ΑΡΧΙΚΟ

METROPOLITAN HOSPITAL

The role of visceral fat on liver function as expressed by gamma-GT or SGPT levels, in overweight and obese adolescents.

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INTRODUCTION

- A number of studies have shown relationship between gamma-GT or SGPT/ALT levels and insulin resistance, in adults, suggesting that these parameters can be used as markers for the insulin resistance state.
- Gamma-GT and SGPT/ALT levels, even within the normal range, correlate with increasing intrahepatic fat. It has been suggested that the elevation of the hepatic enzymes could be the expression of excess deposition of fat in the liver, which is closely related to obesity and other metabolic disturbances such as dyslipidaemia or diabetes mellitus.

AIM

Aim of our study was to investigate the relationship between a) gamma-GT, b) SGPT/ALT levels and insulin resistance indices as well as visceral fat in overweight and obese adolescents.

SUBJECTS-METHODS

	Males (N=14)	Females (N=42)
Age (years)	16.1 ± 1.8	16.05 ± 1.6
BMI (Kg/m^2)	35.5 ± 4.6	30.5 ± 6.0

SUBJECTS-METHODS

We studied retrospectively 56 adolescents, 14 boys and 42 girls, age 16.14±1.83 and 16.05±1.61, BMI=35.46±4.6 and 30.49±5.98, respectively, recruited from the outpatient clinic of Diabetes – Obesity and Metabolism Department of our Hospital.

All subjects had normal thyroid and liver function and reported to no alcohol and coffee consumption.

Adolescents, after overnight fasting, were subjected to measurement of plasma glucose, insulin, SGPT, gamma-GT and ferritin levels.

HOMA insulin resistance (IR) index and Quicki insulin sensitivity index were calculated from fasting glucose and insulin according to the following formulas:

HOMA-IR= Glucose (mmol/l) x Insulin (mU/l) / 22.5

QUICKI= 1 /{logGlucose(mg/dl) + logInsulin (mU/l)}

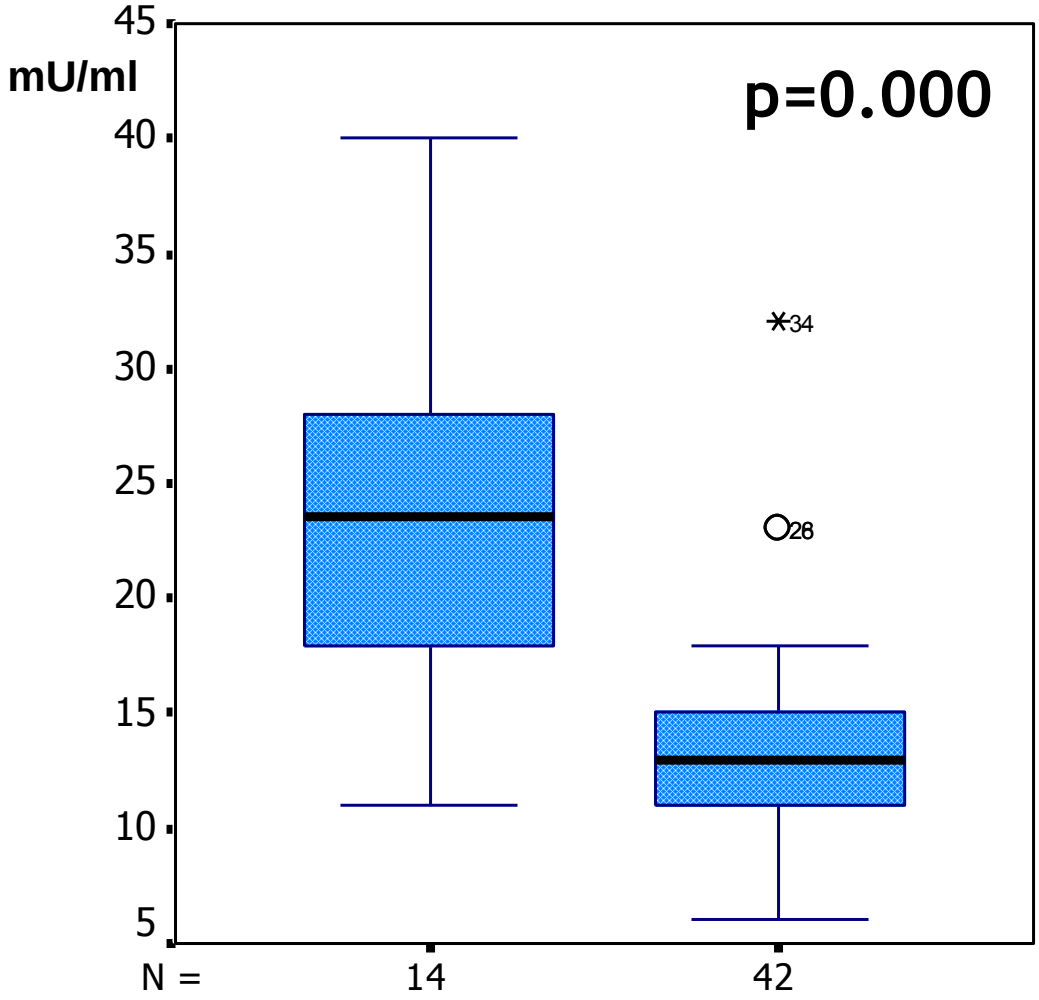
Anthropometry consisted of a) weight and height measurement for calculation of BMI, b) Waist and Hip circumference for calculation of WHR, c) % total body fat (BIA) and d) sagittal abdominal diameter for calculation of the amount of visceral fat. “% Visceral fat” was calculated according to the formula: Visceral fat x 100 / Total body fat.

