Comparison of insulin resistance indices: HOMA and Belfiore in 6-8-year-old, properly growing children born small for gestational age

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INTRODUCTION

It is well known that low birth weight in children (born small for gestational age, SGA) predisposes them to the occurrence of obesity, insulin resistance (IR) and lipid disorders, observed even through the whole first decade of life. Thus, early diagnostics and prevention are very important. The HOMA index is used to assess insulin resistance (IRI_{HOMA}). However, in some cases, high, prolonged postprandial insulin secretion is observed despite the low, adequate fasting glucose and fasting insulin levels. This can easily be assessed during the oral glucose tolerance test (OGTT). One of the indicators that properly analyses glucose and insulin levels during OGTT is Belfiore IR index ($IRI_{Belfiore}$) in the modification intended for the pediatric population.

THE AIM

The aim of the study was to compare IRI_{HOMA} (which evaluates fasting glucose and insulin) with $IRI_{Belfiore}$ (which evaluates glucose and insulin areas under the curve during OGTT) in children born SGA, being in the prepubertal period, in the first decade of life, in order to determine the usefulness of $IRI_{Belfiore}$ in the diagnosis of children with SGA.

MATERIAL AND METHODS

126 children born as SGA, aged 6-8 years, with normal height were enrolled in the study. In each child, OGTT was performed after administering 1.75 g/kg of oral glucose. The glucose and insulin serum concentrations were evaluated at 0, 60th and 120th minute of the test. Based on the results, the IRI_{HOMA} and $IRI_{Belfiore}$ were calculated. In addition, the body mass index (BMI), waist to height ratio (WHtR), lipids profile and blood pressure were assessed. IRI_{HOMA} higher than 2.0 and $IRI_{Belfiore}$ higher than 1.27 was considered abnormal.

RESULTS

No elevated IRI_{HOMA} was observed in any of the children, while elevated $IRI_{Belfiore}$ was found in 13 children. The insulin concentration at 0 and 120th minute during OGTT showed a strong positive correlation with each other. What is more, a strong correlation was demonstrated between IRI_{HOMA} as well as $IRI_{Belfiore}$ and: HDL-cholesterol, triglycerides, BMI, WHtR, and blood pressure.

CONCLUSIONS

Despite the normal fasting insulin concentration in children with SGA, there is an IR tendency, which can be demonstrated on the basis of OGTT results. In such cases, it seems advisable to use some methods to prevent IR complications already at this stage of children's lives. The result of the IRI_{HOMA} is not a reliable diagnostic tool for children with SGA in the first decade of life.

Tab. 1. Auxological and biochemical data in analysed group of children in comparison with control group.

