

# Obese Patients in Medical Intensive Care Unit: Influence of Counseling on Weight Loss and Cardiovascular Parameters

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## ABSTRACT

A case series of 12 obese patients admitted to medical intensive care unit (ICU) due to life-threatening diseases and the influence of weight loss on cardiovascular parameters is presented. We assessed body weight, body mass index (BMI), blood pressure, pulse, and laboratory values on admission. At discharge from ICU patients were counseled on how to lose weight. They were examined one and six months later. Statistically significant ( $p < 0.05$ ) decrease of body weight (median at the beginning of a treatment 134 kg, after six months 127.5 kg), BMI (median 41.5 kg/m<sup>2</sup> at the beginning of a treatment; 38.9 kg/m<sup>2</sup> after six months), systolic blood pressure (medians 145 mmHg and 130 mmHg), diastolic blood pressure (medians 95 mmHg and 85 mmHg) and pulse (medians 104 beats per minute, 78 beats per minute) was found. The reduction of the waist circumference was not significant. One patient died due to severe acute pancreatitis. Patients reported feeling much better after losing weight.

**Key words:** obesity, hypertension, atrial fibrillation, heart failure, pancreatitis

## Introduction

Overweight and obesity are widespread public health problems. Body mass index (BMI) is widely used method to estimate body fat mass. According to World Health Organization overweight is defined as a BMI between 25–29.9 kg/m<sup>2</sup> and obesity as a BMI >30 kg/m<sup>2</sup>. Nearly two thirds of adult population in the USA is overweight and 30.5% of the population is obese<sup>1</sup>. Recent studies also found increase in the prevalence of extreme obesity (BMI >40 kg/m<sup>2</sup>)<sup>2</sup>.

In Croatia, according to some data, 38.11% of population is overweight, and 20.34% is obese<sup>3</sup>.

Obesity is associated with many complications, for example cardiovascular disease, hypertension, diabetes mellitus type 2, sleep apnea, arthritis, pancreatitis, and even malignant diseases.

We analyzed causes of hospitalization of obese patients in the Division of Intensive Care Medicine, Clinical Hospital Center Zagreb and influence of weight loss on their cardiovascular parameters.

## Patients and Methods

Obese patients admitted to the Division of Intensive Care Medicine are reported. Data on body height, body mass, waist circumference, blood pressure, pulse, laboratory parameters (serum cholesterol, HDL cholesterol, LDL cholesterol, triglyceride and blood glucose), chest x-ray, electrocardiogram (ECG) and echocardiography was collected and analyzed. At discharge from ICU patients were advised on how to reduce body weight by making dietary changes and pursuing physical activity. Measurements were repeated one and six months later.

## Statistics

Statistical analysis was performed with *MedCalc* . statistical software. Results are reported as median with range. Due to the small sample size, non-parametric methods were used: Wilcoxon test for paired samples and  $\chi^2$ . Statistical significance was set at  $p = 0.05$ .

**Results**

Twelve consecutive patients (10 male and 2 female) aged between 36 and 78 years (median 59 years) admitted to the ICU in the period from 2003 to 2007 are reported. Primary admission diagnoses were: atrial fibrillation (3 patients), global respiratory failure (2 patients), heart failure (2 patients), acute pancreatitis (2 patients), pulmonary embolism (1 patient), acute cholecystitis (1 patient), and hypertension (1 patient). One patient developed severe acute pancreatitis and died a day after ICU admission. Three patients demanded invasive mechanical ventilation.