RESULTS

	Males		Females		
	Mean	St. deviation	Mean	St. deviation	p
Waist (cm)	111.4	10.1	95.4	13.3	0.000
WHR	0.95	0.06	0.87	0.08	0.000
Saggital diameter (cm)	24.4	2.2	21.3	2.7	0.000
% Body Fat (BIA)	37.5	5.0	37.5	7.0	NS
% Visceral Fat	14.2	2.9	8.8	1.3	0.000
Glucose (mg/dl)	90.0	10.7	86.8	9.9	NS
Insulin (mU/l)	20.7	11.5	16.8	8.9	NS
HOMA-IR	4.37	2.18	3.59	2.01	NS
QUICKI	0.316	0.029	0.326	0.029	NS
Cholesterol (mg/dl)	170.9	21.6	169.3	25.9	NS
Triglycerides (mg/dl)	108.9	37.9	92.1	54.7	NS
HDL (mg/dl)	46.2	10.0	53.1	11.5	NS
LDL (mg/dl)	102.7	23.2	98.6	26.8	NS
SGOT (AST) (mU/ml)	28.1	9.5	19.3	5.7	0.000
SGPT (ALT) (mU/ml)	44.3	22.6	20.4	14.1	0.002
Gamma-GT (mU/ml)	23.4	7.6	13.5	4.6	0.000
ALP (mU/ml)	97.8	28.9	137.3	142.8	NS

