Clinical and biological determinants of metabolically healthy obese status

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OBJECTIVES

While the unfavorable metabolic consequences of obesity have been clearly demonstrated at a population level, there is a wealth of evidence indicating the existence of individuals somehow protected from developing complications, named "metabolically healthy obese".

The aim of our study was to identify clinical and biological parameters independently associated with "metabolically healthy" status

METHODS

440 (303 women) extremely obese patients (mean BMI= 45.33 ± 8.82 kg/m^2) were clinically (medical history, anthropometrics, blood pressure -BP) and biologically (complete metabolic tests, adiponectin, CRP, TNF-α levels) evaluated in a research program for bariatric surgery.

Metabolically healthy obese status was alternatively defined using two criteria:
(1) Absence of metabolic syndrome -MetS (ATPIII definition) and
(2) Insulin sensitivity (IS) - non-diabetic patients with HOMA <2.85 were considered IS+

Table 1. Characteristics of study patients according to insulin sensitivity an MetS pre

	IR+ (N=330)	IR- (N=110)	*p*	MS + (N=261)	MS- (N=179)	*P*
Women, n	210	93	<0.001	164	139	0.001
BMI (kg/m^2)	46.85 ± 8.9	41.46 ± 7.01	<0.001	45.93 ± 8.71	43.22 ± 8.41	<0.001
WC (cm)	127.36 ± 18.61	112.98 ± 7.03	<0.001	128.01 ± 18.07	117.15 ± 19.21	<0.001
Syst BP(mm Hg)	136.93 ± 19.86	127.73 ± 5.91	<0.001	140.08 ± 19.78	125.84 ± 14.96	<0.001
HTN (%)	49.2%	30%	0.001	64.9	11.7	<0.001
Glucose (mg/dl)	93.5 (18)	85 (12)	<0.001	98 (27)	89 (14)	<0.001
Insulin (mIU/ml)	22.35 (15.9)	9.7 (3.7)	<0.001	17.3 (12.8)	14.6 (14.9)	0.014
HOMA-IR	5 (3.31)	2.1 (0.78)	<0.001	4.48 (4.03)	3.16 (3.05)	<0.001
LDL -C(mg/dl)	128.04 ± 36.31	134.33 ± 41.18	NS	131.91 ± 40.44	125.65 ± 32.64	NS
HDL-cholesterol	43.35 ± 10.25	49.29 ± 12.69	<0.001	42.01 ± 10.36	49.8 ± 10.93	<0.001
TG (mg/dl)	160.37 ± 75.68	122.58 ± 64.16	<0.001	175.39 ± 78.42	111.43 ± 46.51	<0.001
VAI	6.51 ± 3.82	4.64 ± 2.52	<0.001	7.22 ± 3.88	4.01 ± 1.86	<0.001
Uric acid (mg/dl)	6.09 ± 1.60	5.01 ± 1.23	<0.001	6.02 ± 1.61	5.46 ± 1.49	0.002
CRP (mg/dl)	1.08 (1.36)	0.62 (1.19)	0.001	0.90 (1.2)	0.73 (1.1)	0.026
TNF-alpha (pg/ml)	10.3 (59)	8.05 (4.93)	0.01	9.4 (6.35)	8.75 (5.03)	NS
Adiponectin (mg/dl)	6.49 (3.92)	7.91 (3.13)	<0.001	6.82 (4.13)	7.76 (4.76)	0.01

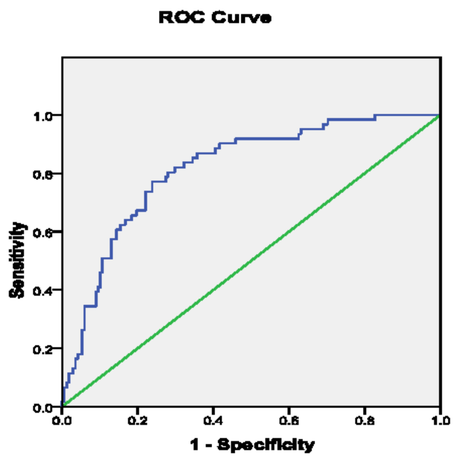

Figure 1. Predictive value of logistic regression model for distinguishing between IR + and IR- patients

AUROC	IC 95%	P
0.815	0.756 – 0.875	<0.001

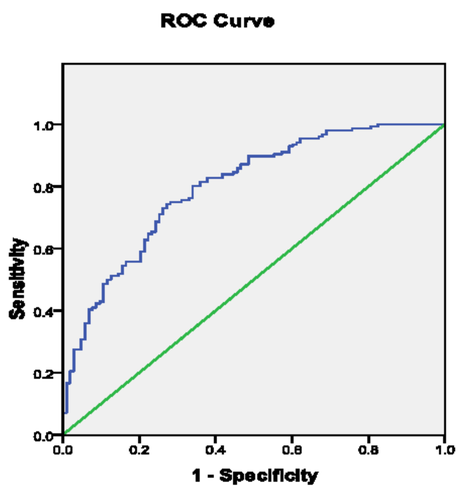

Figure 2. Predictive value of logistic regression model for distinguishing between MetS+ and MetS- patients

AUROC	IC 95%	P
0.799	0.744 – 0.853	<0.001

RESULTS

Only 15.8% of patients (20.4% of women) fulfilled both criteria of metabolic health.
Women were IS+ in a higher percentage than men (30.7% compared with 12.4%, p<0.001). IS+ patients showed a lower general (BMI) and visceral (WC) adiposity and more favorable parameters of lipid (HDL, triglycerides) and glucose metabolism. They also had lower BP, lower chronic inflammatory markers (TNF-α, CRP), but higher levels of adiponectin. Patients without metabolic syndrome were also younger, mostly women, had a higher insulin sensitivity, lower CRP level and increased concentration of adiponectin. (Table 1)

In logistic regression analysis, adiponectin (p=0.011), VAI (p=0.012) and uric acid (p=0.031) remained significantly associated with insulin sensitivity. Area under ROC curve for the model was 0.815 (IC: 0.756–0.875; p<0.001)(Figure 1).
In a similar model, independent determinant of metabolic syndrome were: adiponectin (p=0.004), HOMA–IR (p=0.01) and age (p<0.001). Area under ROC curve for the model was 0.799 (0.744 – 0.853)(Figure 2).

CONCLUSIONS

Adiponectin is an independent determinant of metabolically healthy obese status, disregarding the criteria used for its definition

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