

The Impact of Depressive Symptoms on Obesity: Preliminary Data on a Group of Patients Before Bariatric Surgery

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We have no potential conflict of interest to report



Aim of the Study

To investigate the impact of depression on obesity severity and on autonomic nervous system functioning



We are working on the evaluation and promotion of psychological and physiological quality of life of patients with severe obesity before and after bariatric surgery



Patients and Methods

- Ninety-five patients with obesity were recruited to the Centro de Pesquisas Clínicas Multiusuário (CePeM) at the Pedro Ernesto University Hospital (HUPE) in Rio de Janeiro
- During an outpatient visit before bariatric surgery, patients filled out **the Hospital Depression Scales questionnaire (HAD) and the Beck Depression Inventory (BDI)** for screening of depressive symptoms. Patients also filled out **the SF-36** to measure their perception of quality of life
- Then, the **LF, HF, RSA, and the RMSSD components of HRV** were measured using the Faros 360° EKG Holter (Bittium Corporation) in a 5-lead configuration with a sampling rate of 1000 Hz
- Patients were fasting for at least two hours, were lying on the examination table, and were required to rest for 5 minutes before beginning the 15-minutes ECG recording
- Lastly, the HRV data were edited and analyzed with CardioEdit (2007), CardioBatch Plus software (2016), and Kubios software (Tarvainen et al., 2014)

Demographic Characteristics

N	95
Sex	89.5% female
BMI	45.78±5.78kg/m ²

Results (1/4): Associations between depression and parasympathetic functioning

Table 1. Correlation Analysis

	HF	RSA	RMSSD	HAD	BDI
LF	.784**	.775**	.737**	-.310**	-.325**
HF		.958**	.829**	-.403**	-.453**
RSA			.801**	-.425**	-.455**
RMSSD				-.358**	-.413**
HAD					.698**

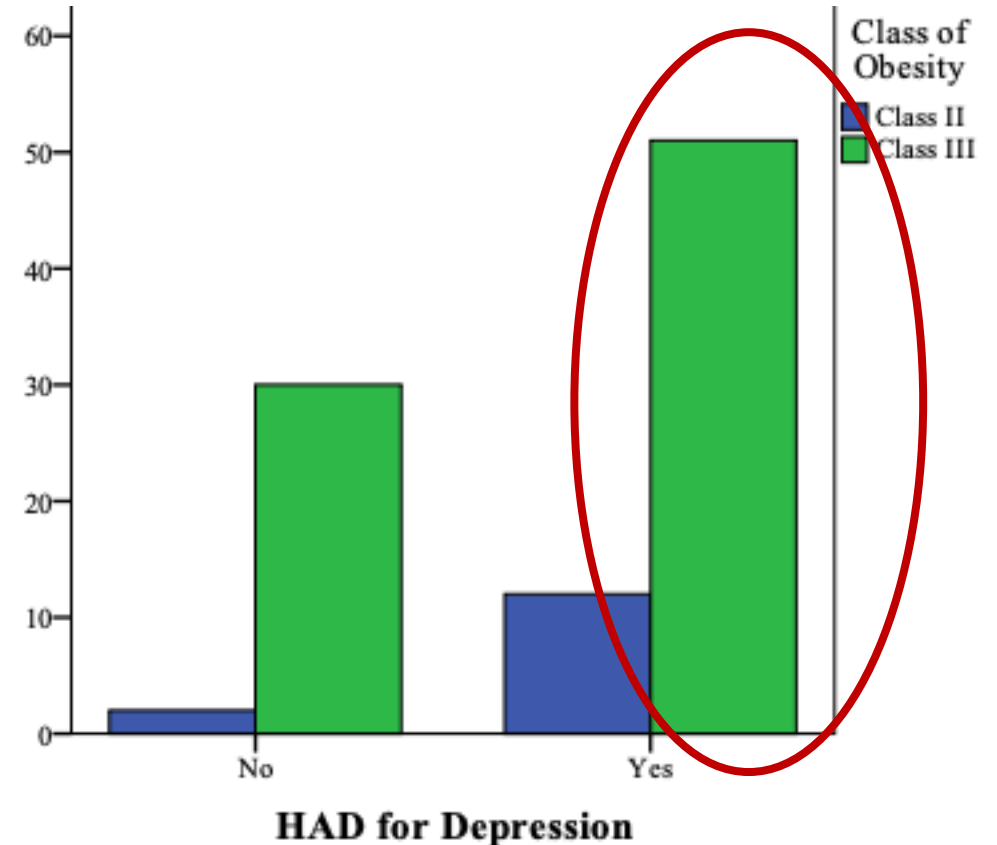
Table 1. Correlation analysis between depression and parasympathetic activity

**Correlation is significant at the 0.01 level (two-tailed); *Correlation is significant at the 0.05 level (two-tailed); LF, Low-Frequency Heart Rate Variability; HF, High-Frequency Heart rate Variability; RSA, Respiratory Sinus Arrhythmia; RMSSD, root mean square of successive Differences; HAD, Hospital Depression Scales; BDI, Beck Depression Inventory.