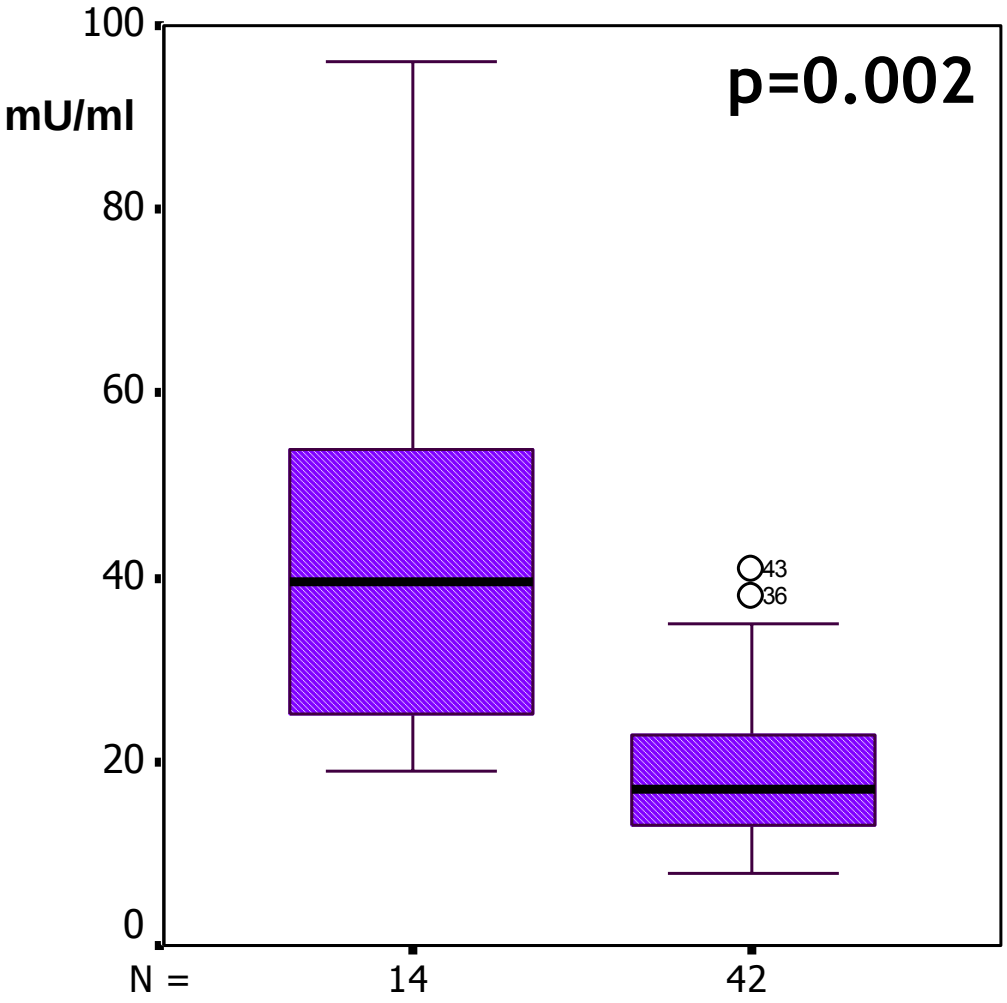
RESULTS

A) Boys had higher gamma-GT and SGPT/ALT levels than girls. No difference was found in insulin levels, HOMA-IR and QUICKI indices between sexes.



Males:
23.36±7.56
(M±SD)

Females:
13.48 ±4.60
(M±SD)

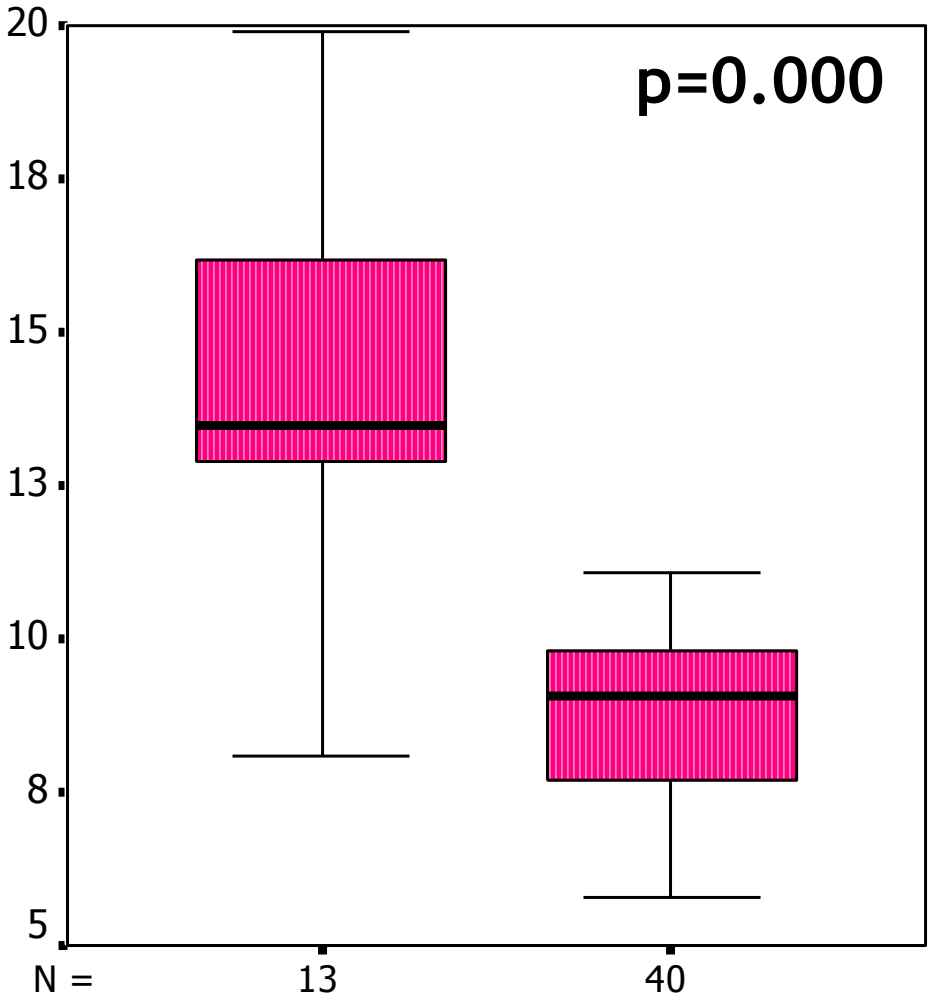


Males:
44.29±22.56
(M±SD)

Females:
20.40 ±14.09
(M±SD)

RESULTS

B) Adolescent boys had higher % visceral fat than girls.

