



ASSESSMENT OF CARDIAC FUNCTION IN OBESE CHILDREN AND ADOLESCENTS WITH METABOLIC SYNDROME



Athanasia Tragomalou¹, Evangelia Kosti¹, Konstantina Sveroni¹, Sofia Loukopoulou², Maria Binou¹,
Georgia Kourlaba³, Marina Papadopoulou¹, Penio Kassari¹, Evangelia Charmandari^{1,4}



¹ Out-patient Clinic For the Prevention and Management of Overweight and Obesity, Division of Endocrinology, Metabolism and Diabetes, First Department of Pediatrics, National and Kapodistrian University of Athens Medical School, 'Aghia Sophia' Children's Hospital, Athens, 11527, Greece

² Department of Pediatric Cardiology, 'Aghia Sophia' Children's Hospital, Athens, 11527, Greece

³ EVROSTON LP, Chatzigianni Mexi 5, 115 28, Athens, Greece

⁴ Division of Endocrinology and Metabolism, Center of Clinical, Experimental Surgery and Translational Research, Biomedical Research Foundation of the Academy of Athens, Athens, 11527, Greece

BACKGROUND

Obesity in childhood and adolescence represents a major health problem of our century. It is often associated with dyslipidemia, hypertension, insulin resistance, inflammation, and disturbances in adipocytokine secretion, which lead to endothelial dysfunction and the development of atherosclerotic cardiovascular disease. Obese children and adolescents with non-alcoholic fatty liver disease, which is currently recognized as the hepatic component of metabolic syndrome, are at greater cardiovascular risk compared with their normal-weight counterparts.

AIMS

The aim of our study was to determine the prevalence of metabolic syndrome (MS) among obese children and adolescents attending our Out-patient Clinic For the Prevention and Management of Overweight and Obesity, and to evaluate their cardiovascular and hepatic function.

METHODS

One thousand four hundred fifty (n=1450) obese children and adolescents attending our 'Out-patient Clinic for the Prevention and Management of Overweight and Obesity in Childhood and Adolescents' were evaluated and screened in order to determine those fulfilling the IDF (International Diabetes Federation) criteria for MS. The study was approved by the local Committee on the Ethics of Human Research. Written informed consent was obtained in all cases by a parent/guardian. All participants underwent clinical examination, including pubertal assessment and standard anthropometric measurements were obtained by a single trained observer. A fasting blood sample for baseline hematological, biochemical and endocrinologic investigations was obtained at 08:00h, and was followed by an oral glucose tolerance test. In addition, all subjects underwent echocardiography, ultrasound of the carotid arteries to determine carotid intima-media thickness (cIMT), and a liver ultrasound scan to determine hepatic steatosis.

RESULTS

Eighty five (n=85) children and adolescents [mean age ± SD: 13.2 ± 1.9 years; 51 males (60%) and 34 females (40%); 13 prepubertal (15,5%) and 71 pubertal (84,5%)] were identified as having MS according to the IDF criteria. The cIMT of the left (LICA) and right (RICA) carotid arteries were 0.7 ± 0.2 mm (normal range: 0,49 ± 0.03 mm). In addition, we found a strong correlation between RICA and LICA and the number of factors that were used to identify children as MS patients, as well as a positive correlation between LICA and TG. Interventricular septal end diastole (IVSd) and systole (IVSs) were 8.4 ± 2.2 mm and 9.6 ± 2.5 mm, respectively. Left ventricular internal diameter end diastole (LVIDd) and systole (LVIDs) were 46.7 ± 3.9 mm and 29 ± 2.9 mm, respectively, while left ventricular posterior wall end diastole (LVPWd) and systole (LVPWs) were 9 ± 2.5 mm and 15 ± 3.5 mm, respectively. A correlation between IVSs and BMI it was also observed. Hepatic steatosis was identified in 68 (%) of the participants.

SONOGRAPIC INDICES EVALUATED

Echocardiography:

Interventricular septal end diastole (IVSd) and systole (IVSs)

Left ventricular internal diameter end diastole (LVIDd) and systole (LVIDs)

Left ventricular posterior wall end diastole (LVPWd) and systole (LVPWs)

Ultrasound of the carotid arteries :

Carotid intima-media thickness (cIMT)

Right and left internal carotid arteries (RICA, LICA)

