

ASSESSMENT OF SELECTED CARBOHYDRATE PARAMETERS IN CHILDREN EXPOSED TO GESTATIONAL DIABETES IN UTERO

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OBJECTIVES

Children exposed to gestational diabetes mellitus (GDM) in utero have higher risk of development of glucose intolerance and diabetes mellitus. The study was undertaken to assess the selected carbohydrate parameters in children exposed to GDM.

METHODS

50 children exposed to gestational diabetes were compared with 46 control subjects. Anthropometric parameters of a newborn were obtained from the medical records. In all participants height, body mass, waist and hip circumferences were measured; BMI, waist-to-hip ratio (WHR) and waist-to-height ratio (WHtR) were calculated. Values of fasting glucose, insulin, C-peptide and HbA_{1c} were measured and insulin resistance (HOMA2-IR), insulin sensitivity (HOMA2-S), β -cell function (HOMA2-B) were calculated. In obese children (BMI $\geq 95^{\text{th}}$ percentile) oral glucose tolerance test (OGTT) was performed. Mother's pre-pregnancy and current BMI was calculated.

RESULTS

The prevalence of overweight/obesity in the study group was 38%, in the control group 41% ($p=0,19$). Higher fasting glucose level ($p=0,02$) and HbA_{1c} ($p=0,000004$) were found in the study group comparing to the control. In children exposed to GDM in utero a positive correlation of fasting insulin and WHR ($r_s=0,31, p=0,028$) as well as significantly lower HOMA2-B ($p=0,03$) were observed. In the study group higher HOMA2-IR ($p=0,0002$) and HOMA2-B ($p=0,000039$) and also lower HOMA2-S ($p=0,0002$) were observed among participants with overweight/obesity comparing to children with normal body weight. In the study group a correlation of HOMA2-IR and SD of the birth weight was found ($r_s=0,28, p=0,049$). In children exposed to GDM the correlation of fasting insulin level, HOMA2-IR, HOMA2-B and mother's BMI (pre-pregnancy and current) was observed.