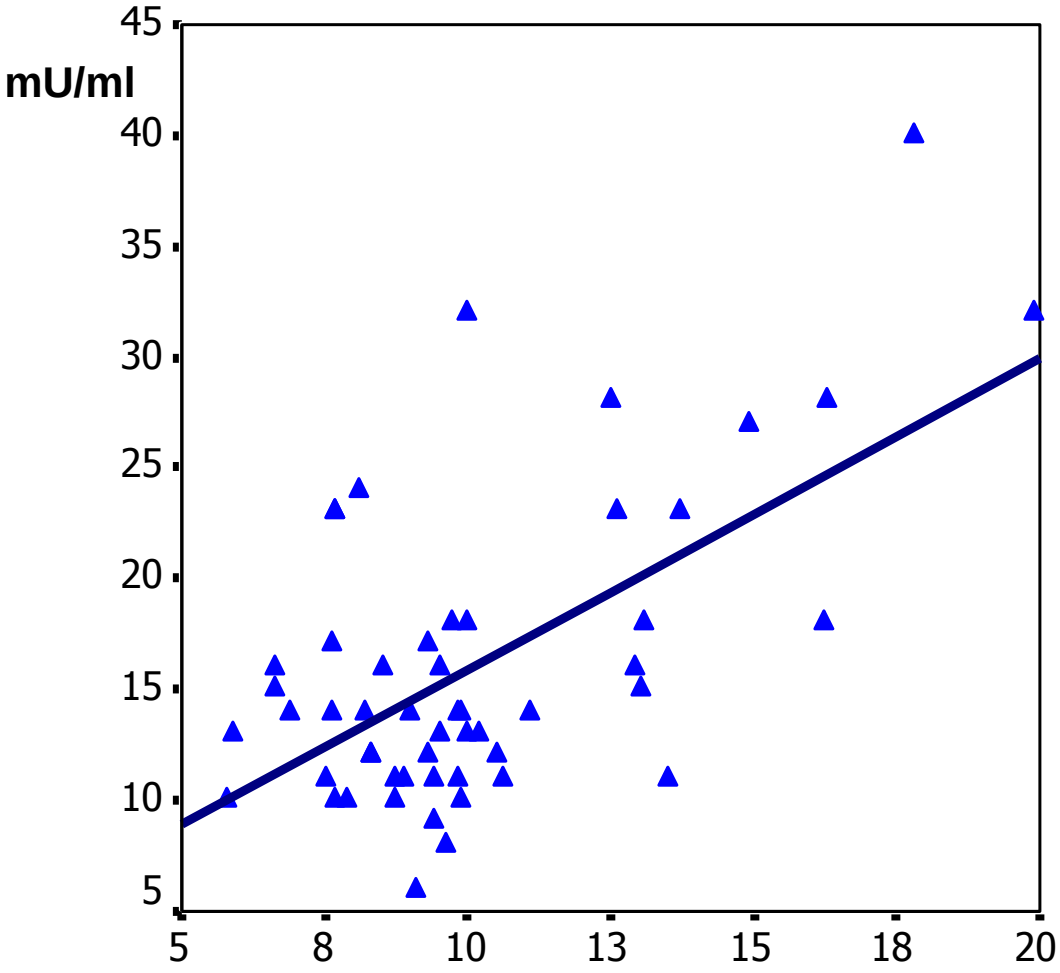


Males:
14.19±2.92
(M±SD)