Median BMI for all patients at ICU admission was 42.6 kg/m<sup>2</sup> (36.7–51.6 kg/m<sup>2</sup>) (Table 1). Hypertension was verified among 8 patients. Two patients were already using antihypertensive drugs, due to which their blood pressure was well controlled. Patient with severe pancreatitis that died presented with hypotension and tachycardia. Only one patient in our case series had normal values of blood pressure. Seven patients had pathological changes in their ECG: left electrical axis was observed in 5 patients, 3 patients had first degree atrioventricular block, and one patient had right bundle branch block. Five patients had cholesterol concentration within the recommend interval and three patients had normal triglycerides. Three patients that had concentrations of cholesterol and triglycerides in the recommended interval were already taking hypolipemic agents (statins and fibrates). Chest x-ray showed increased vascularity and heart dimension in 9 out of 11 patients.

During the hospitalization in the ICU patients received appropriate caloric intake. At discharge from hospital they were counseled on how to reduce body weight.

One month following the discharge from hospital statistically significant (p=0.008) reduction of body mass in 8 patients, whose data was available, was observed (median of body mass during hospitalization was 128 kg (101.5–147 kg), and one month later 124.8 kg (100–144 kg)) (Figure 1). Six months later we managed to contact eight patients. Body mass median for those eight patients

at the beginning of the study was 134 kg and after six months 127.5 kg (90–141.5 kg) (Figure 1), which was statistically significant decrease of body mass (p=0.010). Body mass index also decreased significantly in both points in time. BMI median at the discharge from hospital for eight patients was 41.5 kg/m<sup>2</sup> (37.6–51.6 kg/m<sup>2</sup>), and a month later it was 40.4 kg/m<sup>2</sup> (37.1–50.8 kg/m<sup>2</sup>) (Figure 2), p=0.008. After six months BMI median was 38.9 kg/m<sup>2</sup> (33.5–45 kg/m<sup>2</sup>).

Statistically significant decrease of systolic and diastolic blood pressure was observed one month after the discharge from the hospital. Median for systolic blood pressure during the hospitalization was 145 mmHg and diastolic blood pressure 95 mmHg, one month later it was 130 mmHg and 85 mmHg (Figure 3). Heart rate also decreased (medians 104 beats per minute, 78 beats per minute). Body waist circumference decreased, though not by statistically significant amount. All patients reported that their quality of life improved with reduction of body weight.

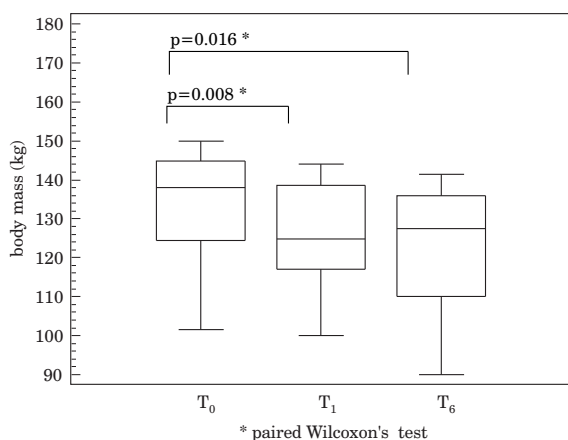


Fig. 1. Change of body mass one month (T1) and six months (T6) after the discharge from the hospital.

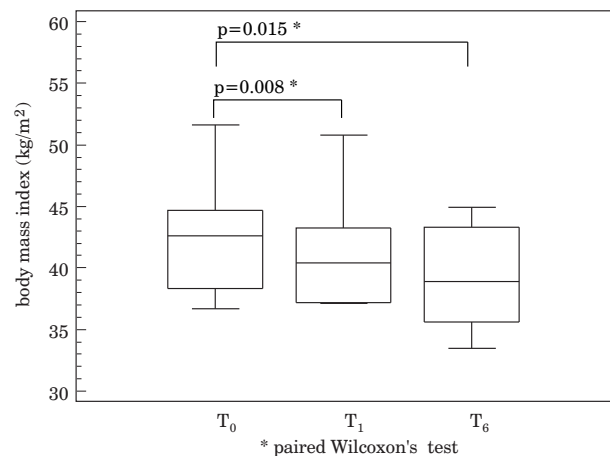


Fig. 2. Change of body mass index one month (T1) and six months (T6) after the discharge from the hospital.