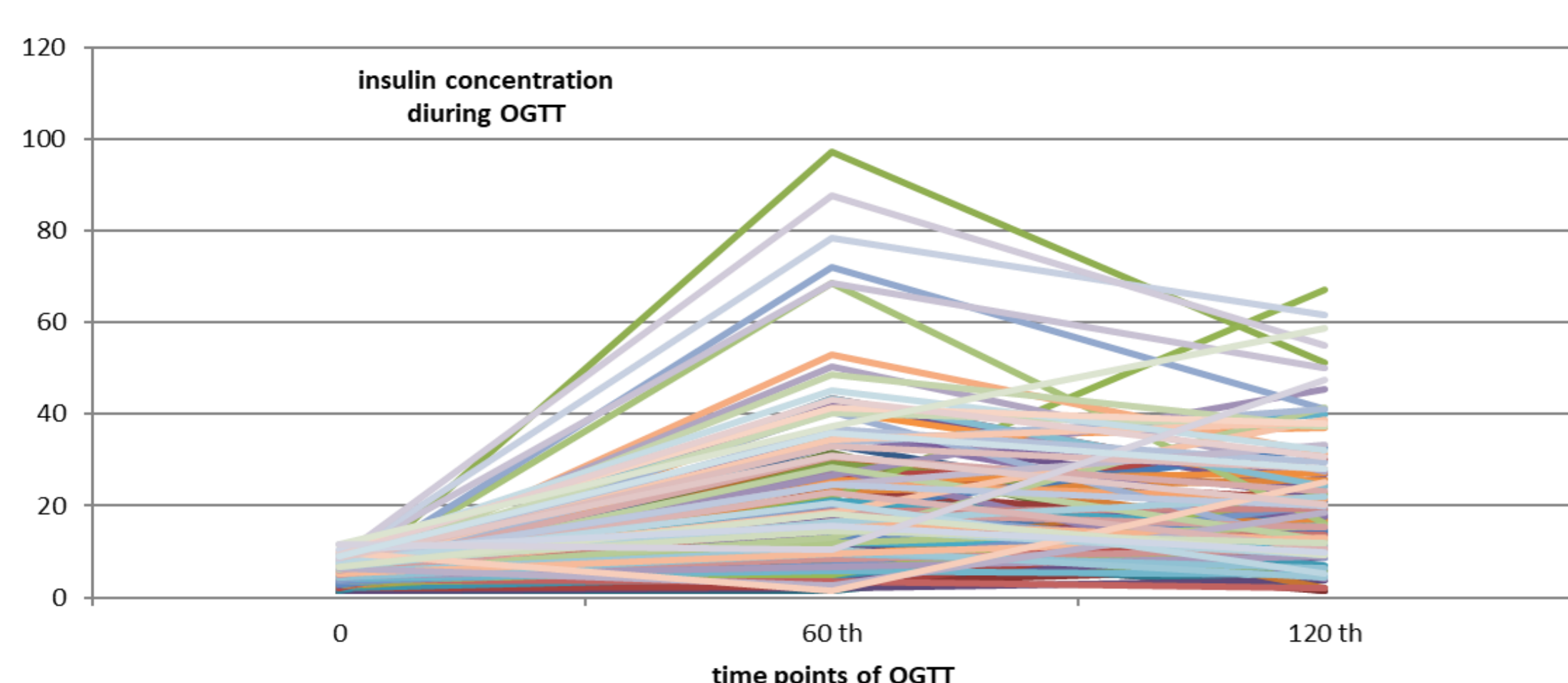| Group	SGA Group	Controls (AGA Group)	Analysis of variance
n (girls/boys)	126 (78/48)	13 (6/7)	-
Chronological age (years)	6.87±1.35	7.52±1.89	NS
Gestational age (weeks)	38.61±1.02	39.46±0.52	NS
Birth weight SDS	-2.32±0.34	0.07±0.64	p<0.05
Height SDS	0.12±1.14	-0.24±0.87	NS
BMI SDS	0.01±1.08	0.33±1.02	NS
Waist to Height Ratio	0.47±0.04	-	-
Systolic pressure (mmHg)	104.65±12.77	-	-
Diastolic pressure (mmHg)	69.37±10.85	-	-
Triglicerydes (mg/dl)	73.92±34.61	65.71±37.57	NS
Total cholesterol (mg/dl)	170.44±27.56	155.14±15.78	NS
LDL-cholesterol (mg/dl)	97.11±23.47	76.86±13.16	NS
HDL-cholesterol (mg/dl)	58.23±23.47	65.14±12.76	NS
Glucose 0' (mg/dl)	81.28±7.90	80.1±5.40	NS
Glucose 60' (mg/dl)	111.71±31.48	99.8±18.5	NS
Glucose 120' (mg/dl)	103.48±20.63	98.8±16.22	NS
Insulin 0' (uIU/ml)	4.09±2.60	4.0±1.30	NS
Insulin 60' (uIU/ml)	22.62±17.75	24.7±10.3	NS
Insulin 120' (uIU/ml)	19.84±13.56	20.7±12.80	NS
IRI HOMA	0.84±0.57	0.83±0.40	NS
IRI Belfiore	0.91±0.33	1.04±0.24	NS