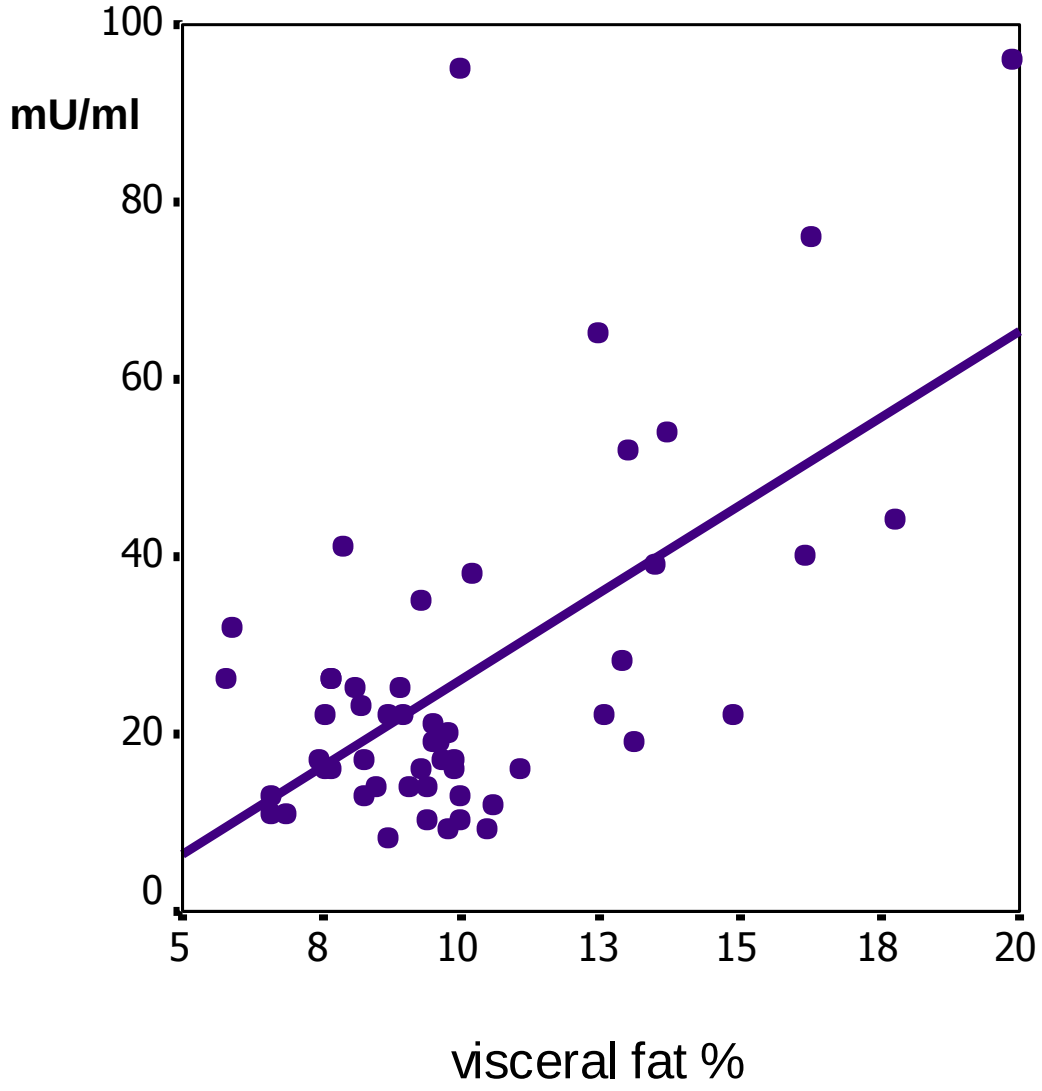
Females:
8.77±1.31
(M±SD)

RESULTS

C) Gamma-GT and SGPT/ALT levels were positively related to % visceral fat.



