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Does the Attention Deficit Hyperactivity Disorder interfere with bariatric surgery results?

O Transtorno de Déficit de Atenção e Hiperatividade interfere nos resultados da cirurgia bariátrica?

Doglas Gobbi Marchesi, TCBC-ES[1]; Jovana Gobbi Marchesi Ciriaco[2]; Gustavo Peixoto Soares Miguel, TCBC-ES[1]; Gustavo Adolfo Pavan Batista, ACBC-ES[1]; Camila Pereira Cabral, ACBC-ES[1]; Larissa Carvalho Fraga[1].

A B S T R A C T

Objective: *to analyze possible negative effects of Attention Deficit Hyperactivity Disorder (ADHD) on the success of bariatric surgery.* **Methods**: *we evaluated forty patients undergoing bariatric surgery and with regular post-operative follow-up of at least one year. To all, we applied the questionnaire advocated in the fourth edition of the Diagnostic and Statistical Manual (DSM-IV) of the American Psychiatric Association for ADHD, as well as analyzed their postoperative data.* **Results**: *fifteen (38%) patients presented a positive questionnaire for ADHD. Patients with ADHD presented higher BMI than patients without the disorder (45.8 vs. 40.9 kg/m², p=0.017), and the difference remained in all postoperative stages. There was no statistically significant difference in surgery success (33.3% x 66.7%, p=0.505) or in BMI reduction (30.71% x 31.88%, p=0.671) one year after the procedure.* **Conclusion**: *ADHD patients have a higher BMI. However, the presence of ADHD does not influence the success of bariatric surgery and the reduction of BMI.*

Keywords: *Bariatric surgery. Obesity. Attention Deficit Disorder with Hyperactivity.*

INTRODUCTION

Obesity is a chronic disease that affects an increasing number of individuals worldwide[1,2]. There are estimates of overweight prevalence of 50.6%[3]. It is associated with a significant increase in morbidity and mortality and raises the incidence of several diseases, among them hypertension, diabetes mellitus, metabolic syndrome[4-7].

Bariatric surgery is a definitive treatment for morbid obesity and presents good long-term results, with loss of up to 70% excess weight[8]. The most commonly performed technique in Brazil and the world is the Roux-en-Y Gastric Bypass (RYGB).

Despite the great efficiency of bariatric surgery, about 10 to 20% of patients submitted to it regain weight after the procedure[9,10]. Both the weight regain and the procedure failure are due to multiple factors. Psychiatric disorders such as anxiety, depression and attention-deficit / hyperactivity disorder (ADHD) are listed among them[9,10].

ADHD is a neurological disorder of genetic causes[11,12], present in about 5% of the adult population[13,14]. Symptoms revolve around the triad of inattention, restlessness, and impulsivity of varying degrees[15]. The etiology of ADHD is still unknown, but recent studies suggest alterations in the reward mechanism, also related to eating disorders and obesity[16]. There is evidence of increased ADHD incidence among obese and of greater difficulty in adherence to treatments and weight control[17]. However, few studies have evaluated the prevalence of ADHD in candidates for bariatric surgery and no study has evaluated its possible effects on the success of this procedure.

The purpose of this study was to evaluate the effect of the presence of ADHD on the results of bariatric surgery.

METHODS

We conducted a retrospective, observational study under the approval of the Ethics in Research

1 - Federal University of Espírito Santo, Department of Surgical Clinics, Vitória, Espírito Santo State, Brazil. 2 - Federal University of Espírito Santo, Department of Internal Medicine, Vitória Espírito Santo State, Brazil.

Committee (CEP) of the Federal University of Espírito Santo (UFES) (CAAE: 05524512.3.0000.5060). We analyzed the specific charts of the bariatric surgery program of patients undergoing bariatric surgery from November 2011 to May 2013, according to the inclusion and exclusion criteria mentioned below.

After the selection of the volunteers, we obtained a list of 122 patients, who were invited to attend the Bariatric Surgery Outpatient Clinic of the Cassiano Antônio de Moraes University Hospital (HUCAM), where they signed the Informed Consent Form.