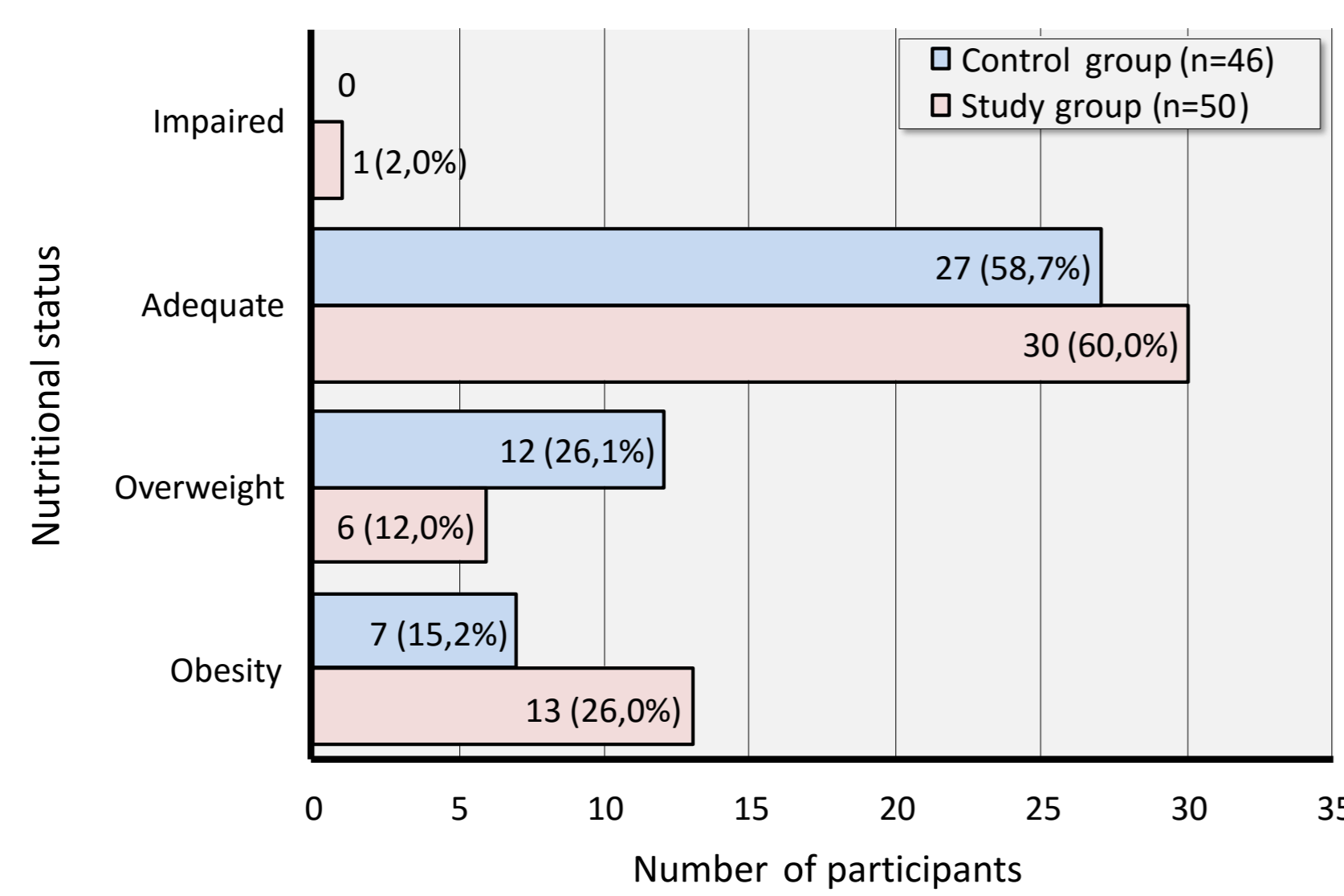


Fig. 1. Nutritional status (according to BMI) of study participants

Tab. 1. Mean glucose concentration of study participants.

Glycemia	Study group		Control group		p-value
	Mean \pm SD	Median (min.-max.)	Mean \pm SD	Median (min.-max.)	
Fasting [mg/dL]	87.8 \pm 6.4	88.0 (72.0 - 101.0)	82.8 \pm 10.8	84.5 (50.0 - 107.0)	0.02
60 th minute of OGTT [mg/dL]	127.2 \pm 23.9	118.0 (99.0 - 185.0)	131.9 \pm 29.5	130.0 (87.0 - 132.0)	NS
120 th minute of OGTT [mg/dL]	111.6 \pm 18.3	108.0 (84.0 - 157.0)	111.1 \pm 25.5	100.0 (94.0 - 165.0)	NS

Tab. 2. Mean C-peptide concentration and the percentage of HbA_{1c} in the study participants.

Feature	Study group (n=50)		Control group (n=46)		p-value
	Mean \pm SD	Median (min.-max.)	Mean \pm SD	Median (min.-max.)	
C-peptide [ng/mL]	1.9 \pm 0.9	1.8 (0.7 - 6.7)	1.9 \pm 0.9	1.9 (0.6 - 4.8)	NS
HbA _{1c} [%]	5.4 \pm 0.2	5.4 (4.9 - 5.9)	5.1 \pm 0.3	5.1 (4.6 - 5.6)	0.000004

Tab. 3. Insulin resistance (HOMA2-IR), insulin sensitivity (HOMA2-S) and β -cell function (HOMA2-B) of study participants.

Feature	Study group (n=50)		Control group (n=45*)		p-value
	Mean \pm SD	Median (min.-max.)	Mean \pm SD	Median (min.-max.)	
HOMA2-IR	1.4 \pm 0.7	1.3 (0.5 - 5.0)	1.4 \pm 0.6	1.3 (0.5 - 3.5)	NS
HOMA2-S	82.0 \pm 31.8	78.0 (19.9 - 201.0)	82.9 \pm 35.9	75.2 (28.6 - 196.0)	NS
HOMA2-B	128.8 \pm 44.8	117.2 (72.9 - 276.7)	143.7 \pm 42.2	138.6 (70.8 - 245.5)	0.03

* - in 1 participant from the control group HOMA2-IR, HOMA2-S and HOMA2-B were not calculated because of fasting hypoglycemia (50 mg/dL).

Tab. 4. Insulin resistance (HOMA2-IR), insulin sensitivity (HOMA2-S) and β -cell function (HOMA2-B) of study participants regarding BMI.