r= 0.605, p=0.000

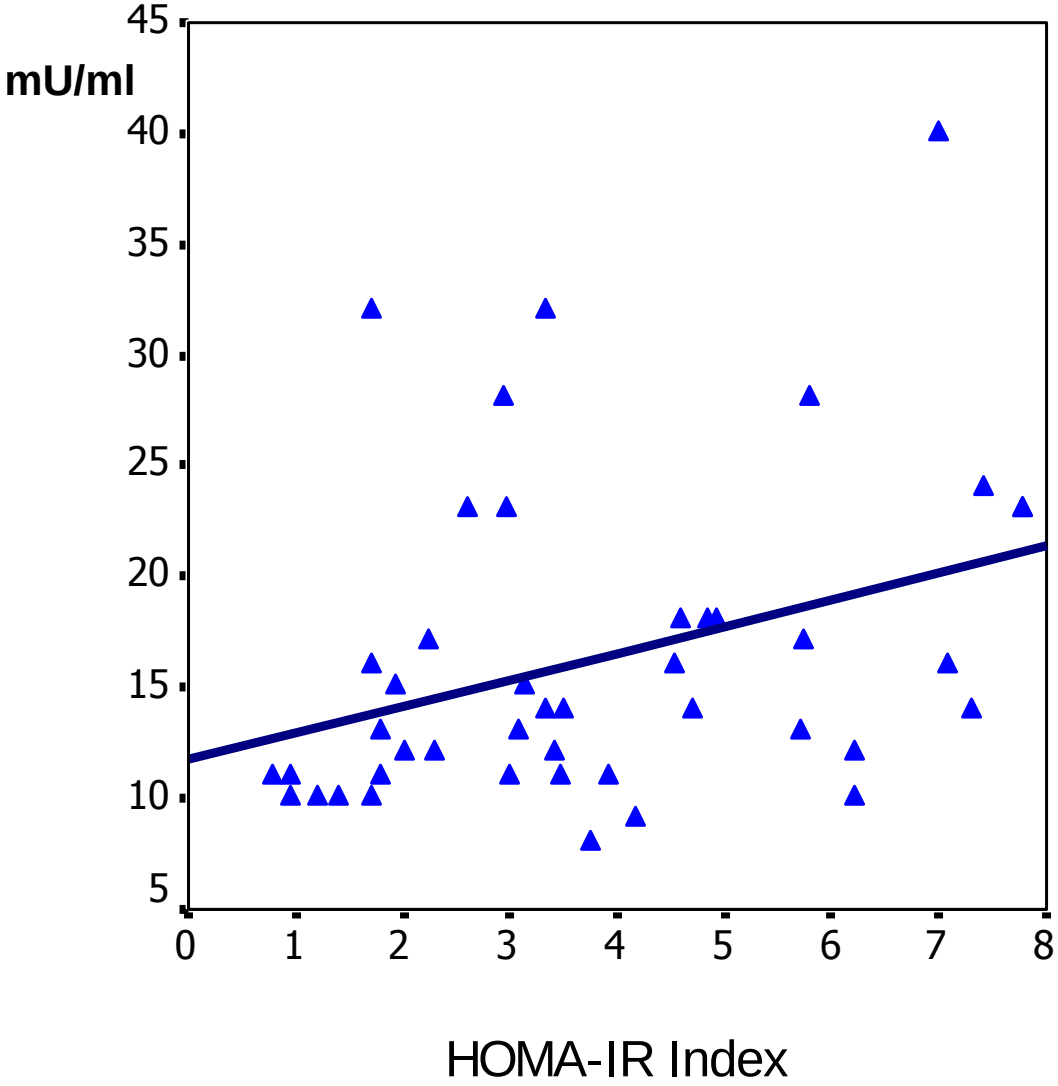


r= 0.587, p=0.000

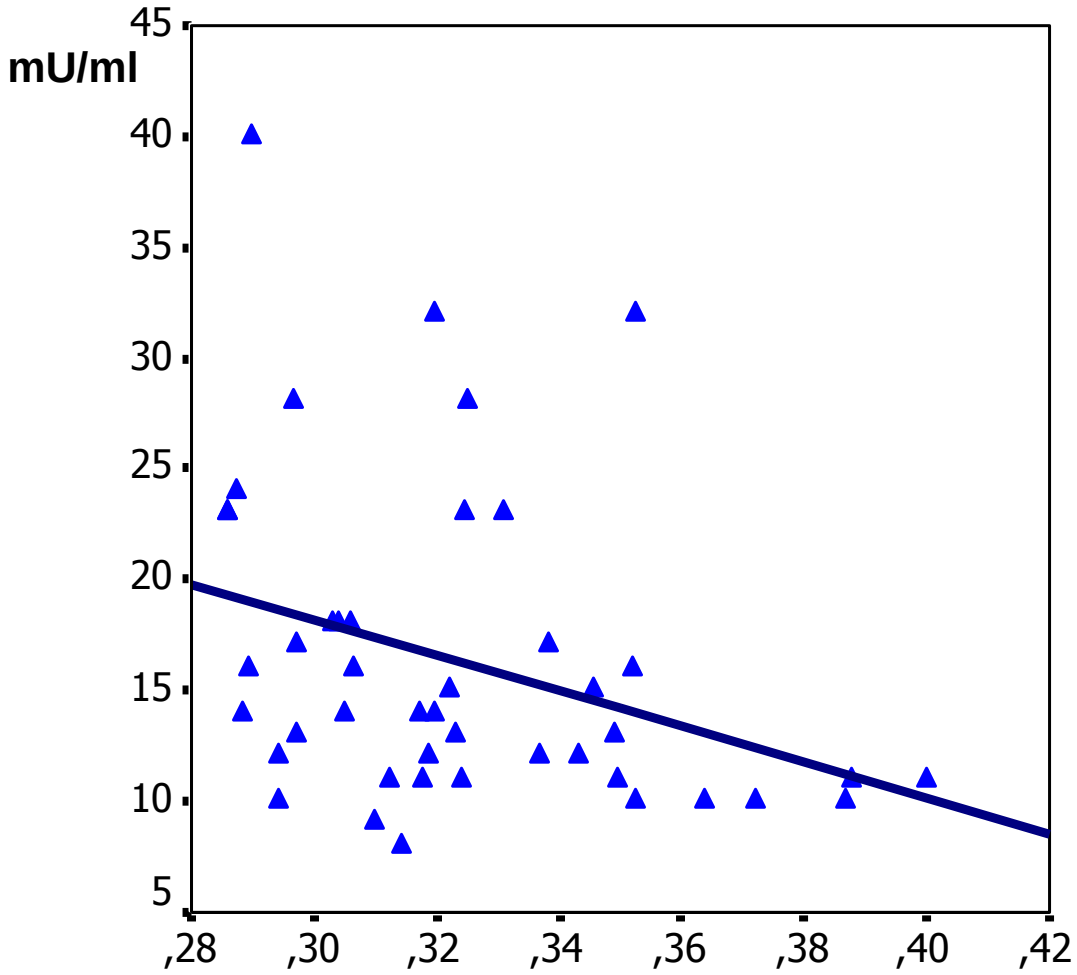
RESULTS

D) Gamma-GT levels were positively related to