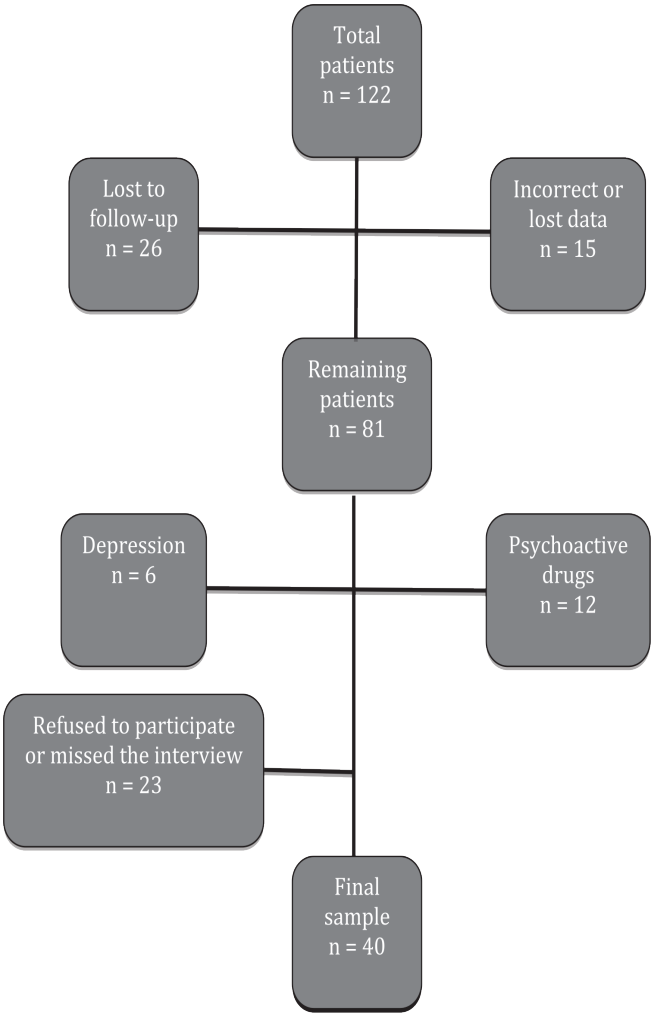
The inclusion criteria were patients submitted to the RYGB, respecting the indications of bariatric surgery according to the guideline of the National Institute of Health (NIH)[6], postoperative time greater than one year,and regular follow-up with the multidisciplinary team.

Exclusion criteria were diagnosis of neurological and/or psychiatric diseases and use of psychoactive medications, to avoid confusion bias due to symptoms' masking.

After this initial screening, we included 40 patients for data evaluation, according to the algorithm shown in figure 1.

After data collection, we performed a descriptive analysis with mean, standard deviation, median, absolute frequency and percentage, as well as maximum and minimum values, and drew up a profile of the cohort, recording data such as schooling, marital status, profession, age, ethnicity and comorbidities, seenin table 1.

Figure 1. *Algorithm of patient selection.*



n= absolute number of patients.

Table 1. *Characterization of the sample.*

Variables	Results
Gender	Male = 8% Female = 93%
Marital Status	Married = 68% Not married = 32%
Profession	With profession = 70% No occupation = 30%
Age	Average ± SD = 48.3 ± 10.2 Median = 50
Weight	Average ± SD = 110.9 ± 19.2 Median = 109.5
BMI	Average ± SD = 43.9 ± 6.1 Median = 42.6
Ethnicity	White = 25% Brown = 43% Black = 33%
Schooling	Incomplete Junior high= 26% Complete Junior high= 11% Complete High school = 34% Incomplete High school= 11% Incomplete College = 5% Complete College= 13%
ADHD	Positive = 38% Negative = 62%
Type of ADHD	Pure attention deficit = 27% Pure hyperactivity = 27% Mixed = 56%

Table 2. *Relationship between number of Comorbidities and ADHD.*

		Number of Comorbidities			
ADHD	n	Median	Average	Standard deviation	p-value*
Yes	15	4.00	3.13	1.25	0.075
No	25	2.00	2.32	2.32	

** Mann-Whitney Test.*

We followed the patients at the institution's bariatric surgery outpatient clinic with programmed returns for three months, six months and one year. We evaluated variables such as weight, body mass index (BMI), percentage of BMI loss, and success of bariatric surgery (defined as loss of 50% or more of excess weight, considering a BMI of 25[8,18]). In addition, researchers previously trained by a neurologist applied the Adult-Self Report Scale (ASRS) structured questionnaire[11], for the diagnosis of ADHD. The questionnaire has 18 questions, the answers of which are divided into five groups (never, rarely, sometimes, often, very often), and grouped in part A (nineattention deficit questions) and part B (nine hyperactivity questions). For ADHD diagnosis, we used the criteria of the fourth American Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)[19] of the American Psychiatry Society, and deemed present when six or more responses were positive in part A or part B, or both, not considering the sum of the positive answers in the two parts. We divided the patients into two groups: with ADHD and without ADHD.