BIOCHEMICAL & ENDOCRINOLOGIC TEST	MEAN ± SD
Plasma glucose	85,8 ± 11,3 mg/dL
Serum insulin	34 ± 15.9 μIU/mL
HbA1c	5.3% ± 0.2%
Cholesterol	159.1 ± 30.3 mg/dL
Triglycerides	142.1 ± 67.9 mg/dL
HDL	39.8 ± 8.1 mg/dL
LDL	91.3 ± 27.2mg/dL
ApoA	124.5 ± 16.9mg/dL
ApoB	90.2 ± 21.7 mg/dL
Lp(a)	16.99 ± 24.84mg/dL

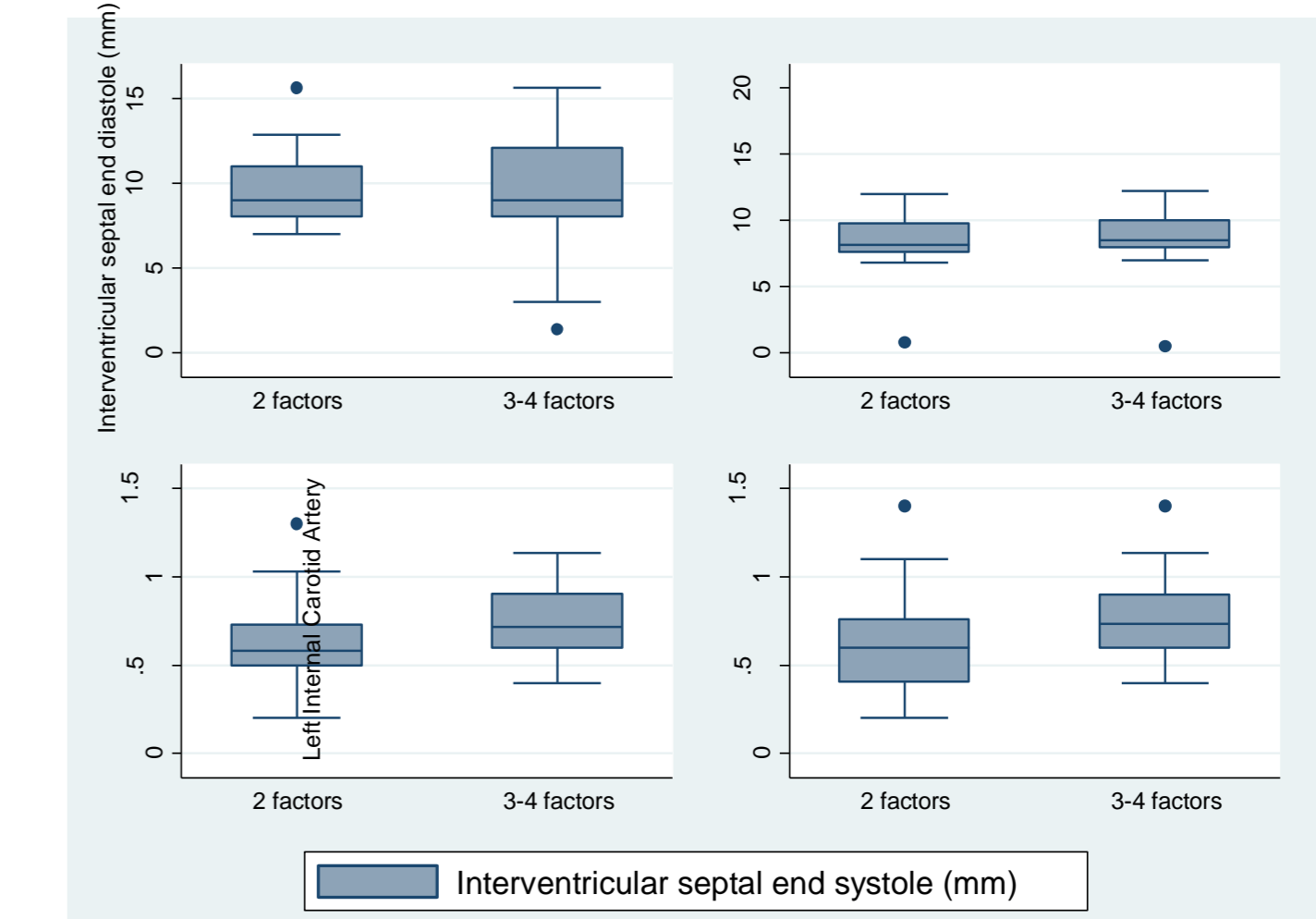
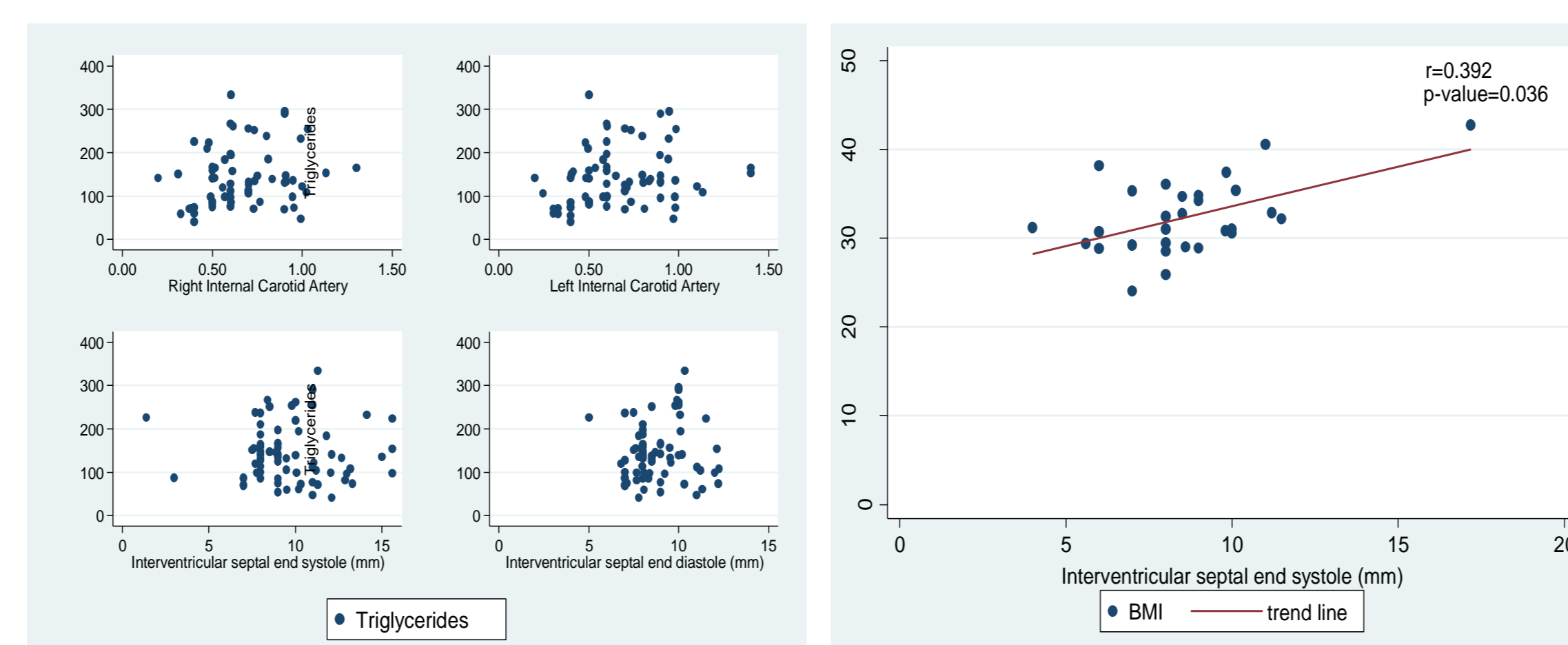
RICA, LICA & LIPIDEMIC PROFILE CORRELATION