HOMA-IR and negatively related to QUICKI index.

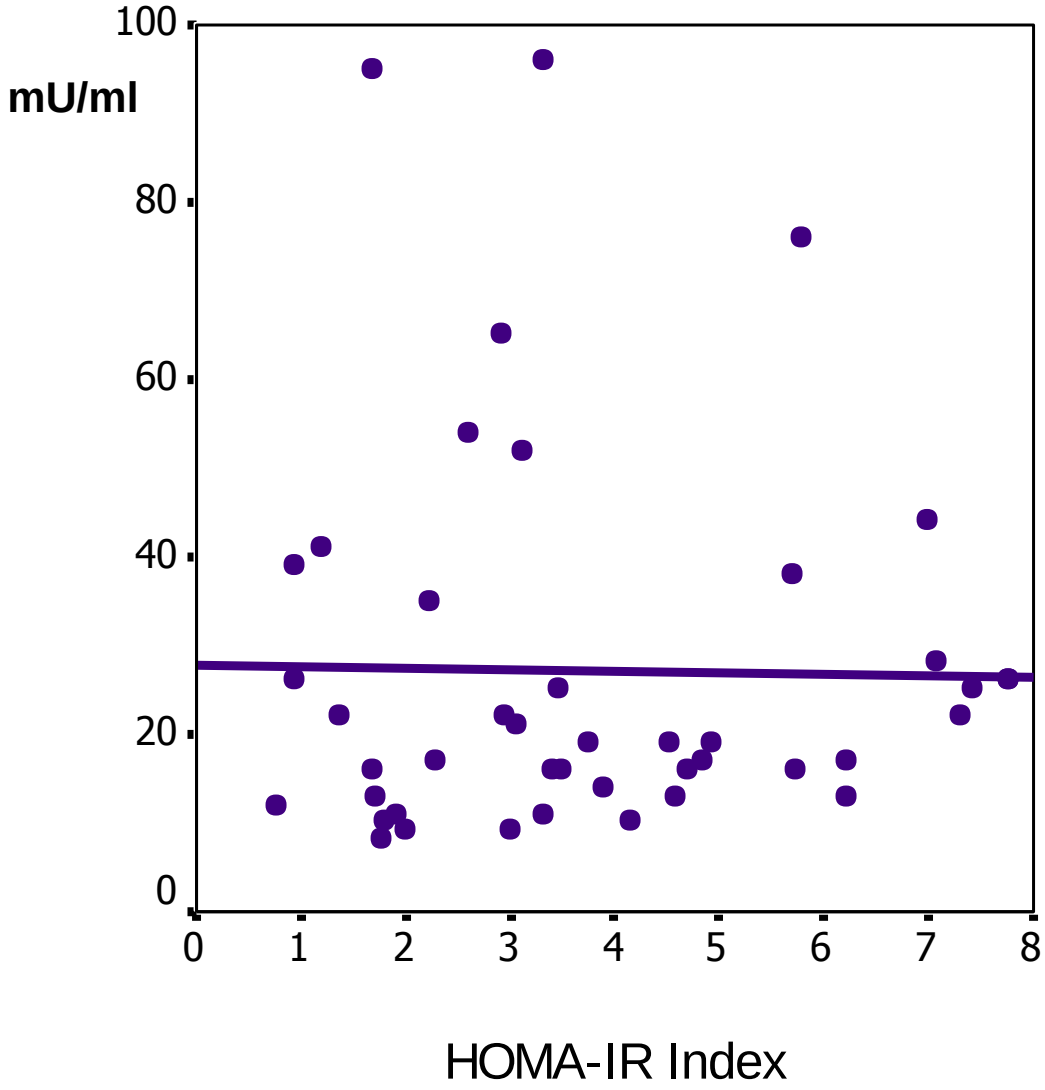
SGPT/ALT levels were not related to insulin resistance or insulin sensitivity indices.