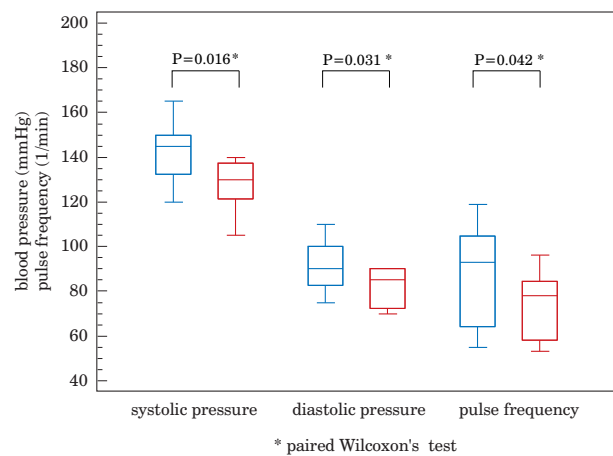


Fig. 3. Decrease of blood pressure and pulse frequency before counseling (blue) and one month after the beginning of counseling (red).

**TABLE 1**  
 PATIENTS' DATA ON ADMISSION (DIAGNOSIS, NEED FOR MECHANICAL VENTILATION, ANTHROPOMETRIC MEASURES, BLOOD PRESSURE, HEART RATE, ECG, BIOCHEMICAL ANALYSIS)

Patient	Diagnosis	MV	Height (m)	BM (kg)	BMI (kg/m <sup>2</sup> )	WC (cm)	SBP (mm Hg)	DBP (mm Hg)	HR (L/min)	ECG	Serum cholestol (mmol/L)	HDL cholestol (mmol/L)	Triglyceride (mmol/L)	Blood glucose (mmol/L)
1.	Heart failure	no	1.85	130	37.98	135	165	100	93	left electrical axis, 1 <sup>st</sup> degree AV block	6.5	1.23	1.79	5.2
2.	Atrial fibrillation	no	1.80	147	45.37	140	145	110	119	right bundle branch block	7.3	0.72	1.95	4.5
3.	Atrial fibrillation	no	1.80	138	42.59	140	120	75	82	left electrical axis	3.9	0.81	1.17	6.3
4.	Hypertension	no	1.70	116.5	40.31	122	140	90	56	left electrical axis	4.2	0.81	2.03	5.6
5.	Atrial fibrillation	no	1.85	146	42.66	136	130	90	55	1 <sup>st</sup> degree AV block	6.1	1.04	1.98	5.2
6.	Respiratory insufficiency	yes	1.79	126	39.32	126	150	80	98	left electrical axis	4.5	0.70	1.16	6.4
7.	Pulmonary embolism	no	1.80	138.5	42.74	138.5	150	95	114	left electrical axis	4.5	1.04	1.52	7.2
8.	Pancreatitis	no	1.72	150	50.24	150	190	110	104	left electrical axis	6.6	0.82	0.82	10.5
9.	Cholecystitis	no	1.64	101.5	37.55	101.5	145	100	82	left electrical axis	7.7	0.72	2.30	4.9
10.	Respiratory insufficiency	yes	1.55	124	51.61	145	150	90	105	left electrical axis, 1 <sup>st</sup> degree AV block	3.6	0.72	1.67	6.8
11.	Heart failure	no	1.96	141	36.7	135	130	80	58	left electrical axis	5.4	0.98	2.06	4.6
12.	Pancreatitis	yes	-	160	-	-	95	60	134	-	-	-	-	20.4
median (min - max)			1.8 (1.55-1.96)	138.25 (101.5 - 160)	42.6 (36.7 - 51.6)	135.5 (122 - 145)	145 (95 - 190)	90 (60-110)	95 (55 - 134)		5.4 (3.6-7.7)	0.9 (0.7-1.23)	1.79 (0.82-2.06)	5.95 (4.5-20.4)