Feature	BMI < 85 th percentile		BMI \geq 85 th percentile		p-value
	Mean \pm SD	Median (min.-max.)	Mean \pm SD	Median (min.-max.)	
Study group					
n=31					
HOMA2-IR	1.2 \pm 0.4	1.1 (0.5 - 2.2)	1.9 \pm 0.9	1.6 (0.8 - 5.0)	0.0002
HOMA2-S	93.8 \pm 30.3	91.1 (46.6 - 201.0)	62.8 \pm 24.3	63.0 (19.9 - 122.0)	0.0002
HOMA2-B	107.2 \pm 23.8	101.5 (72.9 - 178.4)	164.0 \pm 49.1	169.9 (94.3 - 276.7)	0.000039
Control group					
n=26*					
HOMA2-IR	1.3 \pm 0.7	1.1 (0.5 - 3.5)	1.6 \pm 0.6	1.5 (0.8 - 2.8)	NS
HOMA2-S	91.5 \pm 40.1	90.4 (28.6 - 196.0)	71.2 \pm 26.1	65.4 (35.5 - 127.3)	NS
HOMA2-B	136.1 \pm 42.4	135.2 (70.8 - 240.1)	153.9 \pm 40.8	146.5 (94.5 - 245.5)	NS

* - in 1 participant from the control group HOMA2-IR, HOMA2-S and HOMA2-B were not calculated because of fasting hypoglycemia (50 mg/dL).

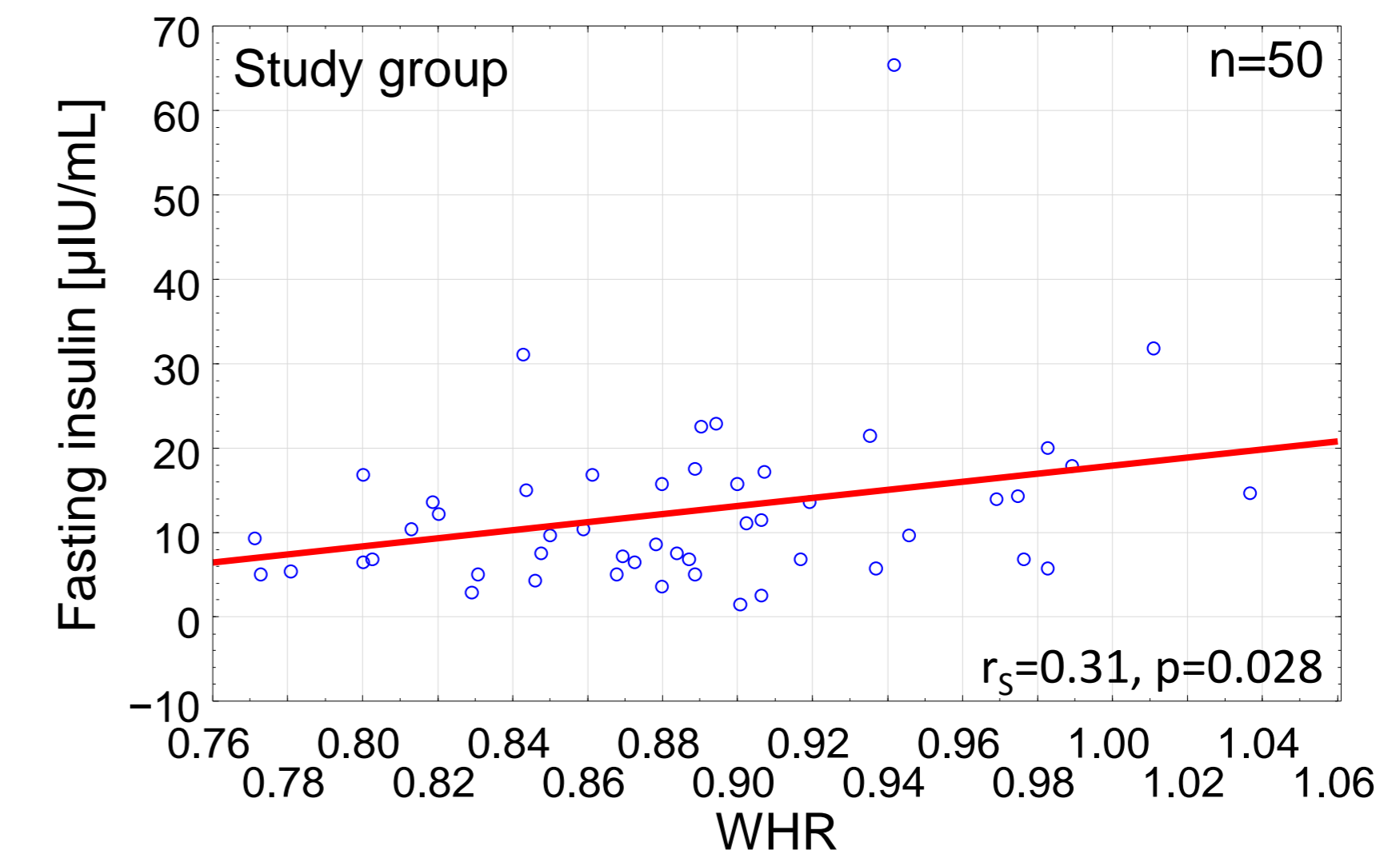


Fig. 2. Correlation of mean fasting insulin concentration with waist-to-hip ratio (WHR) in the study group.