	RICA		LICA	
	r	p-value	r	p-value
BMI	-0,028	0,820	-0,048	0,687
Cholesterol	0,027	0,825	0,081	0,496
TG	0,221	0,071	0,279	0,017
HDL	0,932	0,450	0,097	0,412
LDL	-0,097	0,433	-0,066	0,579
ApoA1	0,151	0,223	0,198	0,096
ApoB	-0,019	0,878	0,032	0,790
Lpa*	0,049	0,703	0,051	0,678

RICA, LICA, IVSd, IVSs & NUMBER OF MS FACTORS CORRELATION

	2 MS FACTORS		≥3 FACTORS		p-value
	N	Median (IQR)	N	Median (IQR)	
RICA	42	0,6 (0,5-0,7)	26	0,7 (0,6-0,9)	0,039
IVSd	42	8,2 (7,6-9,8)	29	8,5 (8-10)	0,428
IVSs	44	9 (8-11)	30	9 (8-12,1)	0,695
		Mean (SD)		Mean (SD)	
LICA	44	0,6 (0,2)	29	0,7 (0,2)	0,036 [§]

§ t-test



CONCLUSIONS

The prevalence of MS in our large cohort of obese children and adolescents was 5.9%. Our findings demonstrate increased cardiovascular risk in children and adolescents with MS.