MV - mechanical ventilation, BM - body mass, BMI - body mass index, WC - waist circumference, SBP - systolic blood pressure, DBP - diastolic blood pressure, HR - heart rate, ECG - electrocardiogram, - patient passed away one day after the admission in the ICU

## Discussion

Our case series reports causes of hospitalization of obese patients in intensive care unit and the effect of weight loss on cardiovascular parameters. We showed that proper counseling at the time of discharge from hospital can motivate patients to change their lifestyle, lose weight and become physically more fit. Observed weight reduction was significant and had positive influence on cardiovascular parameters such as blood pressure and heart rate.

The issue of obesity in the acute illness is important but unfortunately mainly understudied. According to recently published meta-analysis obesity is not associated with increased risk for ICU mortality, but morbidly obese patients tend to have longer hospital stay in comparison with normal weight patients<sup>4</sup>.

Morbid obesity is also associated with respiratory failure, type of the ventilation (noninvasive or invasive) and the outcome of treatment<sup>5</sup>. All patients in this case series that needed respiratory support were invasively ventilated. Complications of acute pancreatitis are more frequent in obese patients<sup>6,7</sup>. In our series two patients were admitted in the ICU because of the pancreatitis and one of them died.

Positive correlation was found between obesity, high blood pressure<sup>8,9</sup> and atrial fibrillation<sup>10,11</sup>. Our data is in accordance with these findings. Hypertension was diagnosed in ten and atrial fibrillation in three patients.

Considerable advances have been made in dietary, exercise, behavioural, pharmacologic and bariatric surgical approaches to successful long-term management of obesity. Recently performed research of overweight and obese people in Croatia found that they are motivated to lose weight<sup>12</sup>. Multidisciplinary approach, including dietary care, physical activity, psychological and medical care should be applied in order to achieve positive changes in patients' lifestyle that would lead to weight loss.

We tried to explore the correlation among obesity, acute diseases and the value of counseling on patients' lifestyle changes. To our knowledge, this is the first attempt to address these issues in intensive care units in Croatia. In spite of small sample size, we showed that good counseling and regular examinations can positively influence patients' efforts to lose weight and, consequently, to improve their blood pressure and overall well-being.

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## PRETILI PACIJENTI U INTERNISTIČKOJ JEDINICI INTENZIVNE SKRBI: UTJECAJ SAVJETOVANJA NA SMANJENJE TJELESNE MASE I KARDIOVASKULARNE PARAMETRE

### SAŽETAK

Ispitali smo učinak smanjenja tjelesne mase na kardiovaskularne parametre u 12 pretilih pacijenata primljenih u jedinicu intenzivne skrbi zbog životno ugrožavajućih bolesti. Pri prijemu su zabilježeni tjelesna masa, indeks tjelesne mase (ITM), krvni tlak, puls i laboratorijski parametri. Prilikom otpusta iz jedinice intenzivne skrbi bolesnici su savjetovani kako smršaviti. Pregledani su mjesec dana i šest mjeseci nakon otpusta iz bolnice. Zabilježeno je statistički značajno ( $p < 0,05$ ) smanjenje tjelesne mase (medijan prije savjetovanja iznosio je 134 kg, nakon šest mjeseci 127,5 kg), ITM (medijan 41,5 kg/m<sup>2</sup> prije savjetovanja, nakon šest mjeseci 38,9 kg/m<sup>2</sup>), sistoličkog krvnog tlaka (medijani 145 mmHg i 130 mmHg), dijastoličkog krvnog tlaka (medijani 95 mmHg i 85 mmHg) te pulsa (medijani 104/min, 78/min). Smanjenje opsega struka nije bilo značajno. Jedan pacijent je preminuo od posljedica teškog pankreatitisa. Svi pacijenti koji su smršavili su izjavili da se osjećaju puno bolje.