In the comparative analysis, for categorical variables, the statistical technique used was the chi-square test. For metric variables between two groups, we used the t-test for mean (parametric) and the Mann-Whitney test (non-parametric) for the comparisons. Statistical significance was set at $p < 0.05$.

RESULTS

Of the 40 patients evaluated in the one-year period, 24 (60%) were successful. The ADHD group showed a higher average of comorbidities, but there was no statistically significant difference (Table 2).

We observed a statistically significant difference in BMI at all times of follow-up. (Table 3).

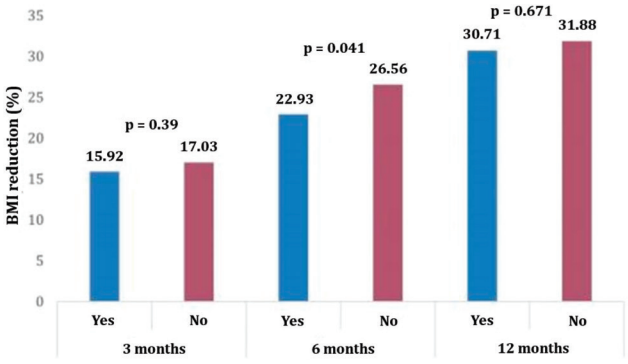
When comparing the percentage of BMI loss, ADHD individuals had a statistically significant difference in six months; however, this difference did not persist after 12 months (Figure 2).

Both in the absolute weight loss assessment and in the comparative analysis of surgery success, there was no statistically significant difference between the groups with and without ADHD (Table 4).

DISCUSSION

The relationship between ADHD and obesity became clear in recent years, both because of similar etiopathogeneses[16] and because of the difficulty in adhering to treatments and weight control[17]. Concomitantly, despite the efficiency of bariatric surgery, a not insignificant portion of the patients, up to 20%, presented weight regain and the associated relapse of some comorbidities[9,10]. Faced with this situation, review studies performed to evaluate psychosocial predictors of failure in bariatric surgery have shown that the vast majority of studies are conflicting and inconclusive[20, 21]. This result is

Figure 2. *Percentage reduction of BMI.*



Yes= with ADHD; No= no ADHD.

Table 3. *BMIaccording to ADHD.*

Variables	ADHD	n	Median	Average	Standard deviation	p-value*
BMI (pre-op)	Yes	15	45.80	47.09	6.75	0.017
	No	25	40.90	42.03	4.98	
BMI (3 months)	Yes	13	37.80	40.15	6.01	0.007
	No	24	32.60	34.82	4.61	
BMI (6 months)	Yes	11	34.50	36.42	5.51	0.003
	No	23	29.50	30.98	4.07	
BMI (12 months)	Yes	15	31.00	32.49	6.16	0.022
	No	25	27.10	28.52	3.85	

** Mann-Whitney Test.*

due in part to the fact that manybariatric surgery teamsautomaticallyconsider patients diagnosed with psychiatric disorders as ineligible for the procedure[20].

The prevalence of 38% of ADHD found in our sample was in line with the studies that evaluated obese patients in general[17,22,23] and with a value far above that found in patients in bariatric surgery programming[24,25]. Studies evaluating the obese population in general found a prevalence of ADHD between 27.4 and 32.2%,[17,22,23] but one of the studies identified a higher incidence in individuals with BMI=40kg/m^2 [22]. Two of these studies used as a diagnostic method a semi-structured interview and psychological follow-up[17,22]. Pagoto *et al*.[23] used the same ASRS scale that we used in our study, but considered as positive the patients that met four criteria only. Thus, these studies opted for greater sensitivity in diagnosis.

On the other hand, studies in groups of patients in preoperative bariatric surgery showed prevalence between 10.2 and 12.1%[24,25]. However, Gruss *et al*.[24] considered positive only those patients who fulfilled criteria in two scales. When evaluating only the ASRS use, they found a prevalence of 29.3%, which is the closest to our result. We also note that these two studies used the ASRS scale with the patient reading and completing it alone, while in our study the researchers/interviewers conducted the questionnaire, as previously trained. We consider this adaptation necessary since we work with a portion of the population of low socioeconomic level, which would compromise the understanding of the questionnaire and its due fulfillment. In addition, we increased the accuracy of the diagnosis and avoided false-negative results.

Regarding comorbidities, we observing no difference between the patients with ADHD and the group without the disorder. We found no articles in the literature comparing these variables. We believe that the obesity degree directly influences the number of comorbidities[6], without direct influence of ADHD.