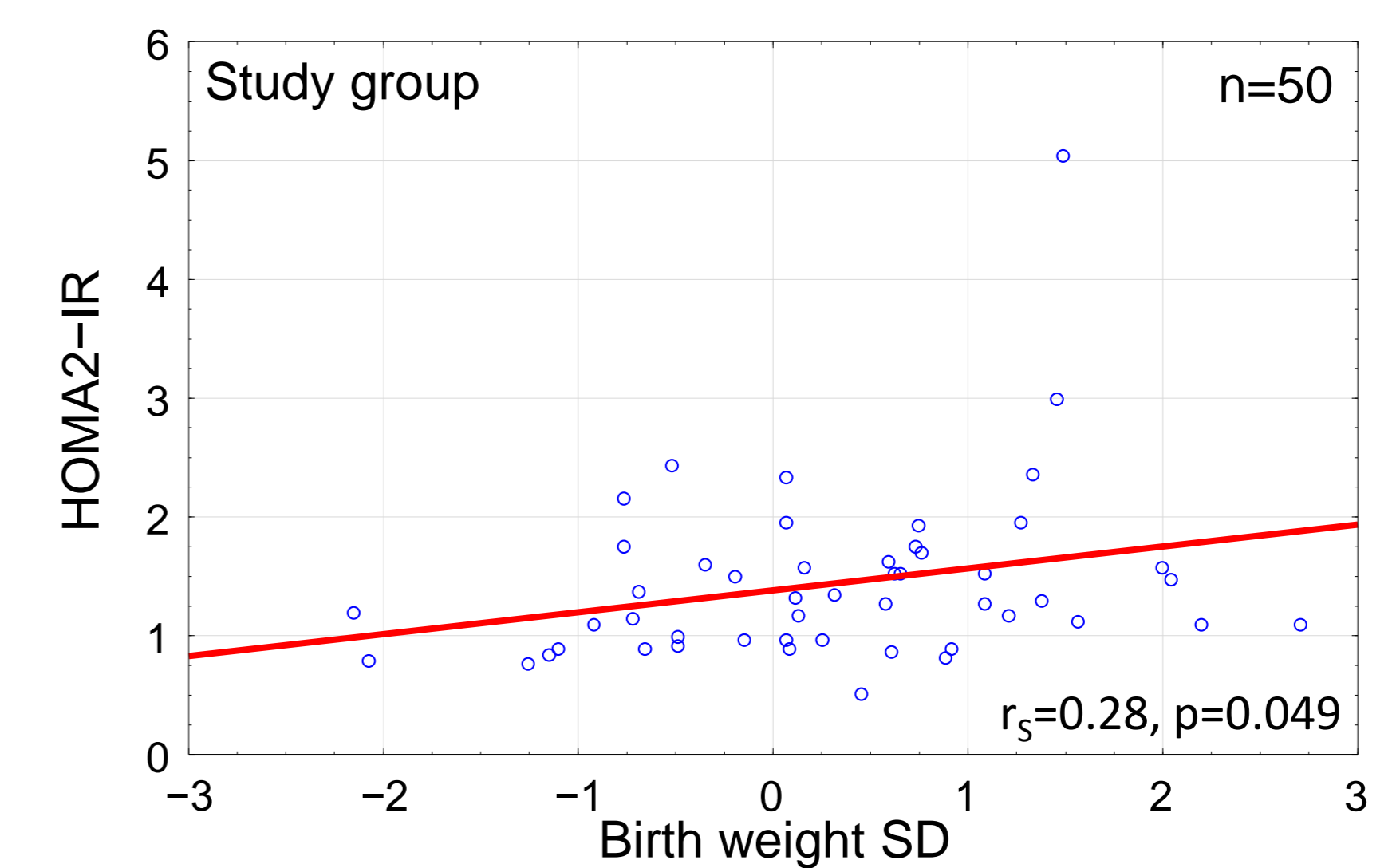


Fig. 3. Correlation of insulin resistance (HOMA2-IR) with birth weight SD in the study group.