Fig.2. Correlation between insulin concentration at 0' and 120' in analysed group of SGA children
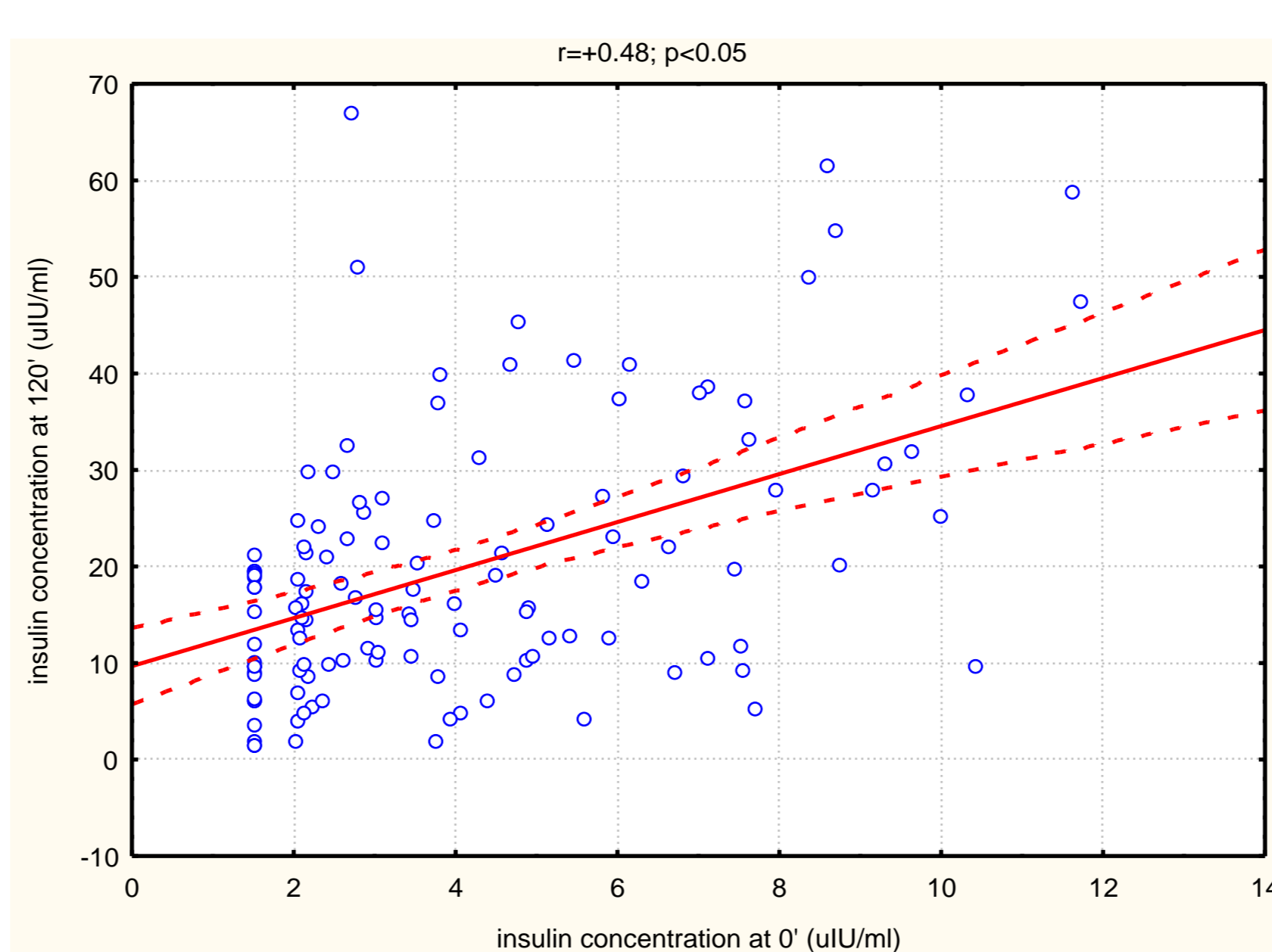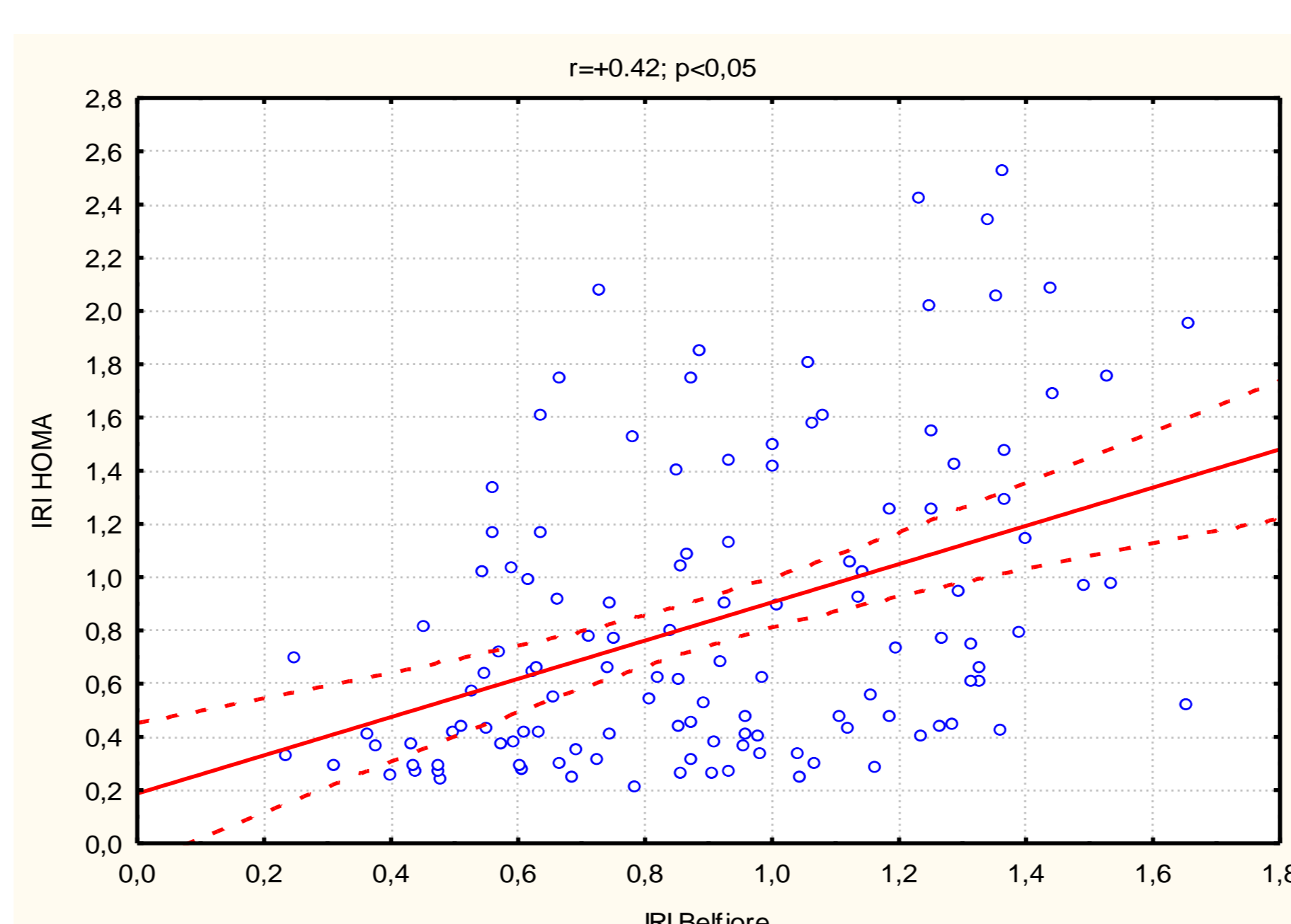

r=+0.48; p<0.05

Fig.3. Correlation between IRI HOMA and IRI Belfiore

r=+0.42; p<0,05

Tab. 2. Correlations between selected parameters in analysed group of SGA children.

Group	IRI HOMA r=	IRI Belfiore r=
BMI SDS	+0.29	+0.20
Waist to Height Ratio	+0.26	+0.23
Systolic pressure (mmHg)	+0.36	+0.28
Diastolic pressure (mmHg)	+0.29	+0.29
Triglicerydes (mg/dl)	+0.38	+0.16
HDL-cholesterol (mg/dl)	-0.23	-0.13

red market= p<0,05

Fig. 1. Insulin concentration during OGTT

insulin concentration diuring OGTT

Fat, metabolism and obesity

Anna Lupinska

Poster presented at: