2007), improvements in quality of life occur concurrently with weight loss (in the first 12 months after surgery). The findings of these authors show also that in the period 1-6 years after surgery, there is a decline in quality of life, as there is a small weight gain. Importantly, the majority of patients in our study were in that postoperative period.

Although there are few studies in Brazil that focused on the impact of morbid obesity and the effects caused by bariatric surgery on HRQOL. The

present study was concerned to contribute to a better understanding of these issues. However, it is important to note that some limitations, mainly related to research design, which does not allow the establishment of cause and effect. Thus, it is not possible to state that patients participating in this study showed improvements in HRQOL after bariatric surgery. Therefore, the results, differences between groups and calculation of TE, in each of the questionnaires, needs to be interpreted with caution, since we assumed that the groups formed by subjects who have had bariatric surgery (G2, G3 and G4) have shown, before passing through the surgical process, similar scores compared to those found in the surgical candidates group (G1). Thus, our results suggest that bariatric surgery has provided improvements in HRQOL, given that numerous studies point to this direction (KARLSSON et al., 2007; MASHEB et al., 2007).

## Conclusion

In conclusion, the results of this study indicate that morbid obesity has a strong impact on HRQOL and suggest that bariatric surgery is able to promote significant improvements in quality of life in obese people, especially in the first 18 months. It is suggested that further research be conducted to confirm such results in our country, and should preferably accompany the pre-surgical patients to a long postoperative period. Moreover, the inclusion of multi teams in monitoring patients should also be tested as they may maximize the outcome of the surgery.

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