Results (2/4): The impact of depression on different class of obesity

Table 2. The impact of depression on different class of obesity

	Class of Obesity - Pre-Surgery		Total
	35.0-39.9 (Obesity Class II)	=/>40 (Obesity Class III)	
NO DEPRESSION (HAD)	2 (6.30%)	30 (93.8%)	32 (100%)
YES DEPRESSION (HAD)	12 (19%)	51 (81%)	63 (100%)
TOTAL	14 (14.70%)	81 (85.30%)	95 (100%)



Results (3/4): Relative Risk and Odd Ratio

Table 3. Relative Risk and Odd Ratio

	Value	95% Confidence Interval	
		Lower	Upper
Odd ratio for HAD Depression (0 / 1) (No / Yes)	0.283	0.059	1.353
For the cohort Obesity Class II (BMI: 35-39.9)	0.328	0.078	1.378
For the cohort Obesity Class III (BMI: \geq 40)	1.158	0.997	1.345

- Patients with obesity class III have 16% higher depressive risk than patients with obesity class II
- The odd ratio of symptoms of depression in patients with obesity class II vs patients with obesity class III is 0.283 (95% CI, 0.059 to 1.353), indicating a lower risk of developing depressive symptoms for patients with obesity class II compared to patients with obesity class III

Results (4/4): Depression after three months from bariatric surgery

Table 4. Paired samples test

Paired samples test	Mean standard error	95% difference confidence interval		t	gl	Sign. (two-tailed)
		Inferior	Superior			
Pre-surgery - Post 3 months						
BMI	0.523	4.936	7.03	11.428	61	0,000
HF	0.121	-0.872	-0.385	-5.166	61	0,000
RSA	0.117	-0.816	-0.348	-4.981	61	0,000
RMSSD	2.277	-16.338	-7.232	-5.176	61	0,000
LF	0.132	-0.673	0.143	-3.083	61	0.003
HAD_depression	0.435	2.015	3.758	6.625	61	0,000
BDI	1.046	2.858	7.044	4.73	61	0,000
SF-36	2.071	-20.701	-12.416	-7.994	61	0,000
HR	1.273	1.681	6.775	3.319	61	0.002

Table 5. M and DS before and after 3 months from bariatric surgery

N= 62	M	SD	Mean standard error
BMI_pre	46.18	6.08	0.77
BMI_3m	40.19	6.42	0.81
HF_pre	5.74	1.01	0.13
HF_3m	6.37	0.85	0.11
RSA_pre	5.5	0.98	0.12
RSA_3m	6.08	0.86	0.11
RMSSD_pre	37.68	18.1	2.29
RMSSD_3m	49.47	20.55	2.61
LF_pre	4.06	0.97	0.12
LF_3m	4.47	0.92	0.11
HAD_depression_pre	7.87	3.49	0.44
HAD_depression_3m	4.98	2.63	0.33
BDI_pre	17.29	7.46	0.94
BDI_3m	12.33	6.66	0.84
SF-36_pre (%)	47.87	17.93	2.27
SF-36_3m (%)	64.43	16.45	2.08
HR_pre	67.5	9.3	1.18
HR_3m	63.27	10.31	1.31

Discussion and Conclusion

- Our preliminary results are in line with the literature and show that severe obesity is associated with greater depressive symptoms (Abiles et al, 2010; Karmali et al., 2013; Fu et al., 2022) (Relative Risk: 16%) and a withdrawal of parasympathetic activity (Hage et al., 2017c; Koenig et al., 2016; Rottenberg, 2007; Rottenberg et al., 2005; Rottenberg et al., 2002)
- Also, bariatric surgery after three months has a great benefit for our patients both from a psychological point of view, improving perceived quality of life and reducing depressive symptoms, and from a physiological point of view, improving parasympathetic activity
- **Limitations:** the small sample size, the lack of homogeneity of groups considering gender and obesity severity, and is still a preliminary study that highlights the importance of treating depression in our patients with obesity by educating them about quality of life
- The multidisciplinary equipe should ensure these results over time, and we are trying to do that with this clinical research



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