We observed that the BMI of patients with ADHD were higher than of those without the diagnosis. An American epidemiological study of 2013 with 34,653 people directly interviewed by psychiatrists confirmed that there was a significant difference in both weight and BMI in ADHD individuals[26], which corroborates our results.

Our success rate with surgery was 60% after one year. However, some factors may have negatively influenced this result. The maximum weight loss can occur up to the second postoperative year[27]. Our serieshad a large proportion of blacks, who display less weight loss in bariatric surgery[28]. Finally, weight loss after bariatric surgery is usually lower in superobese patients and in diabetics[29,30]. Thus, one expects that in a sample with a high percentage of diabetics and

Table 4. *Weight loss according to presence of ADHD.*

			BMI percentage loss (%)			
Postoperative period	ADHD	n	Median	Average	Standard deviation	p-value
3 months	Yes	13	16.56	15.92	3.40	0.390
	No	24	16.71	17.03	3.88	
6 months	Yes	11	23.21	22.93	4.73	0.041
	No	23	26.57	26.56	4.61	
12 months	Yes	15	31.40	30.71	10.04	0.671
	No	25	31.88	31.88	7.17	
			Weight loss in 12 months (Kg)			
ADHD		n	Median	Average	Standard deviation	p-value
Yes		15	33.40	37.93	15.78	0.586
No		25	33.50	33.23	9.38	
			Success in 12 months			
			Yes		No	
ADHD			n	%	n	%	p-value
Yes			8	33.3	7	43.8	0.505
No			16	66.7	9	56.2	

Success= loss greater than 50% of excess weight. T test for means to BMI, Mann-Whitney test for weight and Chi-square test for success.

superobese like ours, with 37.5% diabetics and 15% superobese, the percentage of excess weight loss is lower than the general average. Several studies analyzed this fact, such as the one from Schauer *et al*.[31], who had a sample of 275 patients, 6.5% of them diabetic, who presented a mean weight loss of 68.8%[31]. Wittgrove *et al*.[30] found 17% of diabetics and observed 80% weight loss in 18 months, but considering only the diabetic population the value was approximately 70%.

When assessing ADHD with the evolution of patients after Gastric Bypass, we found no significant differences between the groups, leading to the belief that ADHD did not influence the procedure success. Although we found a single difference in the percentage of BMI loss at six months, this trend did not persist in the 12-month period.

Even with limited sample size, lacking sufficient external validity to prove that ADHD would affect surgery success, the data are relevant because there is a huge shortage of such studies. It is known that individuals with ADHD have a higher mean BMI and even less weight loss with clinical obesity treatment[17]. Concurrently, the higher the BMI, the greater the surgical morbidity and mortality[32]. Thus, it is expected that the treatment of such patients since the preoperative period allows better weight loss before the procedure and provides reduction of surgical complications.

We conclude from our study that patients with ADHD have a higher BMI on average. However, bariatric surgery success of was not affected by the disease. This study has limitations on the sample size of and may not have statistical strength for definitive conclusions. However, these are preliminary results and further prospective studies are needed, with larger samples, longer follow-up times and multivariate analysis of the different confounding factors.

R E S U M O

Objetivos: analisar possíveis efeitos negativos do Transtorno do Déficit de Atenção e Hiperatividade (TDAH) no sucesso da cirurgia bariátrica. **Métodos:** foram avaliados 40 pacientes submetidos à cirurgia bariátrica e com acompanhamento pós-operatório regular mínimo de um ano. Todos foram submetidos ao questionário preconizado na quarta edição do *Diagnostic and Statistical Manual* (DSM-IV) da Associação Americana de Psiquiatria para TDAH e analisados os dados pós operatórios. **Resultados***:* quinze (38%) pacientes apresentaram questionário positivo para TDAH. Os pacientes com TDAH apresentaram IMC maior do que os pacientes sem o transtorno (45,8x40,9 Kg/m^2; p=0,017), mantendo-se a diferença em todas as etapas do pós-operatório. Não foi encontrada diferença estatisticamente significativa no sucesso da cirurgia (33,3% x 66,7%; p=0,505), e na redução do IMC (30,71% x 31,88%; p=0,671) após um ano do procedimento. **Conclusão***:* pacientes com TDAH apresentam maior IMC, entretanto, a presença do TDAH não apresenta influência no sucesso da cirurgia bariátrica e na redução do IMC.

Descritores: Cirurgia Bariátrica. Obesidade. Transtorno do Déficit de Atenção com Hiperatividade.

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Mailing address:
Doglas Gobbi Marchesi
E-mail: doglas.marchesi@gmail.com
doglas.marchesi@ebserh.gov.br