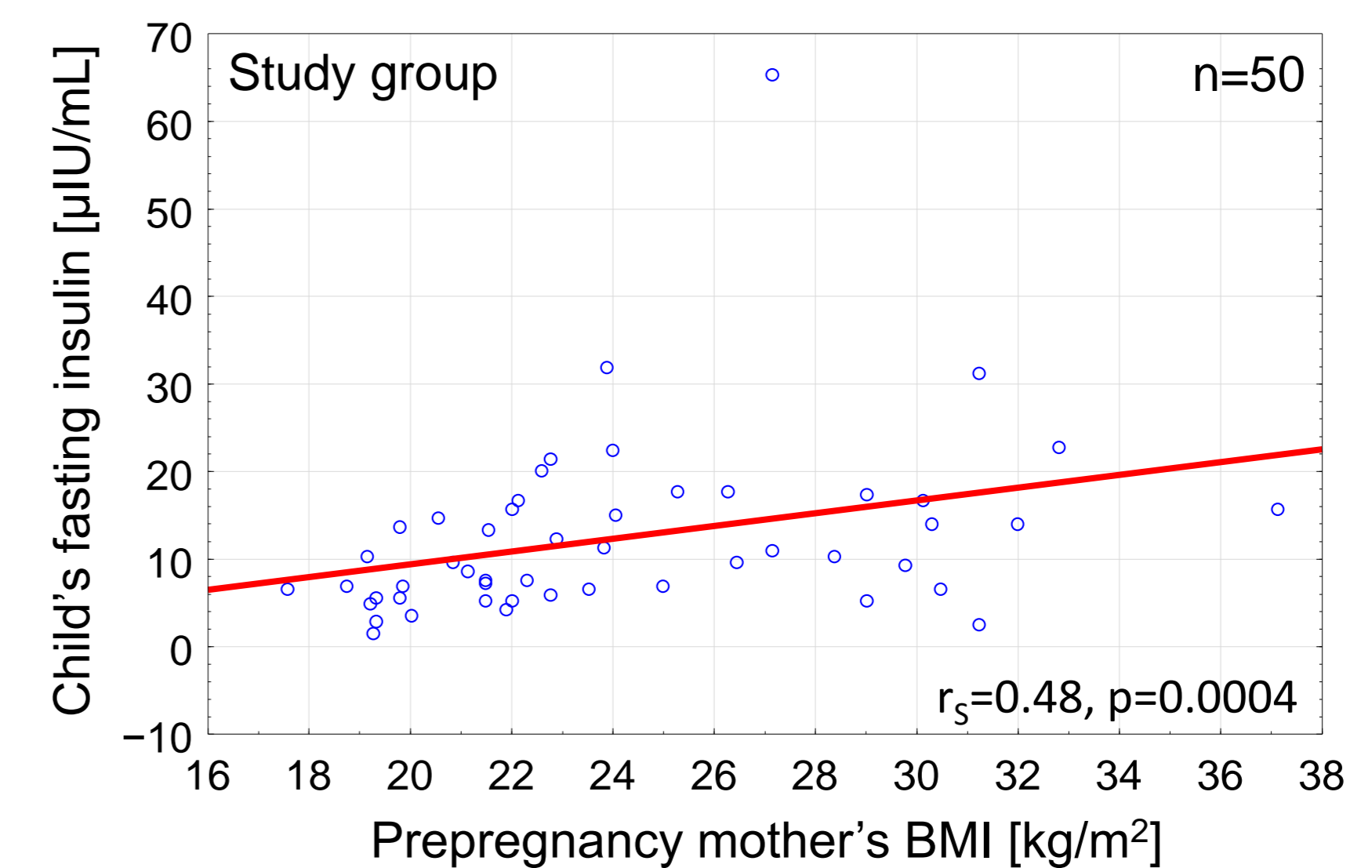


Fig. 4. Correlation of mean fasting insulin concentration with prepregnancy mother's BMI in the study group.