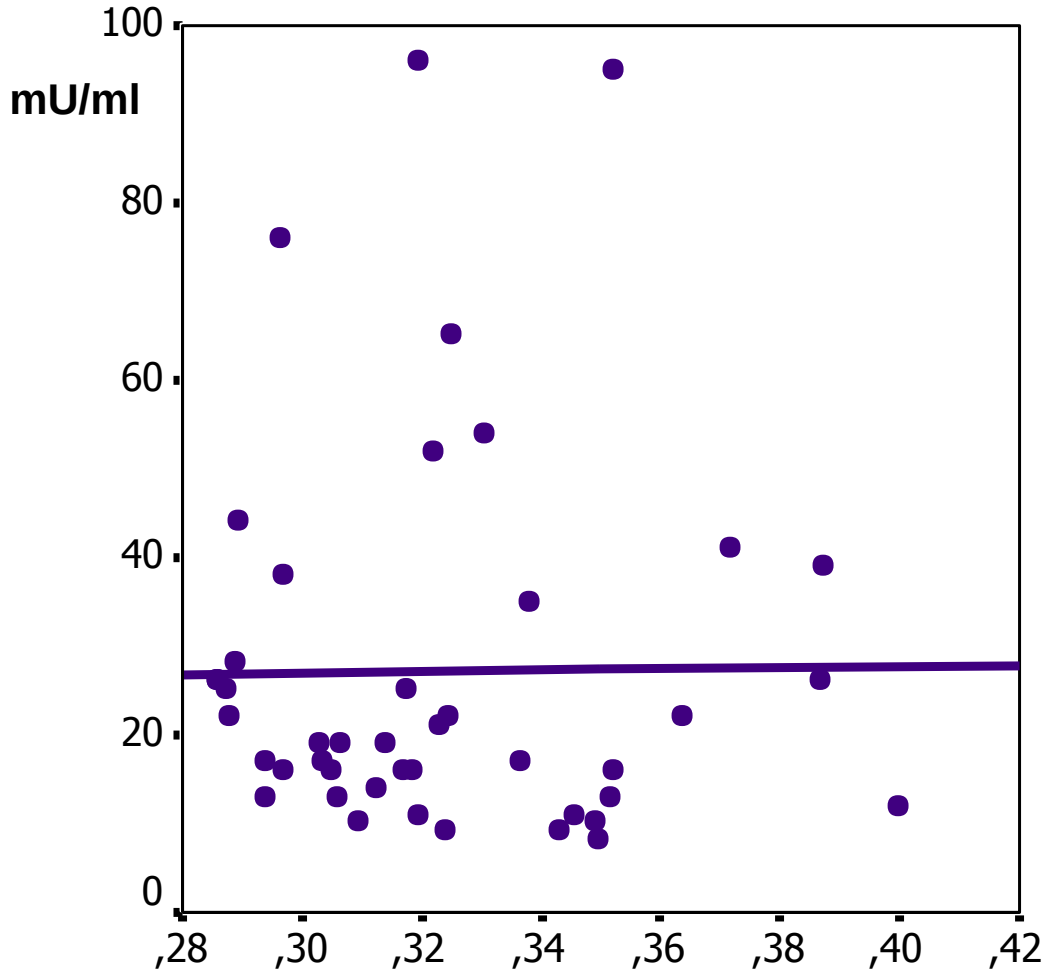
r_s= 0.383, p=0.010



r_s= -0.383, p=0.010



r_s= 0.114, p=0.460



r_s= -0.114, p=0.460

RESULTS

E) Multiple regression analysis revealed that the best fitted models for the prediction of gamma-GT and SGPT/ALT levels were:

RESULTS

Gamma-GT

R^2=53.8, F= 6.589, p=0.000

	beta	p
HOMA-IR	0.382	0.006
% visceral fat	0.465	0.015

Sex, age, % total body fat (BIA) and ferritin levels were Not Significant in the model

RESULTS

SGPT

R^2=41.9, F= 5.328, p=0.001

	beta	p
% visceral fat	0.509	0.013

Sex, age, % Total Body Fat (BIA) and HOMA-IR were Not Significant in the model

***No relationship was found between % Total Body Fat and % visceral fat (r= -0.003, p=0.984)**

Conclusions

1) Even from the adolescent state, hormonal function results in different fat distribution between sexes.
2) Different fat distribution between sexes, results in different gamma-GT and SGPT/ALT levels.
3) In overweight and obese adolescents, gamma-GT can be index both of visceral fat deposition and of insulin resistance, while SGPT/ALT can be index only of visceral fat.