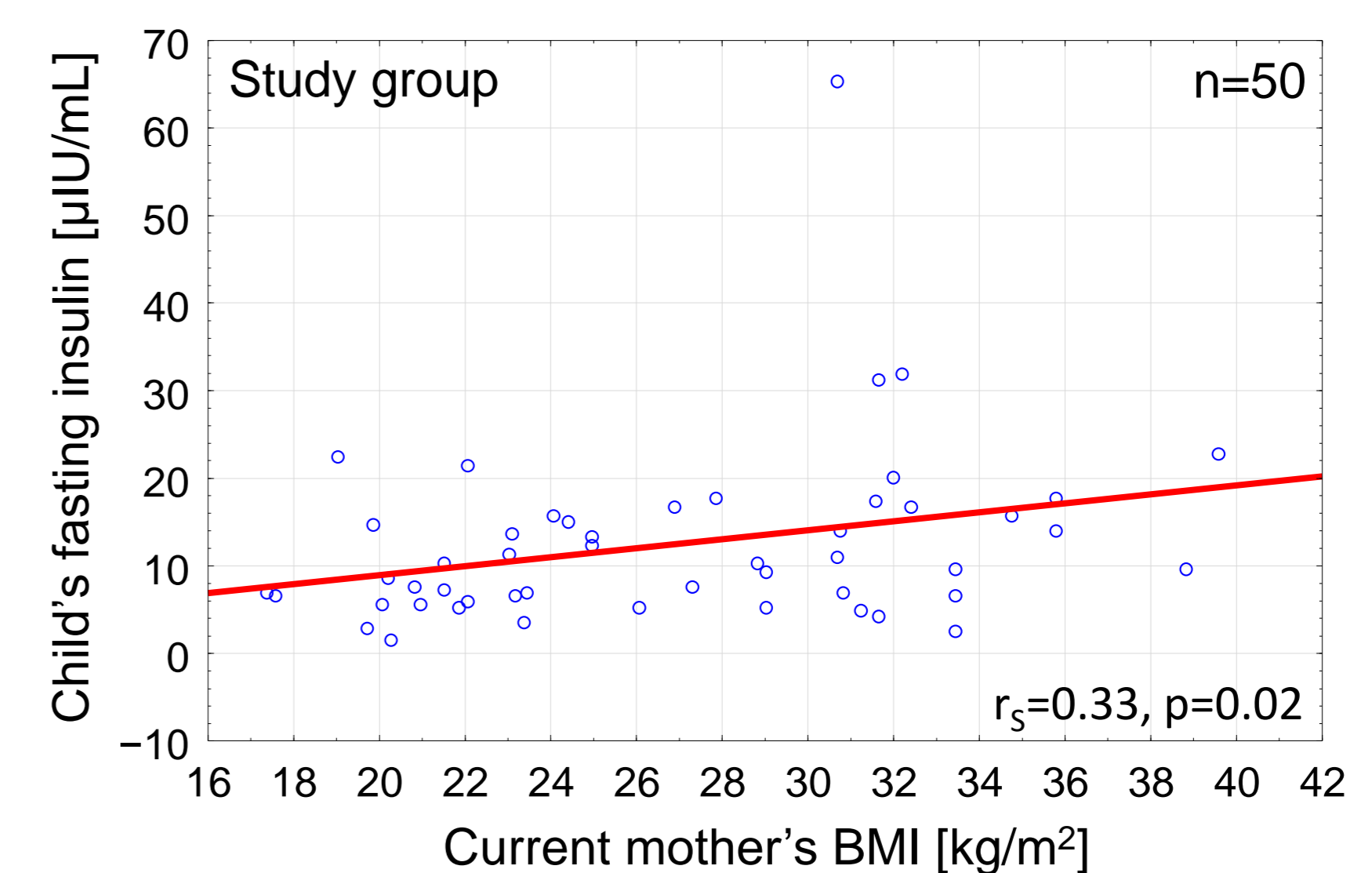


Fig. 5. Correlation of mean fasting insulin concentration with current mother's BMI in the study group.

Tab. 5. Correlations of insulin resistance (HOMA2-IR), insulin sensitivity (HOMA2-S) and β -cell function (HOMA2-B) with mother's prepregnancy and current BMI in the study group.

Feature	Pregpregnancy mother's BMI		Current mother's BMI	
	r_s	p-value	r_s	p-value
HOMA2-IR	0.48	0.0004	0.30	0.03
HOMA2-S	-0.48	0.0004	-0.30	0.03
HOMA2-B	0.44	0.001	0.30	0.04

CONCLUSION

Children exposed to gestational diabetes in utero, in spite of similar prevalence of overweight/obesity comparing to their non-exposed peers, could have higher risk of glucose intolerance and diabetes mellitus in future. Towards observed decreased insulin sensitivity and compensatory increase in insulin secretion, prevention of overweight and obesity in this group seems to be essential.

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CONFLICTS OF INTEREST: The authors confirm that this poster content has no conflicts of interest.

